National Aeronautics and Space Administration
Dryden Flight Research Center
Edwards Air Force Base, California

Environmental Restoration Program

Feasibility Study
Operable Unit 6

Final

August 2004

12 August 2004
EAFB-04-SJ-1220

National Aeronautics Space Administration
Dryden Flight Research Center
Safety, Health, and Environmental Office
Edwards AFB, CA 93523-0273

Attention: Mr. Dan Morgan

Contract No: F41624-00-D-8023
Task No.: 0042
CDRL: A044

Subject: **Feasibility Study, NASA Dryden Flight Research Center, Operable Unit 6, Edwards AFB, California, Final**

Dear Mr. Morgan:

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If you have any questions, please contact me at (661) 258-7720.

Very truly yours,

EARTH TECH, INC.

Todd Battey
Project Manager
Earth Tech USA Division

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12 August 2004
EAFB-04-SJ-1221

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Environmental Restoration Division
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Edwards AFB, CA 93524-8060

Attention: Mr. Tom Merendini

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Task No.: 0042
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Todd Battey
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Earth Tech USA Division

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12 August 2004
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U.S. Department of the Air Force
Center for Environmental Excellence
Installation Support, Air Force Materiel Command (AFCEE/ISM)
3300 Sidney Brooks
Brooks City-Base, TX 78235-5112

Attention: Mr. David Leeson

Contract No: F41624-00-D-8023
Task No.: 0042
CDRL: A044

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John O'Kane, DTSC	1
Sheryl Lauth, U.S. EPA	1
Peter Phillips, URS Corp.	1

Once the replacement pages have been inserted in the draft final document *Feasibility Study, Operable Unit 6, June 2004*, as instructed in the attachment, the document will be considered in Final form.

If you have any questions, please contact me at (661) 258-7720.

Very truly yours,

EARTH TECH, INC.

Todd Battey
Project Manager
Earth Tech USA Division

cc. AFCEE/MSCD
HSW/PKVBB

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EDWARDS AIR FORCE BASE, CALIFORNIA

12 August 2004

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2. A copy of the replacement packet has also been sent to Mr. Peter Phillips (URS).

3. If you have any questions or comments, please call Mr. Tom Merendini at (661) 277-1414.

DAVID E. STECKEL
Remedial Project Manager
Edwards AFB

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8. Replace page 1-5.
9. Replace page 4-25.
10. Replace page 4-38.
11. Replace page 5-1.
12. Replace Table 9-3.
13. Add "Responses to United State Environmental Protection Agency, Region IX and Department of Toxic Substances Control Comments, Environmental Restoration Program, Feasibility Study, Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California, Draft Final, June 2004" to the end of Appendix B.
14. Replace Appendix D (Tables D-1, D-2, D-3, and D-4).
15. Replace Appendix E (Tables E-1, E-2, and E-3).

ENVIRONMENTAL RESTORATION PROGRAM

FEASIBILITY STUDY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
DRYDEN FLIGHT RESEARCH CENTER
OPERABLE UNIT 6

EDWARDS AIR FORCE BASE
CALIFORNIA

FINAL

AUGUST 2004

Prepared for:

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DRYDEN FLIGHT RESEARCH CENTER
SAFETY, HEALTH, AND ENVIRONMENTAL OFFICE
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14. ABSTRACT
This feasibility study addresses identified contaminants that pose potential risks to human health and/or the environment at Sites N2, N3, and N7 at the National Aeronautics and Space Administration Dryden Flight Research Center, Edwards Air Force Base, California. Four alternatives were developed to satisfy the overall remedial action objective of reducing, to acceptable levels, the risk associated with the chemicals of concern identified during the remedial investigation.

Alternatives were evaluated against the following criteria: overall protectiveness of human health and the environment; compliance with applicable or relevant and appropriate requirements; long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; cost; regulatory agency acceptance; and community acceptance.

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a. REPORT	b. ABSTRACT	c. THIS PAGE			David Leeson
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This report was prepared for the United States Air Force by Earth Tech, Inc., for the purpose of aiding in the implementation of a final Record of Decision at Edwards Air Force Base (AFB) under the Air Force Environmental Restoration Program (ERP). Because the report relates to release of potentially hazardous substances, its release prior to an Air Force final decision on remedial action may be in the public's interest. The limited objectives of this report and the ongoing nature of the ERP, along with the evolving knowledge of site conditions and chemical effects on human health and the environment, must be considered when evaluating this report, because subsequent facts may become known that may make this report premature or inaccurate.

PREFACE

This feasibility study, prepared for the National Aeronautics and Space Administration Dryden Flight Research Center, Operable Unit 6 (OU6), Edwards Air Force Base, California, summarizes the backgrounds, plume characteristics, and remedial action alternatives for sites recommended for remedial action within OU6. This document has been prepared for the United States (U.S.) Air Force Center for Environmental Excellence according to the requirements of Contract Number F41624-00-D-8023, Task Order Number 42, between the U.S. Air Force and Earth Tech, Inc.

Approved:

Todd Battey, Operable Unit Manager
California R.G. No. 5348
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LIST OF ABBREVIATIONS AND ACRONYMS

3-D	three-dimensional
95 ABW/EM	95th Air Base Wing, Environmental Management Office
µg/L	micrograms per liter
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
AFCEE/ERD	Air Force Center for Environmental Excellence, Environmental Restoration Division
AFFTC	Air Force Flight Test Center
AFFTC/EMR	Air Force Flight Test Center, Environmental Restoration Division
AOC	area of concern
APU	auxiliary power unit
ARAR	applicable or relevant and appropriate requirement
Barbour	Barbour Well Surveying Corporation
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, xylenes
Cal/EPA	California Environmental Protection Agency
CCR	California Code of Regulations
C.E.G.	Certified Engineering Geologist
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
CRWQCB	California Regional Water Quality Control Board
DCA	dichloroethane
DCE	dichloroethene
DFRC	Dryden Flight Research Center
DNAPL	dense non-aqueous phase liquid
Dryden	NASA Dryden Flight Research Center
DTSC	Department of Toxic Substances Control
Earth Tech	Earth Tech, Inc.
EPA	Environmental Protection Agency
ERP	Environmental Restoration Program
FFA	Federal Facility Agreement
FS	feasibility study
ft/day	feet per day
ft^2/day	square feet per day
GIS	Geographic Information System
HB&A	Higginbotham/Briggs & Associates
HHRA	Human Health Risk Assessment
ID	identification
ISM	Installation Support, Air Force Materiel Command
J&E	Johnson and Ettinger
JP-4	jet fuel number 4

LIST OF ABBREVIATIONS AND ACRONYMS (Continued)

JP-5	jet fuel number 5
KCEHSD	Kern County Environmental Health Services Department
lbs	pounds
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NA	not applicable; not available
NASA	National Aeronautics and Space Administration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDMA	N-nitrosodimethylamine
NFI	no further investigation
ng/L	nanograms per liter
NPL	National Priorities List
OSHA	Occupational Safety and Health Administration
OU6	Operable Unit 6
PAH	polyaromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PERA	Predictive Ecological Risk Assessment
POTW	publicly-owned treatment works
ppb v/v	parts per billion volume per volume
ppm v/v	parts per million volume per volume
PPE	personal protective equipment
PRG	preliminary remediation goal
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
R.G.	Registered Geologist
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
ROD	record of decision
ROI	radius of influence
RPM	Remedial Project Manager
Rust	Rust Environment & Infrastructure
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act
SERA	Scoping Ecological Risk Assessment
SVE	soil vapor extraction
SVOC	semivolatile organic compound
TBC	to be considered
TCE	trichloroethene
TDS	total dissolved solids
TOC	total organic carbon

LIST OF ABBREVIATIONS AND ACRONYMS (Continued)

TPH	total petroleum hydrocarbon
TPHd	total petroleum hydrocarbon as diesel
TPHg	total petroleum hydrocarbon as gasoline
TS	treatability study
TVPH	total volatile petroleum hydrocarbons
U.S.	United States
U.S.C.	United States Code
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	underground storage tank
VOC	volatile organic compound

EXECUTIVE SUMMARY

This feasibility study (FS), prepared for the National Aeronautics and Space Administration (NASA) Dryden Flight Research Center (Dryden), Edwards Air Force Base (AFB), California, summarizes the backgrounds, plume characteristics, and remedial action alternatives evaluated for sites recommended for remedial action within Operable Unit 6 (OU6). This report includes preliminary cleanup goals, technical approach comparisons, and cost comparisons of applicable remedial alternatives. Sites in OU6 are not currently used for residential purposes, nor is such use anticipated; therefore, the FS focuses on industrial use considerations.

Following Edwards AFB's formal listing on the National Priorities List on 30 August 1990, the United States (U.S.) Air Force entered into a Federal Facility Agreement (FFA), which provides a procedural framework for developing, implementing, and monitoring response actions in accordance with applicable or relevant and appropriate requirements (ARARs). This FS was prepared under that framework and in accordance with the U.S. Environmental Protection Agency document *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (Comprehensive Environmental Response, Compensation, and Liability Act).

The *Operable Unit 6, Remedial Investigation (RI) Summary Report* (OU6 RI) summarizes investigation of 19 sites, identifies those sites requiring remedial action, and provides the primary source of information for this study. Based upon the results of the OU6 RI, the Remedial Project Managers (RPMs) approved a recommendation of no further investigation (NFI) for 16 of the 19 OU6 sites; the NFI letters are included in Appendix A. A 20th site, Area of Concern 351, has been designated as a petroleum-only site and has been removed from the CERCLA process. The three remaining active sites (N2, N3, and N7) were identified as the sources of a commingled volatile organic compound (VOC) plume. Remediation of this plume is the focus of the remedial alternatives presented in this FS.

Following a screening process, six sites (N1, N2, N3, N4, N7, and N14) were evaluated to identify the potential risk to human health associated with chemicals detected in soil and groundwater. All 19 OU6 sites were evaluated for potential risk to ecological receptors. Potential risks identified (based upon current land use) in the risk assessments were evaluated by the RPMs in risk management meetings and were deemed insignificant. Though VOC groundwater contamination comprising the commingled

plume associated with the three remaining active sites does not pose a risk to industrial receptors, CERCLA requires that remedial actions attain a degree of cleanup and control of hazardous substances that complies with ARARs. State Water Resources Control Board Resolution 68-16, and the potentially related drinking water standards (maximum contaminant levels), are the primary considerations for the study.

Additional OU6 RI information used in the development and evaluation of remedial alternatives include:

- The site is underlain by a relatively thin deposit of alluvium or colluvium, which is situated on top of granitic bedrock. The depth to groundwater at the site ranges from 7 feet below ground surface (bgs) to more than 20 feet bgs. The groundwater occurs within the fractured granitic bedrock.
- The groundwater plume was characterized based upon the primary contaminant of concern – trichloroethene (TCE). The approximate areal extent of the OU6 TCE plume is 50 acres. The approximate TCE product volume is 49 gallons (596 lbs).
- Groundwater monitoring results indicate that the plume has reached steady-state conditions and the rate of advance is approximately equal to the rate of attenuation.
- Treatability studies consisting of ex-situ treatment technologies: air sparging/soil vapor extraction and dual extraction (groundwater and soil vapor extraction) have been conducted at OU6 with limited reduction in TCE mass. Treatability studies involving Fenton-based reagent, permanganate, and persulfate in-situ chemical oxidation have indicated that these approaches yield more reductions in TCE mass than ex-situ treatment technologies.

Based upon the remedial action objective of reducing to acceptable levels (as defined in the FS) the risk associated with the chemicals of concern identified in the OU6 RI, five alternatives were developed and retained for detailed analysis:

- Alternative 1 — Access restrictions
- Alternative 2 — Groundwater Monitoring/Hydrologic Control (with access restrictions)
- Alternative 3 — Chemical Reaction (with access restrictions)
- Alternative 4 — Source Control and Hydrologic Control with Groundwater Monitoring (with access restrictions)
- Alternative 5 — No action

These five alternatives were assessed based on the following criteria, subcriteria, factors, and considerations:

- Overall protection of human health and the environment
- Compliance with ARARs and To Be Considered (TBC) criteria

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability (includes feasibility and availability of services and materials)
- Cost

Cost Summary

The estimated total present value for each of the five alternatives are as follows:

- Alternative 1: Access Restrictions – $125,600
- Alternative 2: Groundwater Monitoring/Hydrologic Control – $1,342,500
- Alternative 3: Chemical Reaction – $71,458,900
- Alternative 4: Source Control and Hydrologic Control with Groundwater Monitoring – $1,905,800
- Alternative 5: No Action – $0

Comparative Analysis

Each alternative is evaluated against criteria of effectiveness, implementability, acceptance and cost using a five-tiered scale (poor, fair, good, very good, and excellent) as detailed in Table ES-1.

Recommended Remedial Alternative

Based on the screening of alternatives, evaluation and comparative analysis of retained alternatives, and the intended industrial use of Dryden, *Source Control and Hydrologic Control with Groundwater Monitoring* (Alternative 4) is recommended as the preferred alternative for the Proposed Plan. The alternative is protective of human health and the environment. This alternative consists of the following:

- In-situ chemical reaction of the plume source area using permanganate.
- The natural dispersion and dilution of residual contaminants to effectively reduce contaminants to levels below those specified by drinking water standards.
- Management of the Edwards AFB Geographic Information System as it relates to the extent of contamination at the site (as part of a Base-wide program). This information, in addition to well location data, is used to control site activities (such as excavation) and/or determine proper protective equipment to be employed during intrusive activities.
- Long-term monitoring of groundwater within the plume and at the leading edge.
- Five-year reviews and associated data acquisition through groundwater sampling. Supporting documentation, including groundwater monitoring results and modeling predictions, is used to evaluate progress toward reducing concentrations to cleanup levels.

TABLE ES-1. ALTERNATIVE EVALUATION SUMMARY

	Criteria	Alternative 1: Access Restrict.	Alternative 2: Groundwater Monitoring/ Hydrologic Control	Alternative 3: Chemical Reaction	Alternative 4: Source Control and Hydrologic Control with Groundwater Monitoring	Alternative 5: No Action
Threshold Factors	Overall Protectiveness of Human Health/Environment -Factor requirements "Met" if Protective -Factor requirements "Not Met" if not Protective	Met	Met	Met	Met	Met
	Compliance with ARARs and TBCs -Factor requirements "Met" if compliant -Factor requirements "Not Met" if not compliant	Not Met	Not Met	Met	Met[1]	Not Met
Primary Balancing Factors	Long-Term Effectiveness and Permanence Excellent if Highly Effective Poor if Not Effective	Very Good	Very Good	Excellent	Very Good	Very Good
	Reduction of Toxicity, Mobility, or Volume Through Treatment Excellent if Reduces all Contaminants Poor if No Reduction	Poor	Poor	Excellent	Very Good	Poor
	Short-Term Effectiveness Excellent if Highly Effective Poor if Not Effective	Very Good	Good	Good	Good	Excellent
	Implementability Excellent if Highly Feasible and Available Poor if Not Feasible and Available	Excellent	Excellent	Good	Very Good	Excellent
	Present Value Excellent if < $5,000,000 $10,000,000 > Very Good if > $5,000,000 $15,000,000 > Good if > $10,000,000 $20,000,000 > Fair if > $15,000,000 Poor if > $20,000,000	Excellent	Excellent	Poor	Excellent	Excellent
Modifying Considerations	Regulatory Agency Acceptance Very Good if Highly Acceptable Poor if Not Acceptable	Good	Good	Very Good	Very Good	Poor
	Public Acceptance[2] Very Good if Highly Acceptable Poor if Not Acceptable	Fair	Very Good	Good	Very Good	Poor

Notes:

The scale, from lowest to highest, is: Poor, Fair, Good, Very Good, Excellent.
Text Sections 9.4.1 through 9.4.5 contain descriptive comparative analyses of the alternatives.
[1] Over an extended period.
[2] Public acceptance is projected and comments will be solicited in the Proposed Plan.

ARAR = applicable or relevant and appropriate requirement
TBC = to be considered

.

The Base's General Plan specifies that Dryden will continue to be used for industrial purposes, which limits the potential completion of human exposure pathways. Additionally, groundwater monitoring results (quarterly since 1992 and then semiannually starting in 1996) indicate that the commingled plume is essentially contained and has reached steady-state conditions - the rate of advance approximately equals the rate of attenuation. This further mitigates potential risk to human receptors and potential degradation of beneficial use water supplies.

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1.0 INTRODUCTION

This feasibility study (FS), prepared for the National Aeronautics and Space Administration (NASA) Dryden Flight Research Center (Dryden), Edwards Air Force Base (AFB), California, summarizes the backgrounds, plume characteristics, and remedial action alternatives for sites recommended for remedial action at Dryden (designated as Operable Unit 6 [OU6]). The relative locations of Edwards AFB and OU6 are shown on Figure 1-1 and the OU6 sites are shown on Figure 1-2. The extent of the trichloroethene (TCE) plume is shown on Figure 1-3.

Following Edwards AFB's formal listing on the National Priorities List (NPL) on 30 August 1990, the United States (U.S.) Air Force entered into a Federal Facility Agreement (FFA) with the U.S. Environmental Protection Agency (U.S. EPA), Region IX; the California EPA (Cal/EPA) Department of Toxic Substances Control (DTSC); and the California Regional Water Quality Control Board (RWQCB), Lahontan Region. The FFA establishes the process for involving federal and state regulatory agencies and the public in the Edwards AFB remedial response process. It provides a procedural framework for developing, implementing, and monitoring response actions at Edwards AFB in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the Superfund Amendments and Reauthorization Act of 1986 (SARA); the National Oil and Hazardous Substances Pollution Contingency Plan (NCP); pertinent provisions of the Resource Conservation and Recovery Act (RCRA) statute; and applicable state and local laws. This FS was prepared under that framework and in accordance with the U.S. EPA document *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (U.S. EPA, 1988) to identify, evaluate, and select remedial action alternatives under CERCLA. The *Operable Unit 6 Remedial Investigation (RI) Summary Report* (OU6 RI) (Earth Tech, 2000a) summarizes the investigation of 19 Dryden sites, identifies those sites requiring remedial action, and provides the primary source of information for this study.

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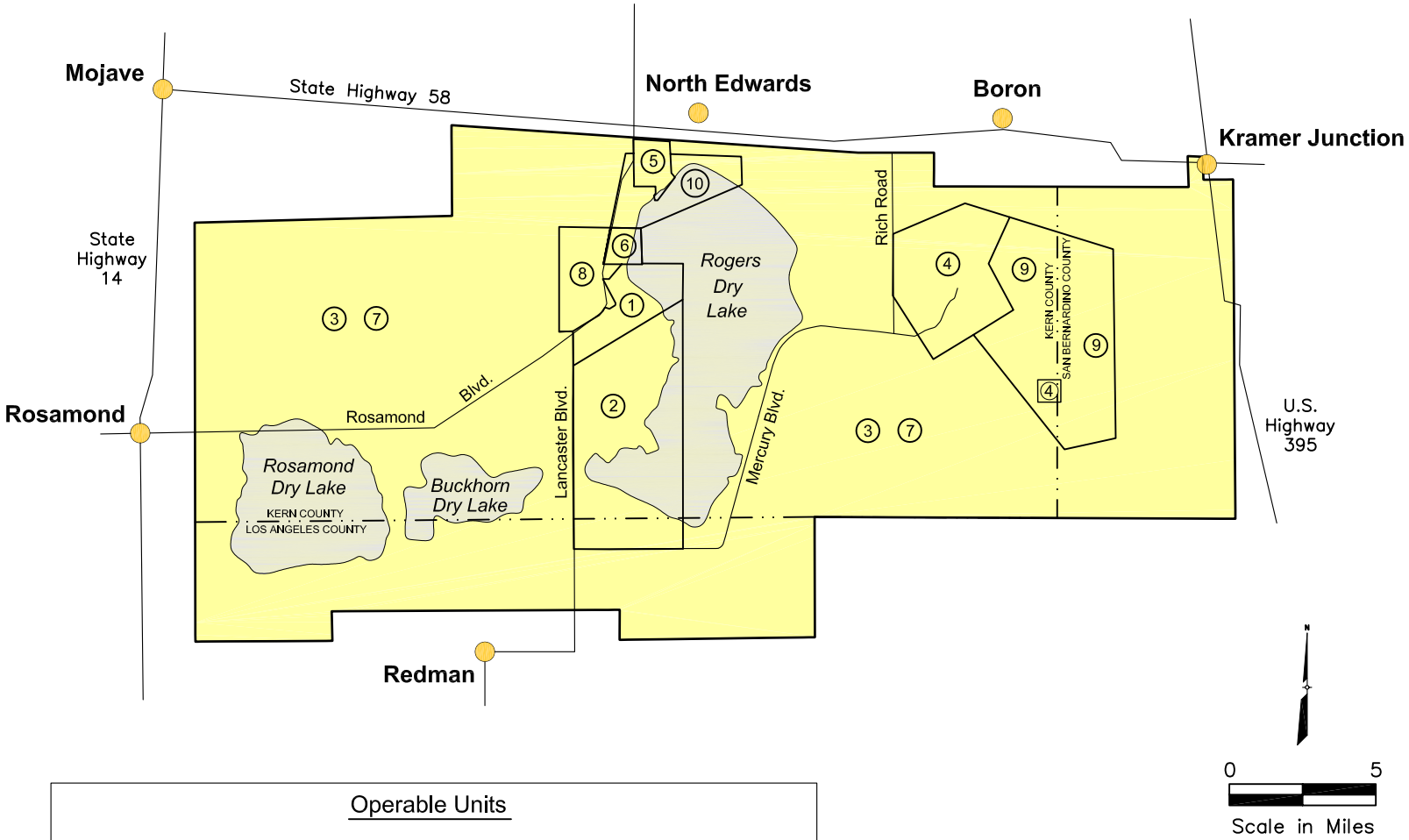

Operable Units

1. Main Base Flightline
2. South Base
3. Basewide Water Wells
4. Air Force Research Laboratory
5. Occupied North Base
6. NASA Dryden
7. Basewide Miscellaneous
8. Northwest Main Base
9. Air Force Research Laboratory-East
10. Unoccupied North Base

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Operable Unit Location Map

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure 1-1
Project No. 54212		

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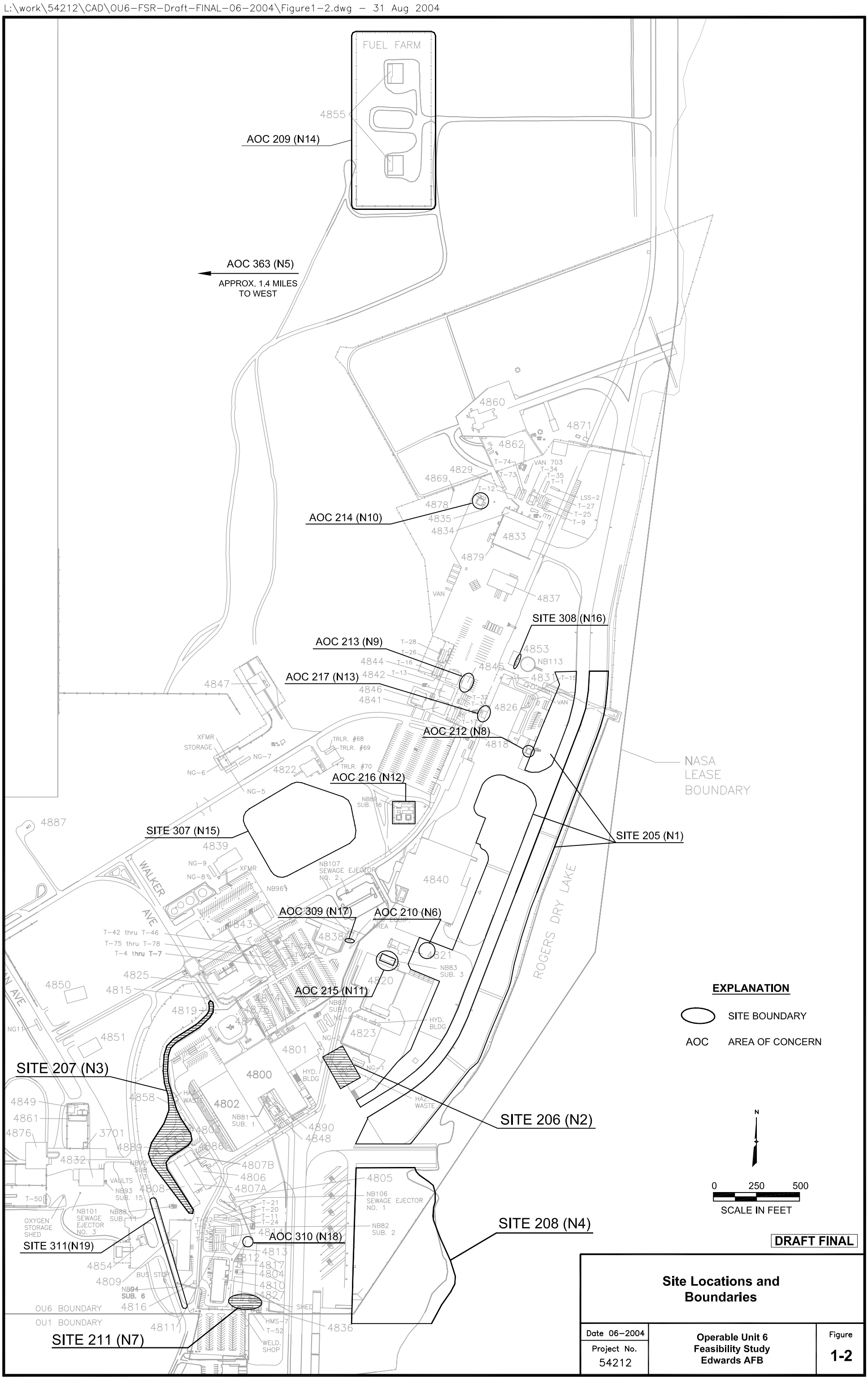

Site Locations and Boundaries

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure 1-2
Project No. 54212		

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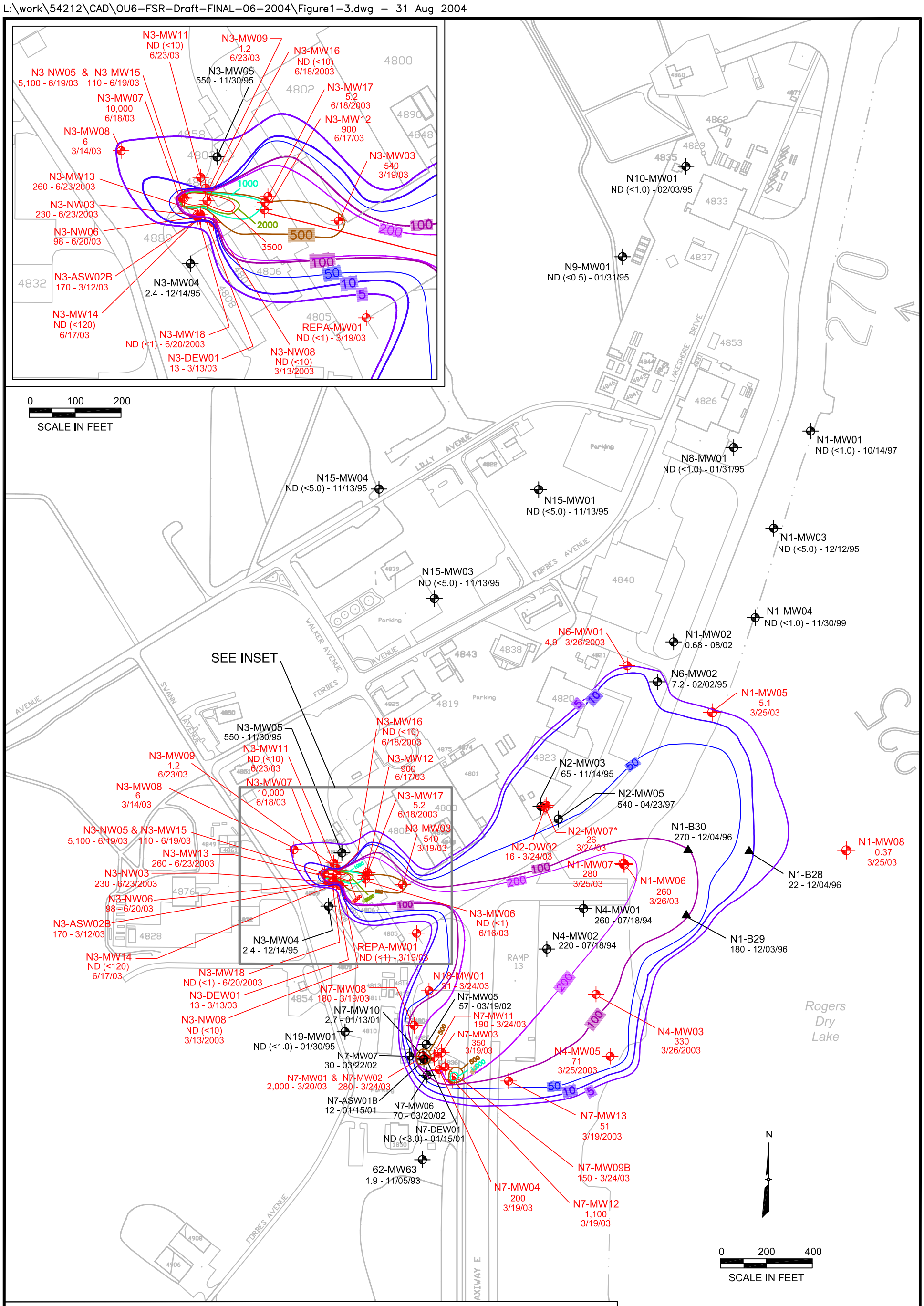

EXPLANATION

N7-MW01 2,000 - 3/20/03 — MONITORING WELL SAMPLED DURING MARCH 2003 SAMPLING EVENT (JUNE 2003 TREATABILITY STUDY DATA INCLUDED WHERE AVAILABLE)

N8-MW01 ND (<1.0) - 01/31/95 — MONITORING WELL SAMPLED DURING PREVIOUS EVENTS

ND — NOT DETECTED

N1-B28 22 — BOREHOLE (GRAB GROUNDWATER SAMPLE)

2000 — TRICHLOROETHENE (TCE) CONCENTRATION CONTOUR (INTERVALS = 5, 10, 50, 100, 200, 500, 1,000, 2,000, 3,500) ALL CONCENTRATIONS SHOWN AS MICROGRAMS PER LITER (µg/L)

DRAFT FINAL

TCE Groundwater Concentration Contours

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure 1-3
Project No. 54212		

1.1 REPORT PURPOSE AND ORGANIZATION

This report is intended to present the results of the complete FS process and contains the following sections:

- Introduction – Summarizes regulatory framework, site status in the remedial investigation/feasibility study (RI/FS) process, site assessment summary, FS objectives, facility description, and environmental setting.
- Groundwater Modeling – Provides a summary of the modeling process and results.
- Risk Assessment Approach – Provides an overview of the risk assessment process.
- Site Summaries – Includes histories, remedial activity descriptions, nature and extent of contamination, and risk assessment summaries for each site.
- Identification of Remedial Action Objectives and Regulatory Requirements – Describes the remedial action objectives (RAOs) and the applicable or relevant and appropriate requirements (ARARs) selection process.
- Feasibility Study Details – Describes the remedial action alternatives and provides a comparative analysis of these alternatives.

1.2 DRYDEN STATUS

Based upon the results of the OU6 RI, 16 out of 19 sites were designated as *Category 1* (no further investigation [NFI] is recommended). These sites were recommended for NFI because soil and groundwater data were sufficient to characterize the sites and screening levels were not exceeded. The sites included NASA Sites/Areas of Concern (AOCs) N1, N4, N5, N6, N8, N9, N10, N11, N12, N13, N14, N15, N16, N17, N18, and N19 (Environmental Restoration Program [ERP] designation 205, 208, 363, 210, 212 to 217, 209, and 307 to 311). The Remedial Project Managers (RPMs) concurred with the NFI recommendation for these sites. An additional AOC, AOC 351, was not identified in the OU6 RI; however, it lies within the OU6 boundary as the 20th site. AOC 351 was designated as a petroleum-only site and is overseen by the Kern County Environmental Health Services Department (KCEHSD) and the California RWQCB, Lahontan Region. The RPMs have removed this AOC from the CERCLA process and from consideration in all future ERP reports (Appendix A). Site investigation activities are considered complete and no sites were designated as *Category 2* (further evaluation is required).

Six sites (N1, N2, N3, N4, N7, and N14) were evaluated to identify the potential risk to human health, associated with potential exposure to chemicals detected in soil and groundwater during RI activities,

using the procedures detailed in the *Human Health Risk Assessment* (HHRA) (Earth Tech, 2003a). Nineteen sites (AOC 351 was not included) were evaluated for potential exposure pathways to ecological receptors as detailed in the *Phase I Scoping Ecological Risk Assessment* (SERA) (United States Geological Survey [USGS], 2003a), and three of those sites (N1, N4, and N14) were further evaluated for potential risk to ecological receptors as detailed in the *Predictive Ecological Risk Assessment* (PERA) (USGS, 2003b). An overview of the site assessment process results and site designations is presented in Table 1-1. The risk assessment approach is presented in Section 3.0. This FS, as part of the remedial response process, addresses three sites identified as *Category 3* (remedial action is recommended or remediation is currently ongoing) in the OU6 RI:

- Site N2 (ERP Site 206)
- Site N3 (ERP Site 207)
- Site N7 (ERP Site 211)

1.3 FEASIBILITY STUDY OBJECTIVE

The NCP defines *remedial action* as "those actions consistent with permanent remedy taken instead of, or in addition to, removal action in the event of a release or threatened release of a hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment" (40 Code of Federal Regulations [CFR] 300.5). The NCP requires an FS to evaluate alternatives to the extent necessary to select a final remedy. The FS is a flexible document that is adapted to the scope, goals, and objectives of the particular remedial action. As part of the remedial action process, the FS provides the framework to identify a final remedy that is consistent with the RAOs and analyze alternatives that might achieve these objectives.

The FS is also a vehicle for public involvement, wherein the 95th Air Base Wing, Environmental Management Office (95 ABW/EM) (formerly the U.S. Air Force Flight Test Center, Environmental Restoration Division [AFFTC/EMR]) will solicit input from the nearby community in the Proposed Plan. Input from regulators has been solicited and integrated into this version of the document (Appendix B). After considering public and regulatory comments on the FS, 95 ABW/EM will select the best remedial action alternative for each site and document that selection in the Proposed Plan. The administrative record for this activity is available to the public at 95 ABW/EM,

TABLE 1-1. SITE ASSESSMENT PROCESS OVERVIEW

NASA Site ID	ERP AOC/ Site ID	OU6 RI Recommendation	HHRA Industrial Scenario Cancer Risk > 1 x 10^{-6}	HHRA Industrial Scenario Hazard Index > 1	Pre-SERA and SERA Results	PERA Results	Summary	Status	Feasibility Study Target Medium
N1	205	Category 1	Soil and Groundwater	Soil	PERA Recommended	Potential risk from COPECs in soil, surface water, and groundwater	Human health risks calculated for COPC concentrations in soil and groundwater are mitigated by the location of the detections. The areas of positive detection are not coincidental to routine industrial activities. Exposure is not likely to occur and the actual risks to receptors are likely to be significantly lower than the estimates. Risks calculated for COPEC concentrations in soil, surface water, and groundwater are, in many instances, of limited ecological significance. The remaining calculated risks are of moderate ecological significance and are mitigated by the existence of low quality habitat (for all receptors) due to proximity to industrial processes and related development. Physical disturbance to the habitat quality is related to high traffic resulting from ongoing industrial processes. Additionally, no threatened or endangered plants, invertebrates, birds, reptiles, or mammals have been reported at the site. Site N1 was removed from the RI/FS process with regard to soil, surface water, and groundwater inorganic COPCs and COPECs per RPM risk management decisions (Appendix A). The organic COPCs exceeding MCLs will be addressed at Site N2.	No Action Required for Soil, Surface Water, and Inorganic Groundwater COPCs and COPECs	Organic COPCs in groundwater to be addressed at source Site N2
N2	206	Category 3	Soil	Soil	No Significant Risk	Not Performed	Site N2 was removed from the RI/FS process with regard to soil COPCs per RPM risk management decision (Appendix A). Groundwater COPC concentrations exceeding MCLs require remedial action.	Feasibility Study	Groundwater
N3	207	Category 3	Soil	Soil	No Significant Risk	Not Performed	Site N3 was removed from the RI/FS process with regard to soil COPCs per RPM risk management decision (Appendix A). Groundwater COPC concentrations exceeding MCLs require remedial action.	Feasibility Study	Groundwater
N4	208	Category 1	Soil	No	PERA Recommended	Potential risk from COPECs in soil and groundwater	Human health risks calculated for COPC concentrations in soil and groundwater are mitigated by the location of the detections. The areas of positive detection are not coincidental to routine industrial activities. Exposure is not likely to occur and the actual risks to receptors are likely to be significantly lower than the estimates. Risks calculated for COPEC concentrations in soil and groundwater are, in many instances, of limited ecological significance. The remaining calculated risks are of moderate ecological significance and are mitigated by the existence of low quality habitat (for all receptors) due to proximity to industrial processes and related development. Physical disturbance to the habitat quality is related to high traffic resulting from ongoing industrial processes. Additionally, no threatened or endangered plants, invertebrates, birds, reptiles, or mammals have been reported at the site. Site N4 was removed from the RI/FS process with regard to soil and groundwater inorganic COPCs and COPECs per RPM risk management decisions (Appendix A). The organic COPCs exceeding MCLs will be addressed at Site N7.	No Action Required for Soil and Inorganic Groundwater COPCs and COPECs	Organic COPCs in groundwater to be addressed at source Site N7
N5	363	Category 1	Not Performed	Not Performed	No Significant Risk	Not Performed	Potential or actual release was from a petroleum-only source. The KCEHSD and the CRWQCB-Lahontan Region oversaw the restoration, where required, of this AOC. The Air Force removed this AOC from the CERCLA process and from consideration in all future ERP reports.	No Further Investigation	None
N6	210	Category 1	Not Performed	Not Performed	No Significant Risk	Not Performed	--	No Further Investigation	None
N7	211	Category 3	Soil	No	No Significant Risk	Not Performed	Site N7 was removed from the RI/FS process with regard to soil COPCs per RPM risk management decision (Appendix A). Groundwater COPC concentrations exceeding MCLs require remedial action.	Feasibility Study	Groundwater
N8	212	Category 1	Not Performed	Not Performed	No Significant Risk	Not Performed	--	No Further Investigation	None
N9	213	Category 1	Not Performed	Not Performed	No Significant Risk	Not Performed	--	No Further Investigation	None
N10	214	Category 1	Not Performed	Not Performed	No Significant Risk	Not Performed	--	No Further Investigation	None
N11	215	Category 1	Not Performed	Not Performed	No Significant Risk	Not Performed	--	No Further Investigation	None
N12	216	Category 1	Not Performed	Not Performed	No Significant Risk	Not Performed	--	No Further Investigation	None
N13	217	Category 1	Not Performed	Not Performed	No Significant Risk	Not Performed	--	No Further Investigation	None
N14	209	Category 1	No	No	PERA Recommended	No Significant Risk	--	No Further Investigation	None
N15	307	Category 1	Not Performed	Not Performed	No Significant Risk	Not Performed	--	No Further Investigation	None
N16	308	Category 1	Not Performed	Not Performed	No Significant Risk	Not Performed	Potential or actual release was from a petroleum-only source. The KCEHSD and the CRWQCB-Lahontan Region oversaw the restoration, where required, of this AOC. The Air Force removed this AOC from the CERCLA process and from consideration in all future ERP reports.	No Further Investigation	None
N17	309	Category 1	Not Performed	Not Performed	No Significant Risk	Not Performed	Potential or actual release was from a petroleum-only source. The KCEHSD and the CRWQCB-Lahontan Region oversaw the restoration, where required, of this AOC. The Air Force removed this AOC from the CERCLA process and from consideration in all future ERP reports.	No Further Investigation	None
N18	310	Category 1	Not Performed	Not Performed	No Significant Risk	Not Performed	--	No Further Investigation	None
N19	311	Category 1	Not Performed	Not Performed	No Significant Risk	Not Performed	--	No Further Investigation	None
NA	351	NA	Not Performed	Not Performed	Not Performed	Not Performed	Potential or actual release was from a petroleum-only source. The KCEHSD and the CRWQCB-Lahontan Region oversaw the restoration, where required, of this AOC. The Air Force removed this AOC from the CERCLA process and from consideration in all future ERP reports.	No Further Investigation	None

Notes:

Category 1 = no further investigation
Category 3 = remedial action recommended
AOC = Area of Concern
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
COPC = chemical of potential concern
COPEC = chemical of potential ecological concern
CRWQCB = California Regional Water Quality Control Board
ERP = Environmental Restoration Program
HHRA = human health risk assessment
ID = identification
KCEHSD = Kern County Environmental Health Services Department
MCL = maximum contaminant level
NA = not applicable
NASA = National Aeronautics and Space Administration
OU6 = Operable Unit 6
PERA = predictive ecological risk assessment
RI = remedial investigation
RI/FS = remedial investigation/feasibility study
RPM = Remedial Project Manager
SERA = scoping ecological risk assessment

5 East Popson Avenue, Edwards AFB, California 93524-8060. The public may review documents in the administrative record by contacting Mr. Gary Hatch, Chief, Environmental Public Affairs, at (661) 277-1454.

1.4 FACILITY DESCRIPTION

Edwards AFB is located approximately 60 miles north-northeast of Los Angeles, California. The Base occupies approximately 470 square miles of high desert, including all of the Rogers, Buckhorn, and Rosamond dry lake beds. Originally activated as the Muroc Army Air Field during World War II, the Base was later renamed for Captain Glen W. Edwards, a test pilot killed in the crash of an experimental bomber, the YB-49 Flying Wing. The original primary mission of the Base was for experimental aviation, and it continues to serve the function of aviation development through experimental and test flight activities.

The Base is presently operated by the Air Force Flight Test Center (AFFTC), which is the Air Force Materiel Command center of excellence for research, development, and test and evaluation of aerospace systems for the United States and its allies. The AFFTC also operates the U.S. Air Force Test Pilot School and supports non-military government agencies. The combat, combat support, and training capabilities of most of the Air Force's weapons systems were first proven at Edwards AFB, giving AFFTC a direct, tangible link to each of the Air Force's core competencies. The following major tenant organizations currently occupy portions of the base:

- Air Force Research Laboratory Propulsion Directorate
- 18th Space Surveillance Squadron (Air Force Space Command)
- 31st Test and Evaluation Squadron (Air Combat Command)
- Air Force Operational Test and Evaluation Center, Detachment 5
- Studies and Analysis Squadron, Detachment 1 (Air Education and Training Command)
- NASA Dryden Flight Research Center
- Marine Aircraft Group 46, Detachment Bravo

1.5 ENVIRONMENTAL SETTING

The environmental setting for Dryden has been detailed in the OU6 RI (Earth Tech, 2000a). The environmental setting includes the area geology, water supply characteristics, hydrogeology,

topography, surface drainage characteristics, climate, vegetation, wildlife, and demographics. Additional hydrogeological information is included in Appendix C.

2.0 AQUIFER CHARACTERIZATION

2.1 GROUNDWATER MONITORING PROGRAM

The current OU6 groundwater monitoring program commenced in late 1996. Previous sampling events are summarized in Table 2-1.

TABLE 2-1. SUMMARY OF DRYDEN GROUNDWATER SAMPLING EVENTS

Event	Date	Site
Former quarterly groundwater monitoring program	May 1992	N3
Remedial invest. Initial sampling of 42 Environmental Restoration Program wells	Winter 1995	OU6
1st through 14th Semiannual Groundwater Monitoring Events	September 1996 through March 2003	OU6
Pilot studies. Initial sampling of 20 additional Environmental Restoration Program wells installed in 1997	1997	Sites N2, N3, and N7
Initial sampling of well N3-MW12	September 1998	Site N3

2.1.1 GROUNDWATER CHARACTERISTICS

2.1.1.1 Dissolved Oxygen

In addition to other water parameters collected during each groundwater monitoring event, dissolved oxygen is measured and recorded. Historic field measurement results for dissolved oxygen have indicated that the average dissolved oxygen content significantly exceeds 1 milligrams per liter (mg/L), substantiating that aquifer conditions within the Dryden plume are aerobic.

2.1.1.2 Groundwater and Contaminant Movement

TCE concentration contours were generated based upon historical groundwater monitoring results (Figures 2-1, 2-2, 2-3, 2-4).

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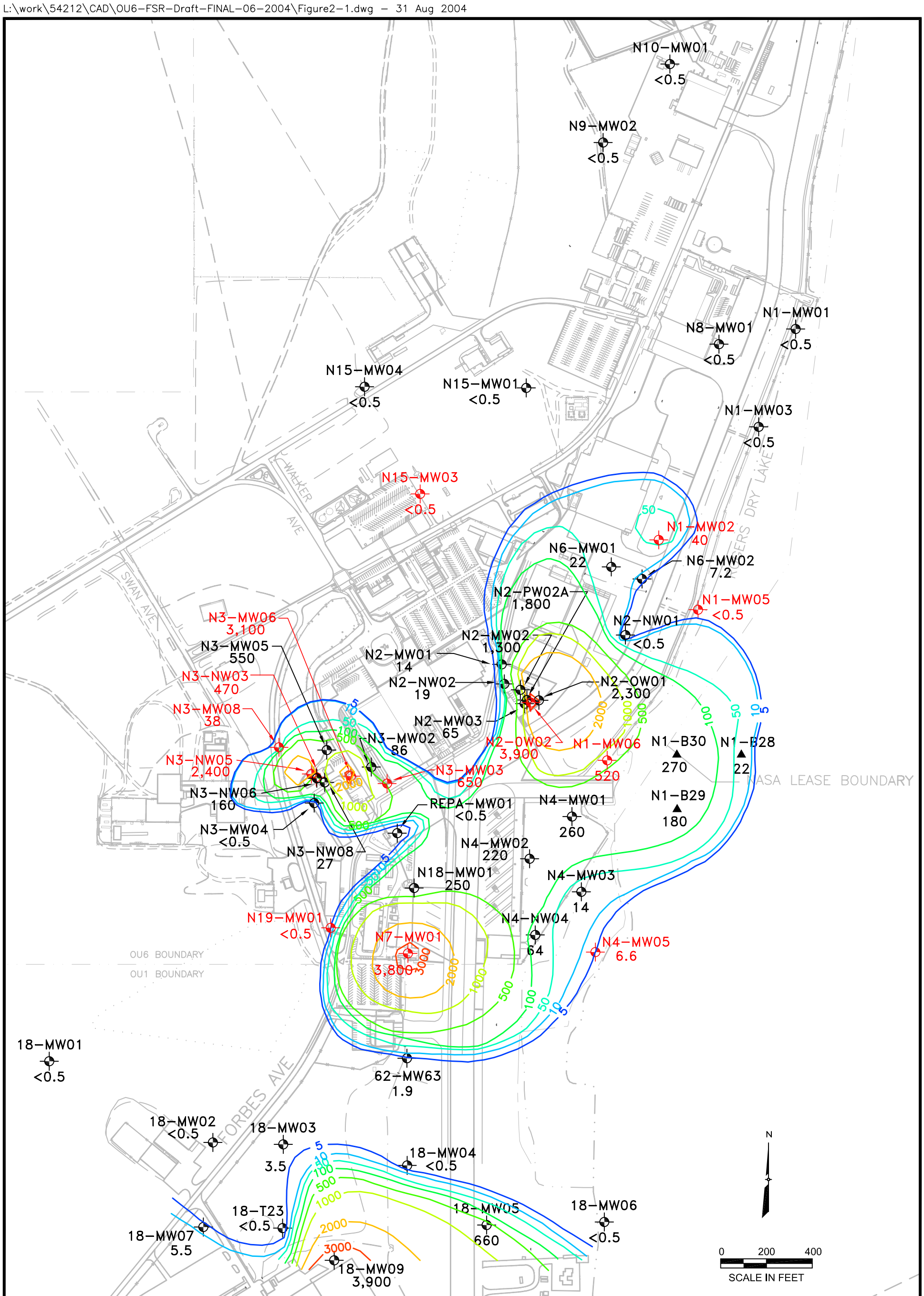

EXPLANATION

N7-MW01 3,800 — MONITORING WELL SAMPLED DURING SEPTEMBER AND OCTOBER 1996 SAMPLING EVENTS

18-MW01 <0.5 — MONITORING WELL SAMPLED DURING PREVIOUS EVENTS

N1-B30 270 — BOREHOLE (GRAB GROUNDWATER SAMPLE)

2000 — TRICHLOROETHENE (TCE) CONCENTRATION CONTOUR (INTERVALS = 5, 10, 50, 100, 200, 500, 1,000, 2,000, 3,000)

ALL CONCENTRATIONS SHOWN AS MICROGRAMS PER LITER (µg/L)

DRAFT FINAL

TCE Groundwater Concentration Contours September and October 1996

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure
Project No. 54212		2-1

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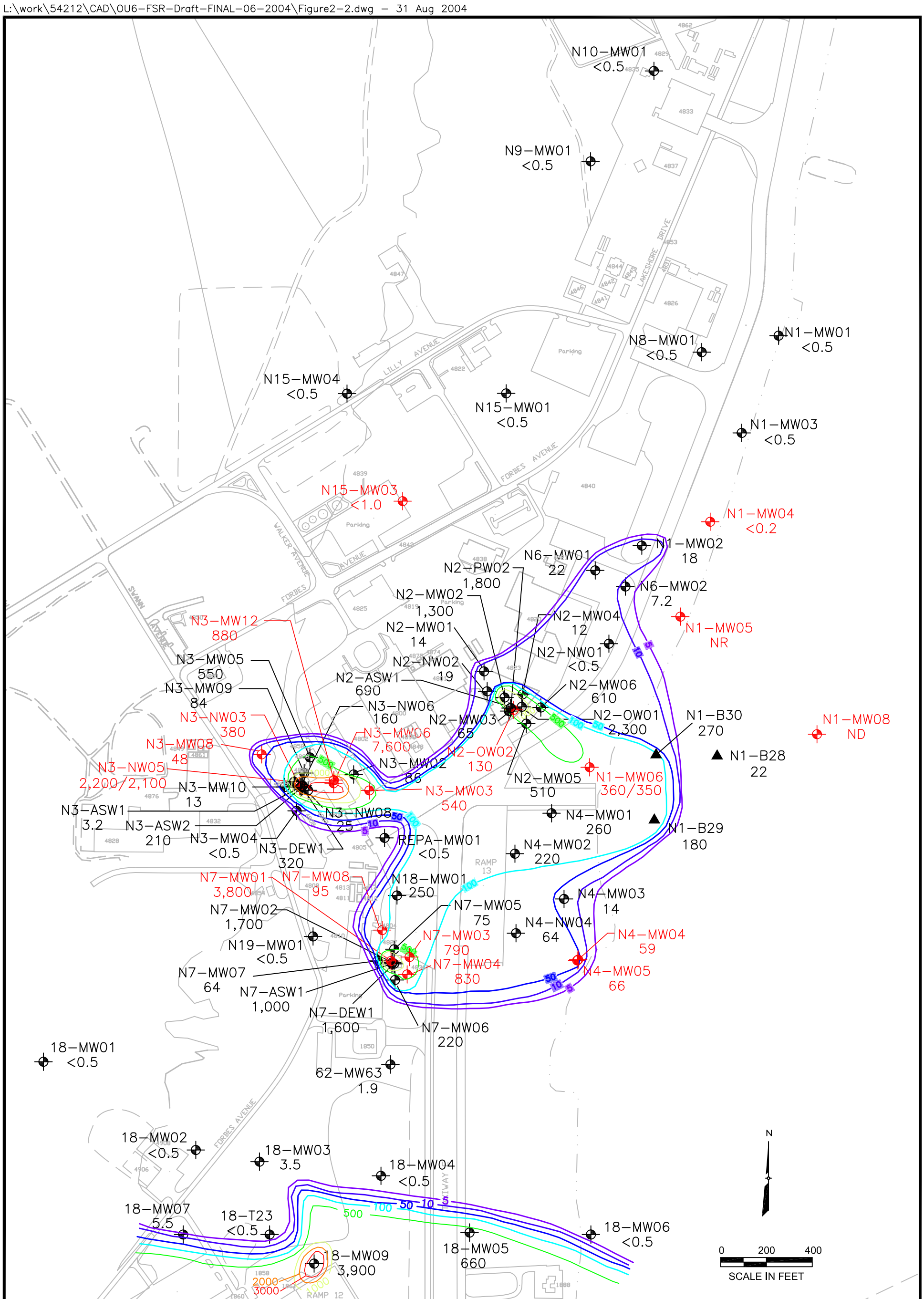

EXPLANATION

N7-MW01 3,800 — MONITORING WELL SAMPLED DURING OCTOBER 1998 SAMPLING EVENT

18-MW01 <0.5 — MONITORING WELL SAMPLED DURING PREVIOUS EVENTS

N1-B28 22 — BOREHOLE (GRAB GROUNDWATER SAMPLE)

2000 — TRICHLOROETHENE (TCE) CONCENTRATION CONTOUR (INTERVALS = 5, 10, 50, 100, 500, 1,000, 2,000, 3,000)

ALL CONCENTRATIONS SHOWN AS MICROGRAMS PER LITER (µg/L)

DRAFT FINAL

TCE Groundwater Concentration Contours October 1998

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure 2-2
Project No. 54212		

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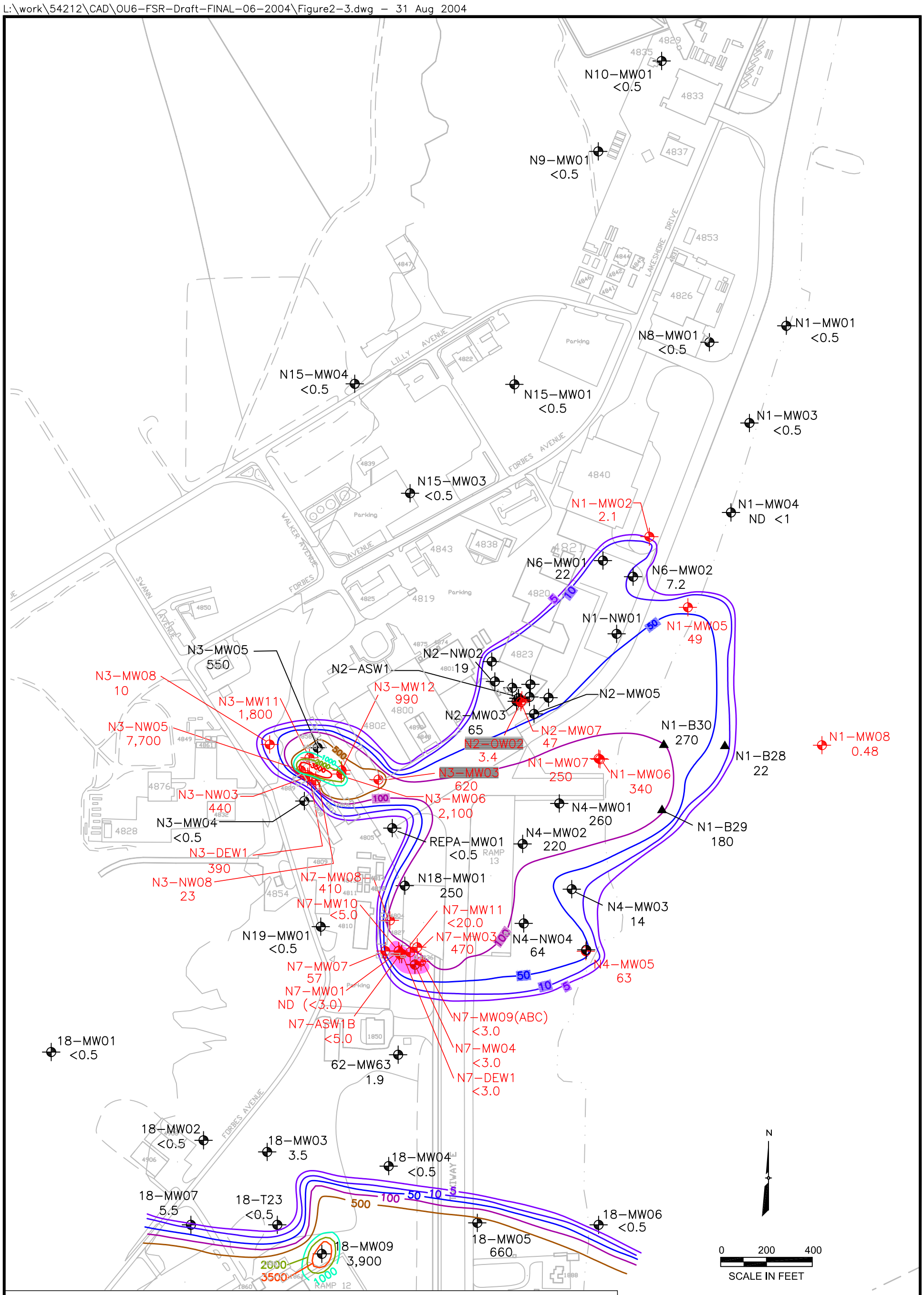

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TCE Groundwater Concentration Contours October 2000

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure 2-3
Project No. 54212		

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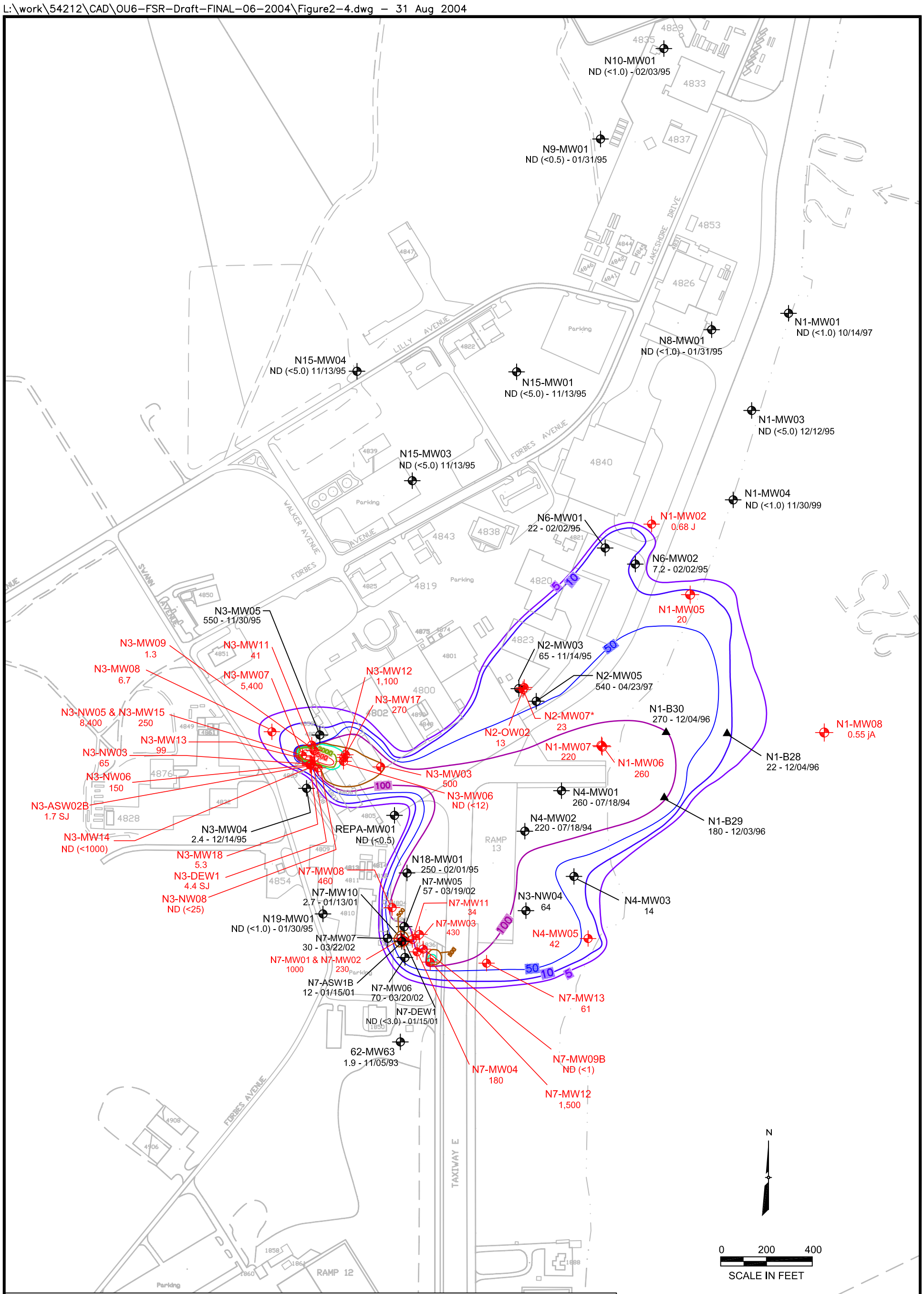

EXPLANATION

N7-MW01 1000 — MONITORING WELL SAMPLED DURING AUGUST AND SEPTEMBER 2002 SAMPLING EVENT

N8-MW01 ND (<1.0) - 01/31/95 — MONITORING WELL SAMPLED DURING PREVIOUS EVENTS

ND NOT DETECTED

N1-B28 22 — BOREHOLE (GRAB GROUNDWATER SAMPLE)

2000 — TRICHLOROETHENE (TCE) CONCENTRATION CONTOUR (INTERVALS = 5, 10, 50, 100, 500, 1,000, 3,500)

ALL CONCENTRATIONS SHOWN AS MICROGRAMS PER LITER (µg/L)

DRAFT FINAL

TCE Groundwater Concentration Contours August and September 2002

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure 2-4
Project No. 54212		

TCE concentrations in samples collected from wells at the leading edge of the plume (N1-MW02, N1-MW08, and N4-MW05) have remained relatively stable since 1998.

Advancement of the leading edge of the plume may be significantly impacted at the interface of the fractured bedrock with the lakebed alluvium. Additionally, groundwater movement within the fractured bedrock, well yields, and plume migration appear to be limited. Results of well pump tests performed in 1997 confirmed that well yields are limited, ranging from 0.6 to 2.5 gallons per minute (Rust, 1997b; Rust, 1997c; Rust, 1997d). Based upon these results and figures, the plume appears to be contained and has reached steady-state conditions.

2.2 GROUNDWATER MODELING APPROACH AND RESULTS

A groundwater model was developed to predict the groundwater flow regime at Dryden from the year 2002 to the year 2125 (approximately 125 years). The model, both a predictive and interpretive tool, was intended to provide contaminant concentration persistence data as well as predictive input for evaluation of remedial alternatives during the FS process. The migration of TCE in groundwater was evaluated using the predicted transient flow conditions in order to predict future contaminant distributions. Groundwater flow was modeled, and transport coupled, to show advective and dispersive contaminant transport though without representation of the retardation and biodegradation mechanisms. The FEMWATER model (a three-dimensional [3-D], finite-element, groundwater flow and transport model) in *Groundwater Modeling System* software was selected as an appropriate code to model the site due to the true 3-D nature of the groundwater flow at the site. The results of the groundwater modeling effort are included in Appendix C.

2.2.1 SIMULATION RESULTS

A numerical model was run to simulate no remedial action for approximately 125 years under current groundwater flow and transport conditions, using the initial concentrations based on a 3-D representation of the current groundwater plume. The 3-D plume was interpolated onto the 3-D finite-element mesh nodes and served as the initial concentrations for the model simulation, which was run from the year 2002 to 2125. The model simulation results indicated the TCE groundwater plume at Dryden is moving at a relatively slow rate. The model predicts that the leading edge should be moving

at approximately 3 feet per year; however, groundwater monitoring since 1992 documents that the groundwater plumes are not moving. The observed plume stability may indicate that plume migration has reached a steady state with dilution and dispersion at the leading edge. The model indicates that the plume is persistent at levels above regulatory limits to the end of the 125-year simulation. These results suggest that the plume is unlikely to naturally attenuate under the influence of these mechanisms.

3.0 RISK ASSESSMENT APPROACH

OU6 RI activities at Dryden included an HHRA and a four-phase ecological risk assessment. The risk assessment approaches are described below, and the results related to the sites addressed in this FS are presented in Section 4.0.

3.1 ECOLOGICAL RISK ASSESSMENT

Four distinct ecological risk assessment phases related to OU6 were performed at Edwards AFB. The first was a validation study and the second was a Pre-SERA. The Pre-SERA results were used to determine the scope of the third assessment, the full SERA. The full SERA results were used to determine the scope of the fourth phase, the full PERA.

3.1.1 VALIDATION STUDY

In order to identify the potential volatile organic compound (VOC) impact on small mammal and reptile populations, a validation study (USGS, 2002b) was performed at Edwards AFB Sites 25 (in Operable Unit 8), 37 and 133 (in Operable Unit 4). These sites were selected for the study because they had historic spills of TCE or tetrachloroethene (PCE) comparable to or larger than other spills identified at Edwards AFB, had potentially different exposure concentrations of PCE and TCE, encompassed or bordered suitable natural habitats, and are in areas of low-to-moderate industrial development. The study investigated specific indicator species for exposure to site contaminants. No abnormalities in blood indices, pathology lesions, or population anomalies directly attributable to site contaminants were identified. Validation study findings were used to support portions of the assessments conducted during the SERA and the PERA

3.1.2 PRE-SCOPING ECOLOGICAL RISK ASSESSMENT

The Pre-SERA was performed to evaluate need for further ecological assessment at specific OU6 sites based upon the remedial status of underground storage tank (UST) sites, groundwater depth, the existence of homestead wells, and evidence of off-site contaminant transport. Assessment results indicated that evidence of contaminant impact to habitat was present and that a full SERA was necessary for all 19 OU6 sites.

3.1.3 SCOPING ECOLOGICAL RISK ASSESSMENT

The SERA was performed to evaluate the chemical, physical, and biological characterization of each site and the potential for complete exposure pathways to ecological receptors at 19 sites in OU6. The study identified habitats and ecological receptors that may potentially be impacted by contaminants at or near the sites. Contaminants of ecological concern, as well as potential exposure pathways, were identified for each site, and potential fate and transport pathways were evaluated. Assessment results indicated that potential wildlife receptors were present or had access to chemicals of potential ecological concern (COPECs). The SERA results indicated that a PERA was necessary at Sites N1, N4, and N14.

3.1.4 PREDICTIVE ECOLOGICAL RISK ASSESSMENT

The PERA was performed to assess exposure and effects through the identification and summing of hazard quotients to generate hazard indices at Sites N1, N4, and N14. The PERA results indicated that some COPECs in soil, surface water, and groundwater may pose potential risks to some receptor groups at Site N1. Additionally COPECs in soil and groundwater may pose potential risks to some receptor groups at Site N4. Risks calculated for COPEC concentrations at Sites N1 and N4 are, in many instances, of limited ecological significance. None of the COPECs identified at Site N14 pose a risk to receptor groups at the site. The remaining calculated risks are of moderate ecological significance and are mitigated by the existence of low quality habitat (for all receptors) due to proximity to industrial processes and related development. Physical disturbance to the habitat quality is related to high traffic resulting from ongoing industrial processes. Additionally, no threatened or endangered plants, invertebrates, birds, reptiles, or mammals have been reported at the sites.

3.2 HUMAN HEALTH RISK ASSESSMENT

The purpose of the HHRA was to summarize the potential risk to human health posed by chemicals that have been released into the environment. The assessment was conducted using the procedures described in the *Basewide Human Health Risk Assessment Work Plan* (Earth Tech, 2001a) and is detailed in the *Human Health Risk Assessment, NASA Dryden, Operable Unit 6* (Earth Tech, 2003a).

The risk assessment process consisted of two steps. The first was a preliminary, screening-level assessment. The screening-level assessment used all the chemicals detected at the site that were

determined to be present at concentrations in excess of their naturally occurring levels. The maximum concentration of each of these chemicals was then individually compared to their respective U.S. EPA Region IX Preliminary Remediation Goals (PRGs) (U.S. EPA, 2000). Because the PRGs consider all potential pathways to be complete, and because the HHRA uses the maximum concentration of each detected chemical, this preliminary assessment is considered screening-level and health protective. Although the PRGs include the risk associated with various direct and indirect exposures, they do not include the potential for volatilization from soil or groundwater into indoor air spaces. Therefore, in addition to the PRG-derived risks, potential indoor air risks were estimated using the approach described by Johnson and Ettinger (J&E) (Johnson and Ettinger, 1991) and maximum detected soil-gas concentrations to estimate concentrations of VOCs in indoor air.

The second step in the risk assessment process involved a more detailed evaluation of risks. This step was used in cases where the results of the preliminary assessment for one or more potential exposure pathways exceeded levels designated in CERCLA to represent a significant health risk (i.e., a cancer risk in excess of 1×10^{-6} or a noncancer Hazard Index in excess of 1). The detailed assessment typically involved the use of more site-specific values for parameters such as representative chemical concentrations or exposure assumptions.

Residential use scenarios were considered in all OU6 risk assessments as part of the PRG-based risk assessments. However, the sites at OU6 are not currently used for residential purposes, nor is such use anticipated (Higginbotham/Briggs & Associates [HB&A], 2001). Therefore, the following discussions of potential cancer risks and non-cancer hazards quantified for OU6 sites do not include consideration of residential use.

Under CERCLA, a cancer risk of 1×10^{-6} is considered "the point of departure for determining remediation goals for alternatives when ARARs are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure" (U.S. EPA, 1980). For noncarcinogenic effects, CERCLA does not specify a point of departure, but it generally is appropriate to assume a Hazard Index equal to 1 (U.S. EPA, 1991). Risk estimate results for OU6 identified five sites (N1, N2, N3, N4, and N7) as having a potential cancer risk in excess of 1×10^{-6} and/or a non-cancer Hazard Index greater than 1 under an industrial use scenario. Human health risks calculated for chemicals of potential concern (COPCs) concentrations in soil and

groundwater at Sites N1 and N4 are mitigated by the locations in which the COPCs were detected. Because the areas in which the maximum chemical concentrations were detected are not coincidental to routine industrial activities, exposure is not likely to occur and the actual risks to receptors are likely to be significantly lower than those estimated in the HHRA. Risk assessment results for the three remaining sites (Sites N2, N3, and N7) are addressed in Section 4.0 of this report.

4.0 SITE SUMMARIES

The purpose of this section is to provide general background information for Sites N2, N3, and N7. Included for each site is a description, remedial activity overview, nature and extent of contamination, contaminant fate and transport, and risk assessment summary. Unless otherwise referenced, the source of the information provided is the OU6 RI (Earth Tech, 2000a).

4.1 SITE N2

4.1.1 SITE DESCRIPTION AND HISTORY

Site N2 consists of approximately 1.5 acres known as the Building 4801 Former Auxiliary Power Unit (APU) Drainage Area located south of Buildings 4801 and 4823 (Figure 4-1). The Former APU Drainage Area was an unlined depression approximately 6 feet deep by 100 feet wide by 150 feet long. It was used to contain wastes from the former APU test facility located to the southwest of the drainage area. In the early 1960s, the drainage area was filled in and the area was paved with asphalt. The Former APU Drainage Area may have received runoff from the aircraft run-up area formerly located on the concrete apron and ramp south and east of the former APU test facility (Rust, 1996).

Site N2 also includes the Building 4801 Dilution Pits in the western half of the Former APU Drainage Area. The Dilution Pits, located northeast of the former APU test facility, consisted of three pits similar in construction to a three-chamber oil/water separator. The Dilution Pits measured 4 feet by 4 feet by 6 feet deep and were constructed of concrete with a metal grate cover. The pits were used to dilute hydrogen peroxide that drained from the former APU test facility. Potential wastes at both the Dilution Pits and the Former APU Drainage Area are hydrogen peroxide, solvents, jet fuel, and hydrazine from the former APU test facility and aircraft run-up area, and chromium associated with runoff from the cooling tower blowdown (Rust, 1996).

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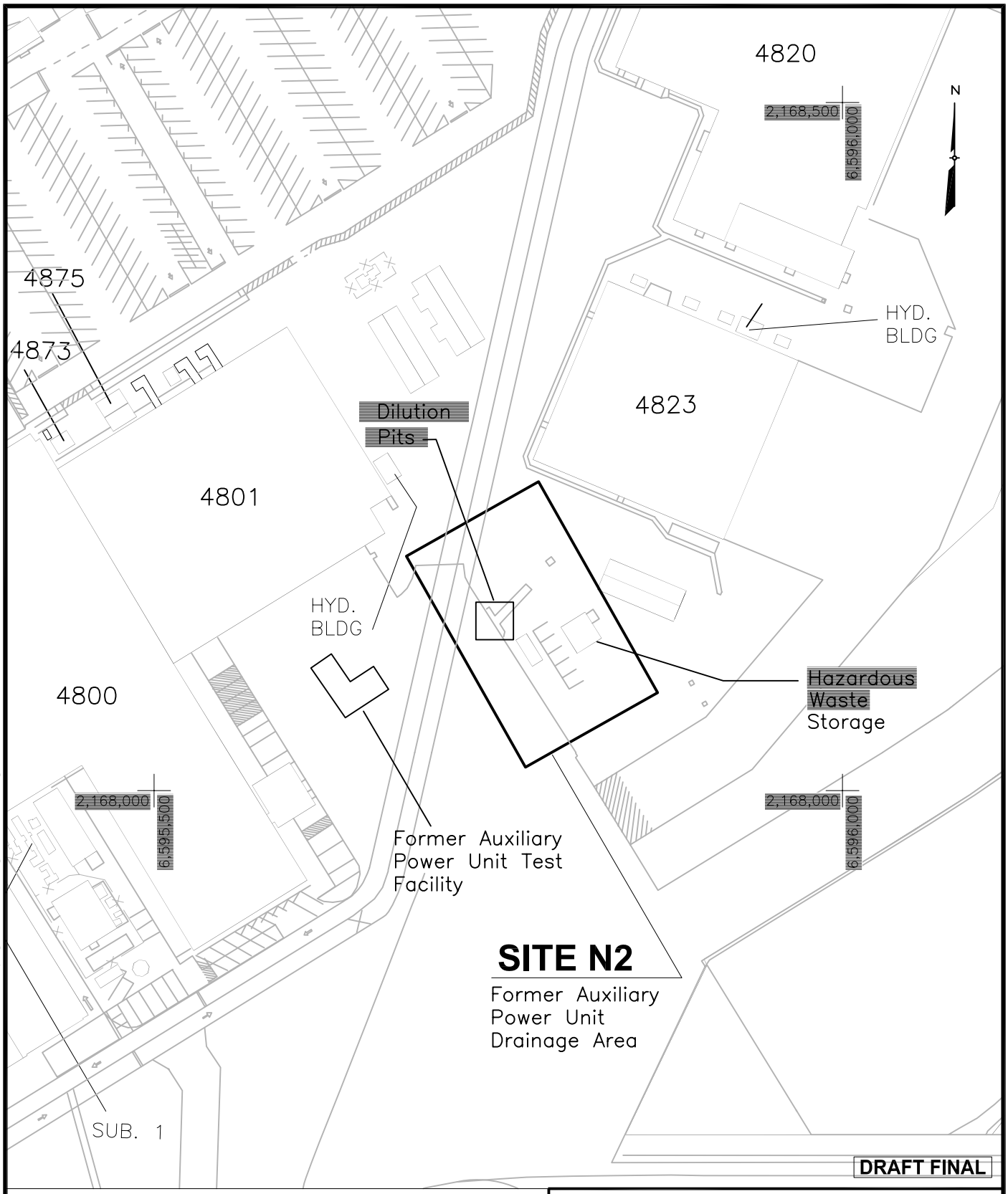

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Site Map
Site N2

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4.1.2 REMEDIAL ACTIVITIES

4.1.2.1 Remedial Investigations

In 1987, M.B. Gilbert Associates performed an investigation to evaluate potential releases at the Building 4801 Former APU. The scope and results of this investigation are discussed in *Results of a Preliminary Drilling and Sampling Program at the NASA/Ames Dryden Research Facility* (M.B. Gilbert Associates, 1988).

In 1995, Rust Environment & Infrastructure (Rust) conducted an RI consisting of soil-gas, soil, and groundwater sampling, and aquifer testing. The purpose of the initial passive soil-gas survey was to screen for volatile compounds in soil and/or groundwater. The soil-gas samples were analyzed for aromatic volatile compounds (benzene, toluene, ethylbenzene, and xylenes [BTEX]), chlorinated VOCs, and total aliphatic hydrocarbons (Rust, 1996). Soil samples were collected and analyzed for VOCs, nonhalogenated VOCs, organochlorine pesticides, polychlorinated biphenyls (PCBs), oil and grease, hydrazine, metals, organic lead, mercury, cyanide, hexavalent chromium, and pH.

In 1995, six monitoring wells (N2-MW01, N2-MW02, N2-MW03, N2-OW01, N2-OW02, and N2-PW02) were installed, developed, and sampled by Rust. The locations of these wells and the subsequent pilot and treatability study (TS) wells are provided in the OU6 RI. Groundwater samples were analyzed for VOCs, semivolatile organic compounds (SVOCs), nonhalogenated VOCs, organochlorine pesticides, PCBs, oil and grease, hydrazine, metals, mercury, cyanide, hexavalent chromium, alkalinity, fluoride, and total dissolved solids (TDS).

In 1995, Rust conducted a constant rate extraction test (pumping test) using well N2-PW02 as the pumping well and wells N2-MW01 through N2-MW03, N2-OW01, and N2-OW02 as observation wells. The low range of transmissivity was approximately 7.2 square feet per day (ft^2/day), the low range of hydraulic conductivity was 0.21 feet per day (ft/day), and the low range storage coefficient was 0.0013.

In 1996, Rust conducted a supplementary passive soil-gas survey to screen for volatile compounds in soil and/or groundwater southwest of Site N2. The survey was conducted within the boundaries of Site N1; however, the results of the survey, in conjunction with groundwater findings, show that it

served to characterize the leading edge of the Site N2 groundwater plume. The soil-gas samples were analyzed for BTEX, chlorinated VOCs, and total aliphatic hydrocarbons.

In February and March 1997, soil samples were collected using a hand auger at four Site N2 drilling locations. The samples were collected by Rust from depths ranging from 0 to 6 feet below ground surface (bgs) and were analyzed for metals, VOCs, SVOCs, chloride/nitrogen/sulfate, total organic carbon (TOC), and geotechnical parameters. A total of 12 well pilot boreholes (N1-MW04, N2-ASW1, N2-MW04 through N2-MW07, and N2-VW01 through N2-VW06) were also drilled. Boreholes/wells designated N1 are included in this section because they were installed to investigate the Site N2 plume in the vicinity of Site N1. Continuous coring was performed for N2-MW05 to allow direct observation of bedrock samples for evaluating bedrock fracture permeability. Also in 1997, packer testing was conducted during drilling of five well boreholes (N2-ASW1 and N2-MW04 through N2-MW07). The packer testing was performed to evaluate the in-situ permeabilities of bedrock intervals prior to selecting well screen intervals. The packer test methodology consisted of: (1) isolating a section of each borehole using inflatable packers, (2) injecting water under constant pressure into the test section, and (3) measuring the rate of water injection. Packer tests were performed in accordance with procedures presented in the *Site N2, N3, and N7 Pilot/Treatability Study Work Plan* (Rust, 1997a). The packer test data indicated bedrock horizontal hydraulic conductivity ranging from 8.5×10^{-4} to 2.83 ft/day. A downhole video tool was used by Barbour Well Surveying Corporation (Barbour) to create a video log of boreholes N2-ASW1, N2-MW04, N2-MW05, and N2-MW07 to provide data for orientation, dip and strike of bedding, joints, fractures, and shear planes, as well as measurement of locations of fluid entry and fluid levels.

Rust installed wells in the pilot boreholes from February through April 1997. One nested air sparge/soil vapor extraction (SVE) well (N2-ASW1A/B), five monitoring wells (N1-MW04, N2-MW04 through N2-MW07), and six vapor monitoring wells (N2-VW01, N2-VW02A/B, N2-VW03, N2-VW04A/B, N2-VW05, and N2-VW06) were installed and developed. Groundwater samples were collected from wells N1-MW04, N2-ASW1B, and N2-MW04 through N2-MW07 after installation and development. Groundwater samples were also collected from multiple intervals in the borehole for well N2-MW07 during packer testing. Selected samples were analyzed for VOCs, SVOCs, metals, pesticides and PCBs, chloride/nitrogen/sulfate, cyanide, and fluoride.

In January 1998, Rust conducted a 3-D seismic reflection survey to assist in selecting well locations. In March 1998, a downhole video tool was used to create a video log of borehole N1-MW07 to provide data for orientation, dip and strike of bedding, joints, fractures, and shear planes. Although numerous fractures were identified, water was generally too turbid during the survey to allow for calculation of fracture orientations. In March and April 1998, nine well pilot boreholes (N1-MW07, N1-MW09, N2-MW08, N2-ASW2A/B, and N2-VW07 through N2-VW11) were drilled. During drilling, packer testing was conducted at four boreholes (N1-MW07, N1-MW09, N2-MW08, and N2-ASW2A/B) to evaluate the in-situ permeabilities of discrete bedrock intervals prior to selecting well screen intervals. Groundwater samples were collected from wells N1-MW07 through N1-MW09, N2-MW08, and N2-ASW2B after installation and development. Groundwater samples were also collected from multiple intervals in the boreholes for wells N1-MW07, N1-MW09, N2-MW08, and N2-ASW2 during packer testing. Selected samples were analyzed for VOCs, SVOCs, metals, and bromide/chloride/nitrogen/sulfate.

4.1.2.2 Groundwater Monitoring

Groundwater monitoring has been performed at Site N2 since 1995. The current groundwater monitoring program, conducted by Rust/Earth Tech, began in 1996. The most recent event addressed in this FS was completed in March 2003. The event consisted of groundwater level measurement, groundwater sample collection, and the laboratory analysis of those samples. Groundwater samples collected during the March 2003 monitoring event were analyzed for VOCs and SVOCs.

4.1.2.3 Pilot Study

A pilot study of dual-extraction and air sparge/SVE systems was performed at Site N2 in June 1997. The primary pilot study objective was to collect site-specific engineering data necessary for the selection of an effective extraction technology and the design of a cost-effective long-term treatment system for Site N2.

Based on the site geology and the results of the pilot study, it was concluded that SVE, air sparging, and dual extraction appeared to be effective, in the short-term, at reducing concentrations of volatile subsurface contaminants. Since the technologies were considered potentially applicable for treating areas of Edwards AFB where groundwater in fractured bedrock is contaminated with halogenated organic compounds, a TS at the most contaminated area of Site N2 was recommended. Further

information regarding the pilot study results is detailed in the *Site N2 Pilot Study Results and Treatability Study Recommendations Report*, *Final* (Rust, 1997b).

4.1.2.4 Treatability Study

A TS was performed in order to assess the long-term viability of the SVE/sparging technique in treating the TCE groundwater plume at Site N2. The TS was initiated in November 1998 and completed in June 1999 with an interruption in operation from December 1998 to February 1999 due to mechanical difficulties. Laboratory analytical results from soil-vapor samples collected from the influent vapor stream indicated that TCE concentrations declined from 4,800 parts per billion volume per volume (ppb v/v) (the highest concentration detected during the study) to less than 10 ppb v/v. These results indicated that minimal contaminant quantities were recovered during the final 2 weeks of the study and the cost to maintain the remedial approach exceeded the benefit. The TS was completed in June 1999 after approximately 2.43 pounds (lbs) of VOCs were removed from the soil vapor.

4.1.3 NATURE AND EXTENT OF CONTAMINATION

Based on the RI activities performed at Site N2, VOCs in groundwater are considered the most significant contaminants due to the widespread, relatively high, concentrations. Groundwater is contaminated with TCE and other chlorinated VOCs associated with the past use of Site N2.

4.1.3.1 Groundwater

The highest TCE concentrations for each sampling round at Site N2 from October 1995 to October 1997 were detected at well N2-OW02 (shallow well). Historically, the TCE concentrations at this well have ranged from 3.8 to 4,100 µg/L, significantly exceeding the established California Maximum Contaminant Level (MCL) of 5 µg/L. VOC concentrations in groundwater at Site N2 appear to be relatively stable after decreasing considerably during the period between 1996 and 1998. TCE concentrations (attributable to the Site N2 plume) exceeding the California primary MCL were detected in samples collected from five wells during the March 2003 sampling event, N1-MW05 (5.1 µg/L), N1-MW06 (260 µg/L), N1-MW07 (280 µg/L), N2-MW07 (26 µg/L), and N2-OW02 (16 µg/L). *Cis*-1,2-dichloroethene (*cis*-1,2-DCE), a biodegradation daughter product of TCE, was also detected in groundwater samples collected at Site N2 at a maximum concentration of 17 µg/L at well N1-MW06.

The most recent detected metals concentrations in the groundwater samples were below values calculated as background with the exception of barium and zinc. The most recent detected barium concentrations were below the tap water PRG and the most recent detected zinc concentrations were below the secondary MCL of 5 mg/L.

No background concentration values exist for hexavalent chromium, cyanide, and boron. No MCL is available for hexavalent chromium; but the most recent detected concentrations were below the tap water PRG, and the most recent detected cyanide concentrations were below the MCL of 0.2 mg/L. Boron was detected in water samples consistently between 5.1 and 5.74 mg/L. These concentrations were detected in unfiltered samples, exceeded the MCL of 1.0 mg/L, and slightly exceeded the tap water PRG of 3.3 mg/L. Unfiltered samples contain suspended inorganic particulates, which possibly represent naturally-occurring metals concentrations.

In 1999, N-nitrosodimethylamine (NDMA) was detected at concentrations ranging from 0.0032 to 0.004 μg/L. Samples have not been analyzed for NDMA since 1999. An MCL has not been promulgated for NDMA.

4.1.3.2 Soil Gas

During the passive soil-gas survey conducted in October 1995, 1,2-dichlorobenzene was detected in the southeast portion of Site N2 near wells N2-MW03 and N2-OW01 with a maximum concentration of 11.95 nanograms per liter (ng/L). Other chlorinated VOCs, such as chlorobenzene, *cis*-1,2-DCE, TCE, and PCE, as well as BTEX compounds, were also detected (Rust, 1996). During the survey conducted southeast of Site N2 from September to October 1996, TCE was detected at a maximum concentration of 732.09 ng/L, and elevated BTEX and total aliphatic hydrocarbon concentrations were detected. The TCE results showed correlation with the southeast leading edge of the Site N2 TCE groundwater plume (Quadrel, 1996).

4.1.3.3 Soil

The only organic compounds detected in soil at Site N2 are oil and grease, and polyaromatic hydrocarbons (PAHs). These organic compounds were detected in shallow soil samples below the pavement in the southeast portion of Site N2. Volatile and semivolatile constituents commonly associated with petroleum hydrocarbons were generally lacking, indicating that most of the oil and

grease detections represent either heavy petroleum hydrocarbons or naturally occurring organic matter. Two PAHs, benzo(*a*)pyrene and benzo(*a*)anthracene, were detected in one soil sample above residential and industrial PRGs. However, the potential for exposure of these compounds to human and ecological receptors is severely limited by the asphalt cap and the relatively immobile nature of PAHs.

Hexavalent chromium was detected in a single soil sample collected below the asphalt at borehole N2-MW03, at a concentration of 0.53 milligrams per kilogram (mg/kg). This form of chromium does not occur naturally, but the reported concentration is less than the residential PRG of 30 mg/kg and the asphalt cap limits the potential for exposure. Other metals detected in soil appear to represent naturally occurring background concentrations.

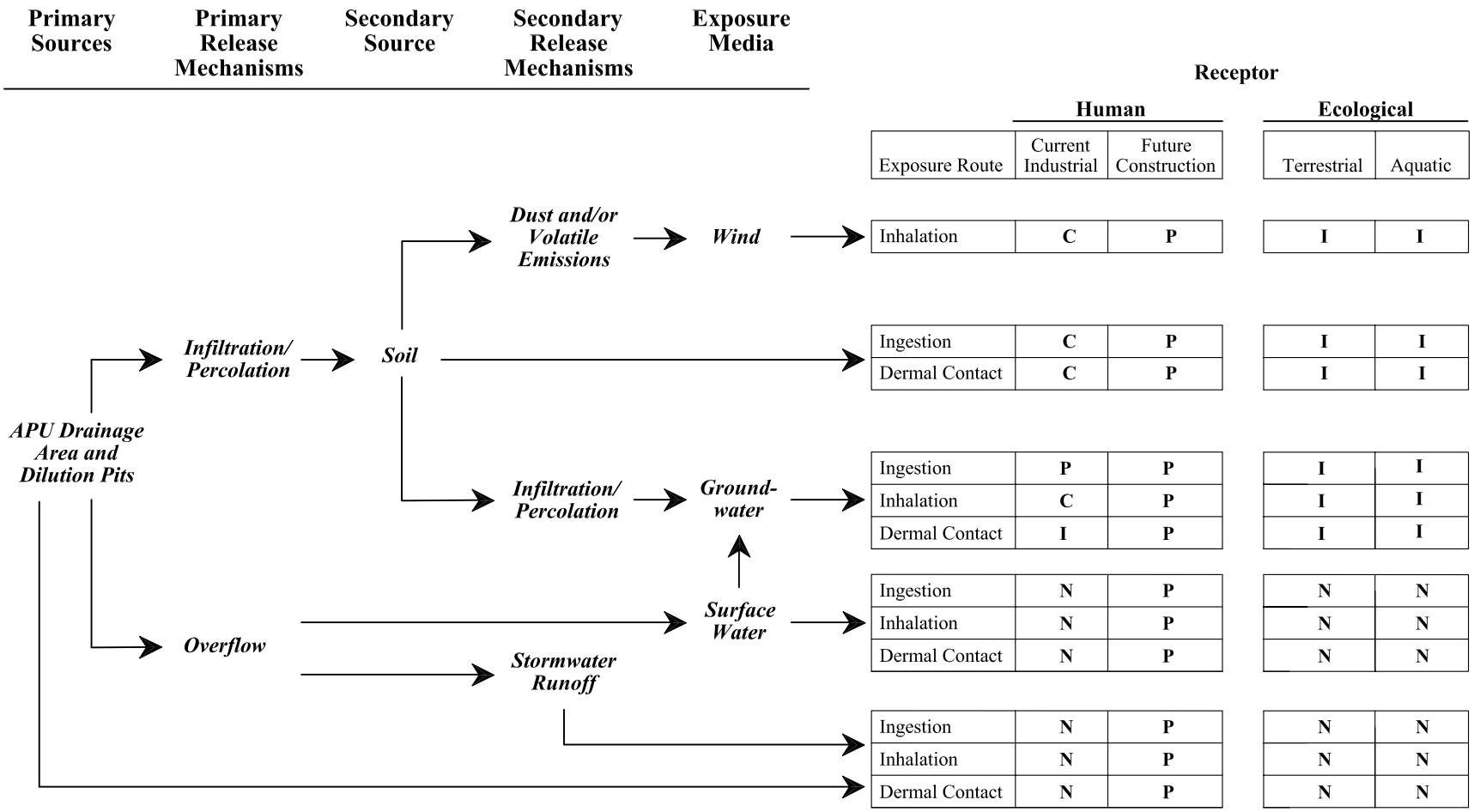
4.1.4 CONTAMINANT FATE AND TRANSPORT

The subsurface contaminants of primary concern at Site N2 are VOCs, primarily TCE, in groundwater originating from disposal of VOCs into the APU Drainage Area or the adjacent Dilution Pits. The Site N2 conceptual model is included in the OU6 RI (Earth Tech, 2000a) and potential contaminant exposure pathways are illustrated on Figure 4-2.

Due to the distance (over 6 miles) between the Site N2 plume and the nearest potential water supply wells at North Edwards, contamination from this site does not threaten the potable water supply and, thus, does not represent an immediate threat to human health. Groundwater monitoring results indicate that the plume has reached steady-state conditions and migration toward the North Edwards wells is unlikely.

4.1.4.1 Plume Volume and Extent

TCE and *cis*-1,2,-DCE concentrations, attributable to on-site sources, exceed MCLs in groundwater at Site N2. The volume of TCE dissolved in groundwater at Site N2 was estimated based on concentration contours derived from the 2003 groundwater monitoring events as shown on Figure 1-3. Assuming an effective bulk rock porosity of 0.30 (Earth Tech, 2003b), an even vertical distribution, and thickness of the contaminated aquifer to be 90 feet, the volumes of dissolved TCE contained between the 100 and 500, 50 and 100, 10 and 50, and 5 and 10 μg/L concentration contour lines were estimated to be approximately 3.41, 3.18, 1.53, and 0.14 gallons, respectively, for a total of 8.26 gallons (Appendix D).



Notes:

I = Incomplete pathway
C = Complete pathway
P = Potential pathway, currently incomplete
N = Incomplete, not applicable due to change in facility use
APU = Auxiliary Power Unit

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Site N2
Contaminant Exposure Pathway Model

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure
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4.1.5 RISK ASSESSMENT SUMMARY

4.1.5.1 Site N2 Scoping Ecological Risk Assessment Summary

Based upon the SERA results (USGS, 2003a), no complete, or potentially complete, pathways exist between facility-related contaminants and potential ecological receptors. No potential for biological receptors to be exposed to on-site contaminants was identified during the SERA.

4.1.5.2 Site N2 Human Health Risk Assessment Summary

The purpose of the HHRA was to summarize the potential risk to human health posed by chemicals that have been released into the environment at Site N2. The assessment is detailed in the *Final Human Health Risk Assessment, NASA Dryden, Operable Unit 6* (Earth Tech, 2003a).

Although residential use scenarios were considered in the OU6 risk assessment, the sites/AOCs in OU6 are not currently used for residential purposes, nor is such use anticipated (HB&A, 2001). Because the estimated risks for the residential scenarios do not reflect the current site conditions, the following summary of potential cancer risks and non-cancer hazards only includes industrial use considerations.

Groundwater – Groundwater is not used at this location for any potable, industrial, or agricultural uses. The nearest groundwater wells used for potable purposes are located at North Edwards, approximately 6 miles from the site. Therefore, pathways involving direct exposure to groundwater are not considered complete. However, indirect exposure to VOCs in groundwater (via volatilization into indoor air) was evaluated (Earth Tech, 2003a), and found to have risks and hazards less than the CERCLA risk criteria.

Soil – The results of the site-specific risk assessment indicated potential cancer risks associated with Site N2 were driven almost exclusively by PAHs in soil, particularly benzo(*a*)pyrene and benzo(*a*)anthracene (both detected in 2 out of 28 samples), and the total noncarcinogenic hazard was driven almost entirely by organic lead in soil (detected in 2 out of 2 samples). Although the total carcinogenic risk at Site N2 was estimated to be in excess of 1×10^{-6} and the total noncarcinogenic hazard was estimated to be approximately 84, no complete pathways currently exist for exposure to soil containing these chemicals due to asphalt and concrete paving of the areas where they were detected. PAHs such as benzo(*a*)anthracene and benzo(*a*)pyrene are associated with relatively unrefined

petroleum products such as asphalt. The detections of benzo(*a*)anthracene and benzo(*a*)pyrene were from surface samples collected through the asphalt pavement, and are likely related to the asphalt and are not representative of site-wide conditions. It should be noted that the two detections of organic lead are "Ja" qualified, indicating that results are detected above the detection limit, but below the reporting limit, and thus are considered quantitatively uncertain. In addition to the site being capped with asphalt, administrative controls (such as excavation permits) are in place to limit worker exposure to site soil. Based on the arguments provided above and those included in the Site Status Memorandum (Appendix A), the RPMs agreed to a decision of No Action Required for Soil for Site N2.

4.1.5.3 Site N2 Risk Summary

Based upon the current and future industrial land use planned at Site N2, the HHRA and SERA results indicated that potential risk to human health and the environment is not likely to be significant.

4.1.6 SUMMARY OF CONTAMINANTS OF CONCERN

The groundwater plume associated with Site N2 has commingled with the plumes originating from Sites N3 and N7. The analytes (detected in wells associated with Site N2 during the March 2003 sampling event) that currently exceed MCLs are presented in Table 4-1 along with their respective maximum detected concentrations.

TABLE 4-1. SITE N2 STATE MAXIMUM CONTAMINANT LEVEL EXCEEDANCES

	Maximum Concentration Detected in March 2003 (µg/L)	Historical High (µg/L)	California Primary MCL (µg/L)
cis-1,2-Dichloroethene	17	890	6
Trichloroethene	280	4,100	5

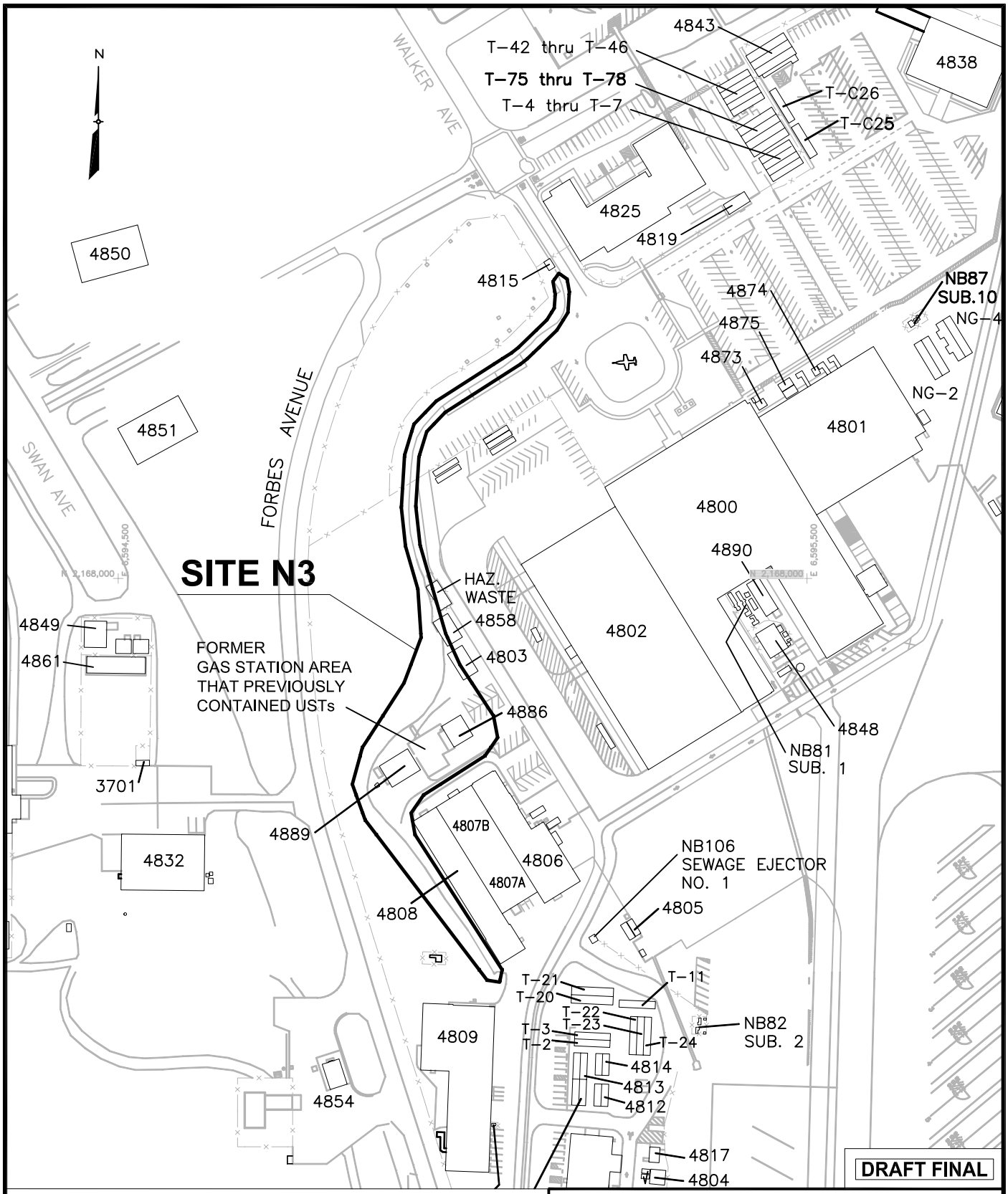
Notes:

µg/L = micrograms per liter
MCL = maximum contaminant level

4.2 SITE N3

4.2.1 SITE DESCRIPTION AND HISTORY

Site N3, the Former Gas Station, is located in the southwest portion of Dryden (Figure 1-2). In addition to the Former Gas Station, the site contains Buildings 4889, 4886, 4803, and 4858 (Figure 4-3), as well



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Site Map
Site N3

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure
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as former and active drum dispensing areas. The Former Gas Station was located between Buildings 4886 and 4889. Site N3 also contains a drainage ditch that runs north to south, west of the previously mentioned features and east of Forbes Avenue. These areas have received the following designations (Earth Tech, 1993):

- Building 4889 Former Gas Station
- Building 4886 Drum Dispensing Area
- Building 4889 Former Drum Dispensing Area
- Building 4889 Drainage Ditch

The Former Gas Station previously contained three USTs (all removed in 1991): a 5,000-gallon, fiberglass, leaded gasoline UST; a 6,000-gallon, fiberglass, unleaded gasoline UST; and a 1,000-gallon, steel, jet fuel number 4 (JP-4) (originally leaded gasoline) UST.

The two gasoline tanks failed integrity tests performed in September 1986 and the JP-4 tank passed. In 1988, investigations at the Former Gas Station identified BTEX, gasoline, and chlorinated solvents in the soil and groundwater surrounding the Former Gas Station. The Drainage Ditch extends north and west of the Former Gas Station, the current Dispensing Areas at Buildings 4803 and 4886, and the Former Dispensing Area at Building 4889. The Drainage Ditch is an open concrete-lined feature, with an average depth of 2 feet and length of 900 feet. The outfall of the Drainage Ditch is the Southern Retention Pond (Site N4).

In 1992, Earth Tech reported three 55-gallon drums stored at the Drum Dispensing Area associated with Building 4803 and fifteen 55-gallon drums and associated drip pans stored at the Building 4886 Drum Dispensing Area. No drums or drip pans were present at these areas during the latter part of 1995. Hazardous materials stored at Site N3 include ethylene glycol, lubricating oil, degreasers, and solvents. The Drainage Ditch may have received these products due to leakage from the Drum Dispensing Area.

4.2.2 REMEDIAL ACTIVITIES

4.2.2.1 Remedial Investigations

M.B. Gilbert Associates commenced RI activities in 1987. RESNA/Groundwater Resources, Inc. and Earth Tech continued the activities through 1994, which included preliminary soil-gas sampling, soil sampling, groundwater sampling, and sampling plan preparation.

In 1991, a groundwater recovery trench was installed downgradient of the Former Gas Station and Building 4889 Former Drum Dispensing Area. From May 1992 to February 1997, groundwater was extracted from the trench and treated with granular activated carbon. Quarterly monitoring associated with the Site N3 treatment system indicated that organic compound concentrations showed considerable fluctuations at some of the wells rather than progressively decreasing concentrations. As a result, the extraction was discontinued in February 1997.

In 1995, Rust conducted RI activities at Site N3 consisting of soil-gas, soil, and groundwater sampling. The purpose of the sampling program was to assess the extent to which the soil and groundwater had been impacted by releases at or near Site N3. A passive soil-gas survey was conducted to screen for volatile compounds in soil and/or groundwater at 37 locations. The soil-gas samples were analyzed for BTEX, chlorinated VOCs, and total aliphatic hydrocarbons. An active soil-gas survey was conducted to evaluate the distribution of volatiles and biogenic gases in the subsurface and determine airflow properties. The samples were analyzed with a portable unit for VOCs and methane.

Soil samples were collected from 22 boreholes, including 7 groundwater well pilot boreholes. The soil samples were analyzed for VOCs, SVOCs, nonhalogenated VOCs, oil and grease, hydrazine, metals, cyanide, organic lead, hexavalent chromium, and pH. Seven monitoring wells (N3-MW02 through N3-MW08) were drilled, installed, developed, and sampled. Groundwater samples were also collected at five existing wells. All groundwater samples were analyzed for VOCs, SVOCs, nonhalogenated VOCs, chlorinated pesticides and PCBs, oil and grease, ethylene glycol, metals, organic lead, cyanide, alkalinity, fluoride, and TDS. A surface water sample was also collected from the drainage ditch behind Building 4803. The sample was analyzed for VOCs, SVOCs, nonhalogenated VOCs, chlorinated pesticides and PCBs, oil and grease, ethylene glycol, metals, organic lead, cyanide, and fluoride. Rising head slug tests and a constant rate extraction test were also conducted to evaluate aquifer

parameters during RI activities. Hydraulic conductivities ranged from 1.2 x 10^{-4} to 3.3 ft/day and transmissivities ranged from 0.005 to 36 ft^2/day.

From February to April 1997, Rust performed additional RI activities including soil sampling, well installation, fracture analysis, packer testing, and groundwater sampling. Soil samples were collected at four Site N3 drilling locations at depths ranging from 0 to 6 feet bgs. Selected samples were analyzed for metals, VOCs, SVOCs, chloride/nitrogen/sulfate, and TOC. Two vapor monitoring wells (N3-VW01 and N3-VW02), two groundwater monitoring wells (N3-MW09 and N3-MW10), two nested air sparge/SVE wells (N3-ASW1A/B and N3-ASW2A/B), and one dual-extraction well (N3-DEW1) were installed. A downhole video tool was used in boreholes N3-DEW1, N3-ASW2, N3-MW09, and N3-MW10 to conduct a fracture analysis for each borehole. Packer testing was conducted during drilling of four well boreholes (N3-DEW1, N3-ASW2A/B, N3-MW09, and N3-MW10) to evaluate the in-situ permeabilities of bedrock intervals prior to selecting well screen intervals. The packer test data indicated bedrock horizontal hydraulic conductivity ranges from 2.83 x 10^{-5} to 5.67 ft/day. The fractures result in high variability in hydraulic conductivity over short distances. For example, packer test data at well N3-MW09 indicated horizontal hydraulic conductivity ranging from 5.6 x 10^{-4} to 5.67 ft/day over intervals separated by only 34 vertical feet. Groundwater samples were collected from wells N3-ASW1, N2-ASW2, N3-DEW1, N3-MW09, and N3-MW10 after installation and development. Groundwater samples were also collected from multiple intervals in the boreholes for wells N3-MW09 and N3-MW10 during packer testing. Selected samples were analyzed for VOCs, SVOCs, and chloride/nitrogen/sulfate.

In 1998, Rust performed RI activities including surveying, well installation, packer testing, pump testing, and groundwater sampling. In January 1998, a 3-D seismic reflection survey was conducted to assist in selecting well locations. One dual-extraction well (N3-DEW2) and one monitoring well (N3-MW11) were drilled and packer testing was conducted to evaluate the in-situ permeabilities of bedrock intervals prior to selecting well screen intervals. A downhole video tool was used to create a video log of borehole N3-MW11 to provide data for orientation, dip and strike of bedding, joints, fractures, and shear planes. Water in this well was generally too turbid during the survey to allow for calculation of fracture orientations. In April 1998, a step-drawdown test was performed at well N3-MW11. Groundwater samples were collected from wells N3-DEW2 and N3-MW11 after installation and development. Groundwater samples were also collected from multiple intervals in the

boreholes for both wells during packer testing. Selected samples were analyzed for VOCs, SVOCs, metals, bromide/chloride/nitrogen/sulfate, fluoride, and sulfide.

4.2.2.2 Groundwater Monitoring

Groundwater monitoring has been performed at Site N3 since 1995. The current groundwater monitoring program, conducted by Rust/Earth Tech, began in 1996. The most recent event addressed in this FS was completed in March 2003. The event consisted of groundwater level measurement, groundwater sample collection, and the laboratory analysis of those samples. Groundwater samples collected during the March 2003 monitoring event were analyzed for alkalinity, TDS, TOC, total volatile petroleum hydrocarbons (TVPH), total petroleum hydrocarbons (TPH) as diesel fuel (TPHd), VOCs, SVOCs, metals, perchlorate, and NDMA.

4.2.2.3 Pilot Study

A pilot study of dual-extraction and air sparge/SVE systems was performed at Site N3 from May to June 1997. The primary pilot study objective was to collect site-specific engineering data necessary for the selection of an effective extraction technology and the design of a cost-effective long-term treatment system for Site N3.

Based on the site geology and the pilot study results, it was concluded that SVE, air sparging, and dual extraction appeared to be effective in the short-term at reducing concentrations of volatile subsurface contaminants. Because the technologies were considered potentially applicable for treating areas of Edwards AFB where halogenated organic compounds exist in fractured bedrock, a dual-extraction TS was recommended at the most contaminated area of Site N3. Additional information regarding the pilot study is presented in the *Site N3 Pilot Study Results and Treatability Study Recommendations Report, Final* (Rust, 1997c).

4.2.2.4 Treatability Studies

Dual Extraction

A TS was performed in order to assess the long-term viability of the dual-extraction technique in treating the VOC and petroleum hydrocarbon contamination at Site N3. The TS was initiated in

October 1998 and completed in June 2001 with an interruption in operation from April 1999 to February 2000 and from November 2000 to January 2001 due to mechanical and logistical difficulties.

Laboratory analytical results from groundwater samples collected from the influent stream indicated that the highest TCE concentration (11,000 μg/L) was detected in December 1998. The lowest TCE concentration (300 μg/L) was detected in the sample collected immediately prior to the completion of the TS in June 2001. Benzene concentrations in the influent stream decreased from 12,000 μg/L in November 1998 to 4,200 μg/L in June 2001, and naphthalene concentrations decreased from 1,100 μg/L in October 1998 to 78 μg/L in June 2001. The rate of contaminant removal from the aquifer at well N3-DEW1 (based upon concentrations detected in the groundwater influent stream of the extraction system) declined significantly after October 2000 and limited removal occurred thereafter (Figure 4-4). Similarly, the rate of contaminant removal from the aquifer at well N3-MW11 declined significantly after October 2000 and limited removal occurred thereafter (Figure 4-5).

Laboratory analytical results from soil-vapor samples collected from the influent stream indicated that TCE concentrations declined from 1,400 ppb v/v (the highest concentration detected during the study) in December 1998 to 170 ppb v/v in June 2001. Results from soil-vapor samples collected from the influent stream indicated that benzene concentrations declined from a high concentration of 790 ppb v/v in April 1999 to 29 ppb v/v in June 2001, and TPH as gasoline (TPHg) concentrations decreased from 49,000 parts per million volume per volume (ppm v/v) in September 1998 to 1,000 ppm v/v in June 2001. The rate of contaminant removal in vapor from the dewatered aquifer at Site N3 (based upon concentrations detected in the cumulative vapor influent stream of the extraction system) declined significantly after October 2000 and limited removal occurred thereafter (Figure 4-6).

A total of approximately 1,071.1 lbs of major contaminants (including 968.0 lbs of TPHg) were removed from soil vapor and 59.4 lbs of contaminants (including 29.0 lbs of TCE) were removed from groundwater. The majority of contaminant mass removal occurred within the first 15 months (not including system downtime) of the study. Mass removal rates began declining and leveling off during the last 5 months of system operation (Figure 4-7). Declining removal rates and stable and/or increasing contaminant concentrations in area wells resulted in the termination of the dual-extraction TS. An alternative treatment approach, in-situ chemical oxidation was proposed and initiated in July 2002.

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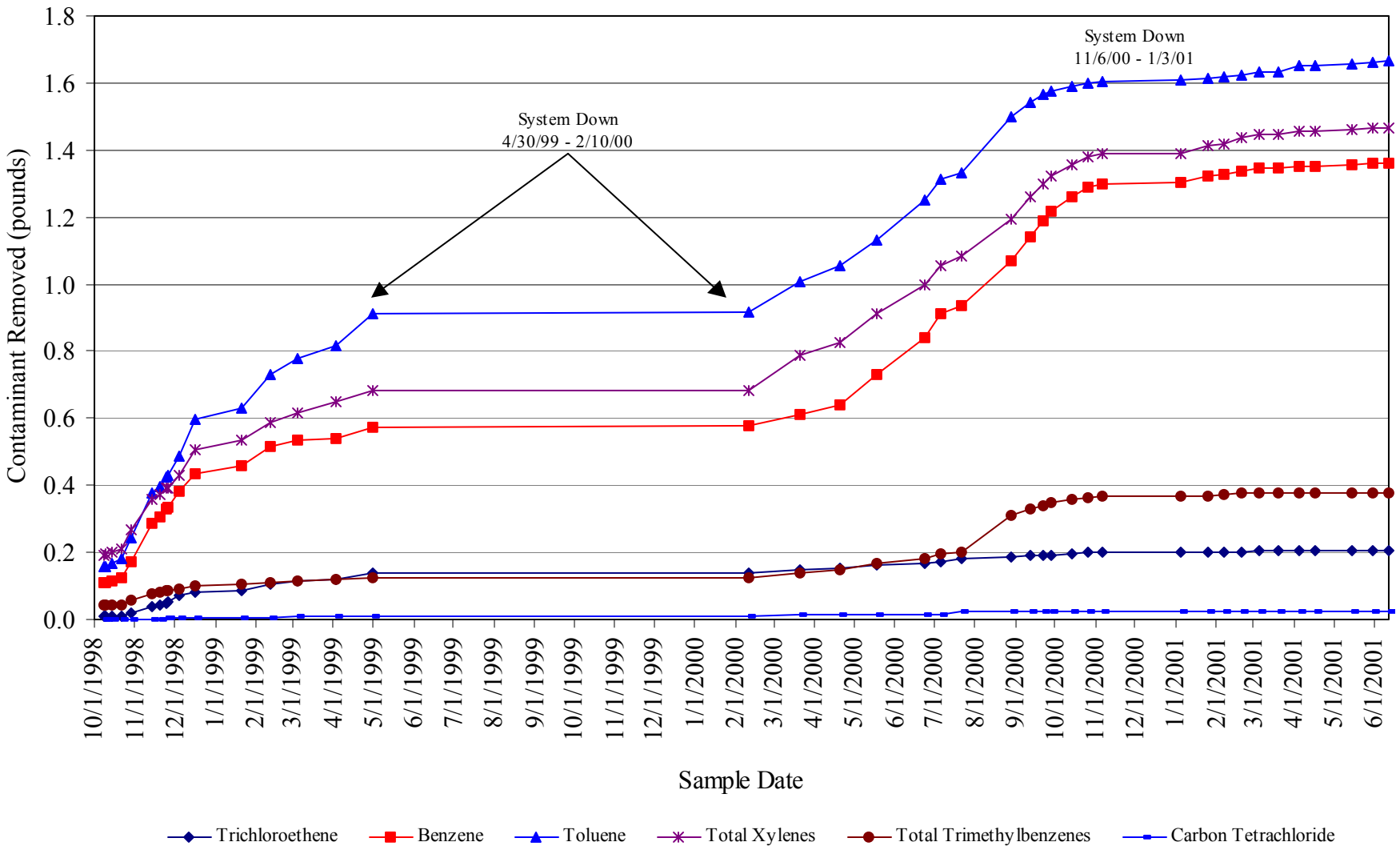

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Extraction Well N3-DEW1 Cumulative Groundwater Contaminant Removal

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure
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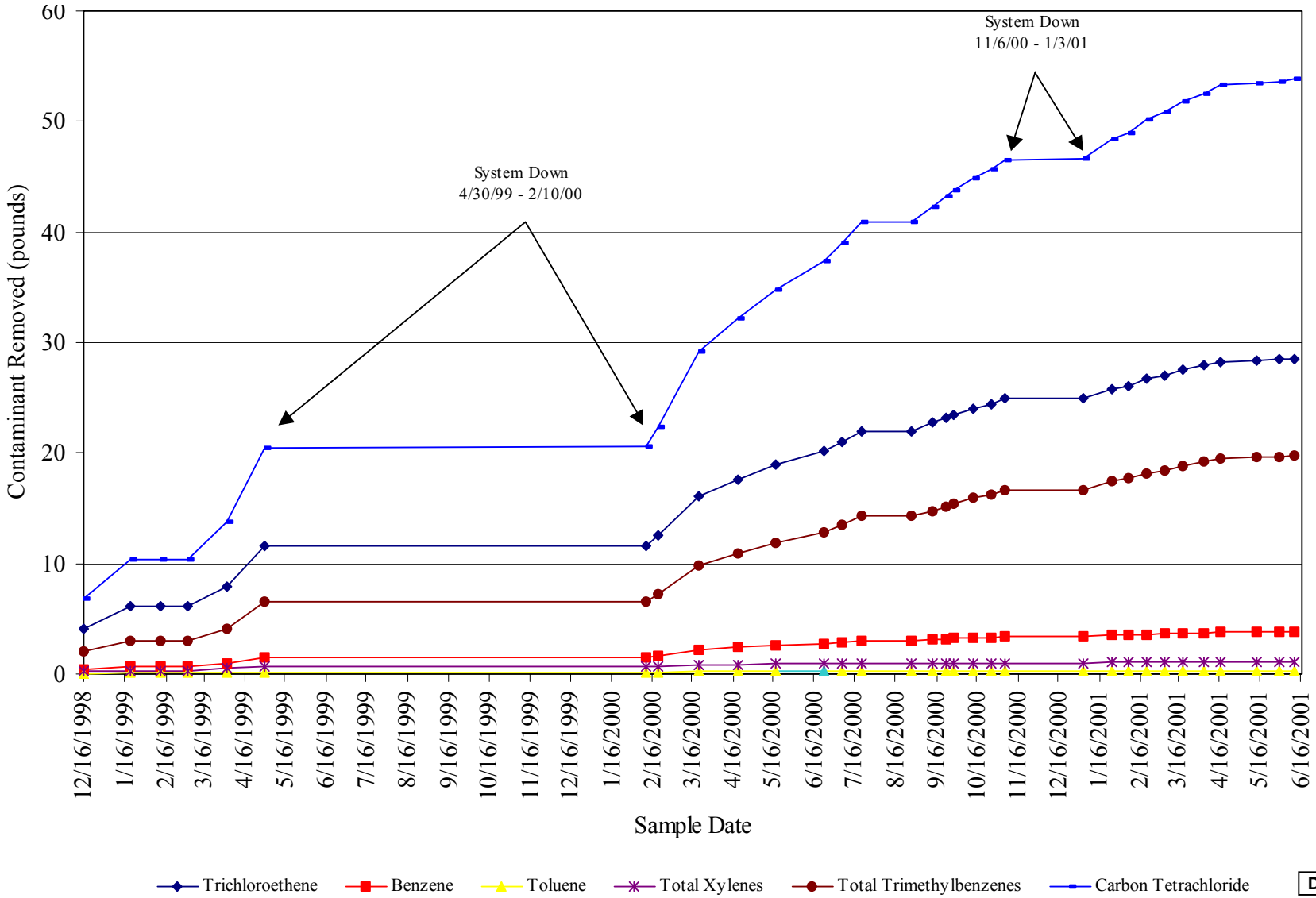

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Extraction Well N3-MW11 Cumulative Groundwater Contaminant Removal

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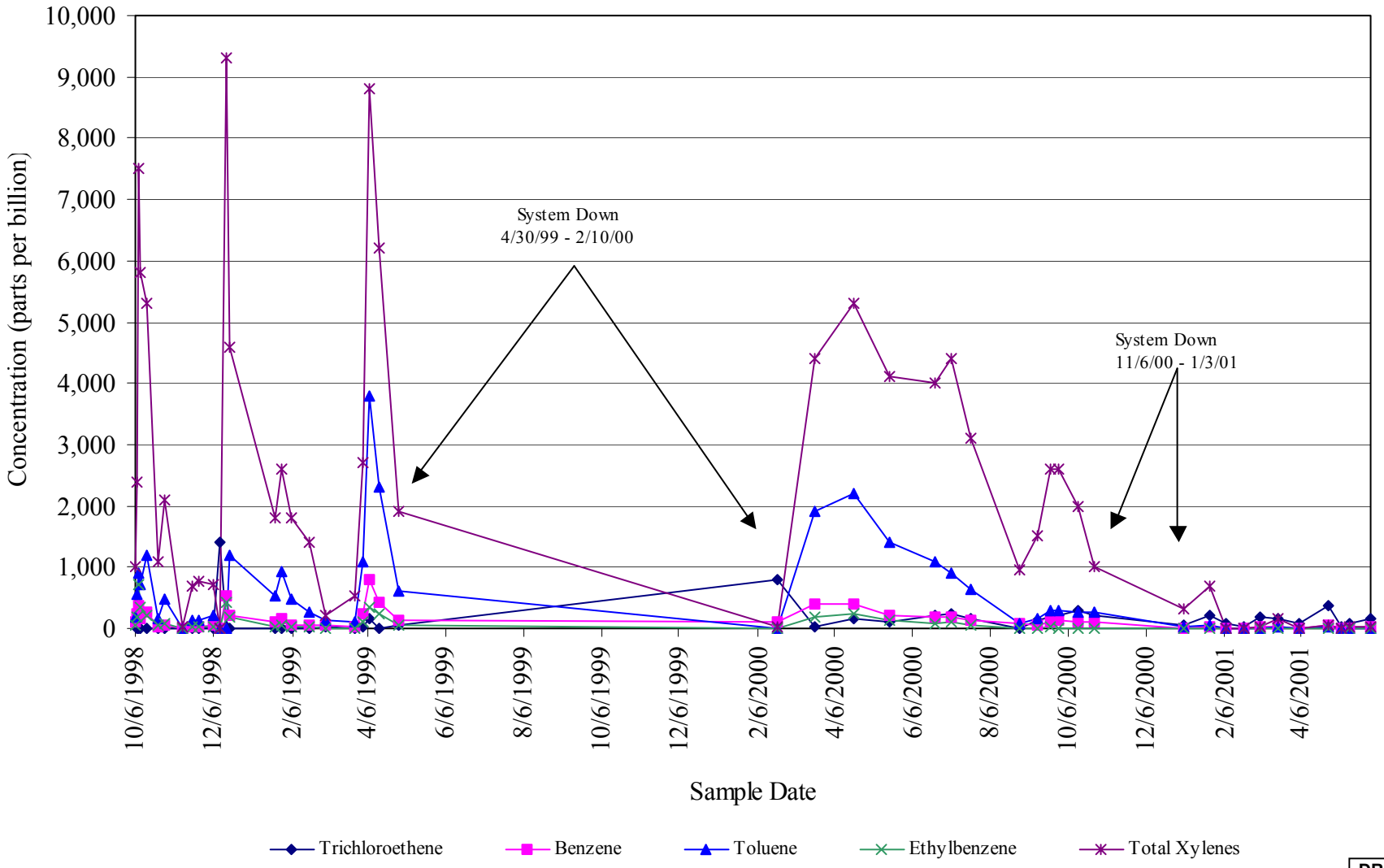

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Site N3 Treatment System Influent Vapor Concentrations

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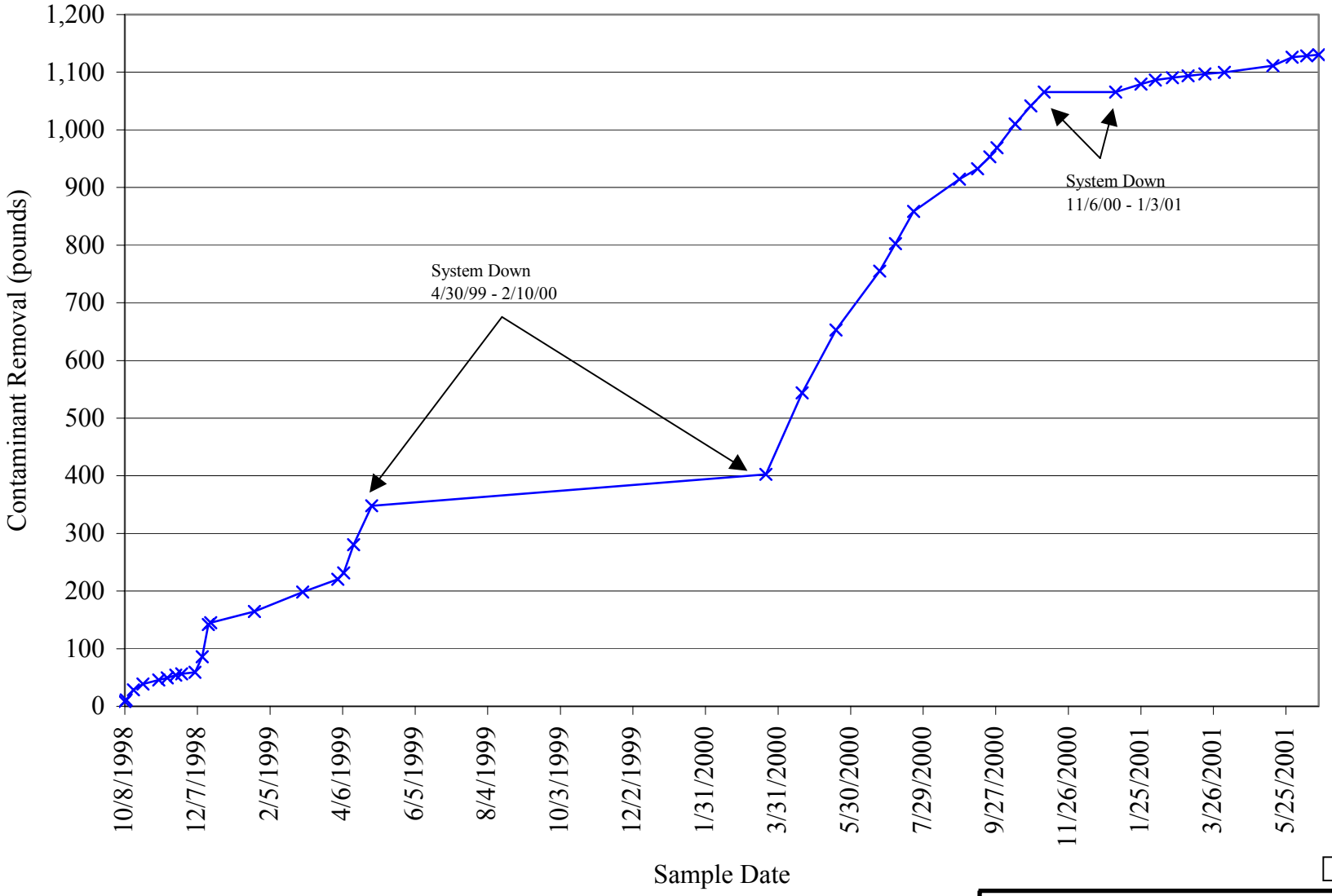

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Dual Extraction Treatability Study
Cumulative Contaminant Mass Removal

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Chemical Oxidation

An in-situ chemical oxidation TS was conducted at Site N3 from June to November 2002 using a Fenton-based reagent (hydrogen peroxide and chelated iron) and from March to June 2003 using persulfate and Fenton-based reagent. A proprietary chelated iron complex catalyst was selected for the TS based on bench-scale study results that indicated up to 85 percent destruction of target VOCs in site groundwater.

The purpose of the TS was to evaluate the effectiveness of persulfate and modified Fenton-based reagent to oxidize in-situ groundwater contamination, to provide data to estimate the radius of influence (ROI) associated with the application of the reagent into the subsurface, and to determine the most effective injection approach for successful contaminant oxidation. The design and procedures implemented to achieve these objectives included conducting a bench-scale study, installing six 100-foot deep wells as injection points, and performing five injection events and seven sampling events.

A preliminary evaluation of the TS data indicated that VOC concentrations were reduced in both injection wells and monitoring wells. The preliminary TS results suggest that Fenton-based reagent alone is more effective than the combination of Fenton-based reagent and persulfate. Fenton-based reagent treatment resulted in TCE reductions of 98 percent and 27 percent in injection wells and monitoring wells, respectively, whereas persulfate and Fenton-based reagent application resulted in a TCE reduction of 75 percent in injection wells and an increase of 10 percent for TCE in monitoring wells. Injection ROIs ranged from approximately 10 to 60 feet.

4.2.3 NATURE AND EXTENT OF CONTAMINATION

Based on the RI activities performed at Site N3, chlorinated VOCs and aromatic VOCs are considered the most significant contaminants due to the widespread, relatively high, concentrations. Groundwater is contaminated with chlorinated VOCs (principally TCE) and aromatic VOCs (principally benzene) associated with the past use of Site N3.

4.2.3.1 Groundwater

The chlorinated VOC groundwater plume at Site N3 appears to have originated at the Former Drum Dispensing Area that was located next to groundwater monitoring well N3-MW07 and spread to the

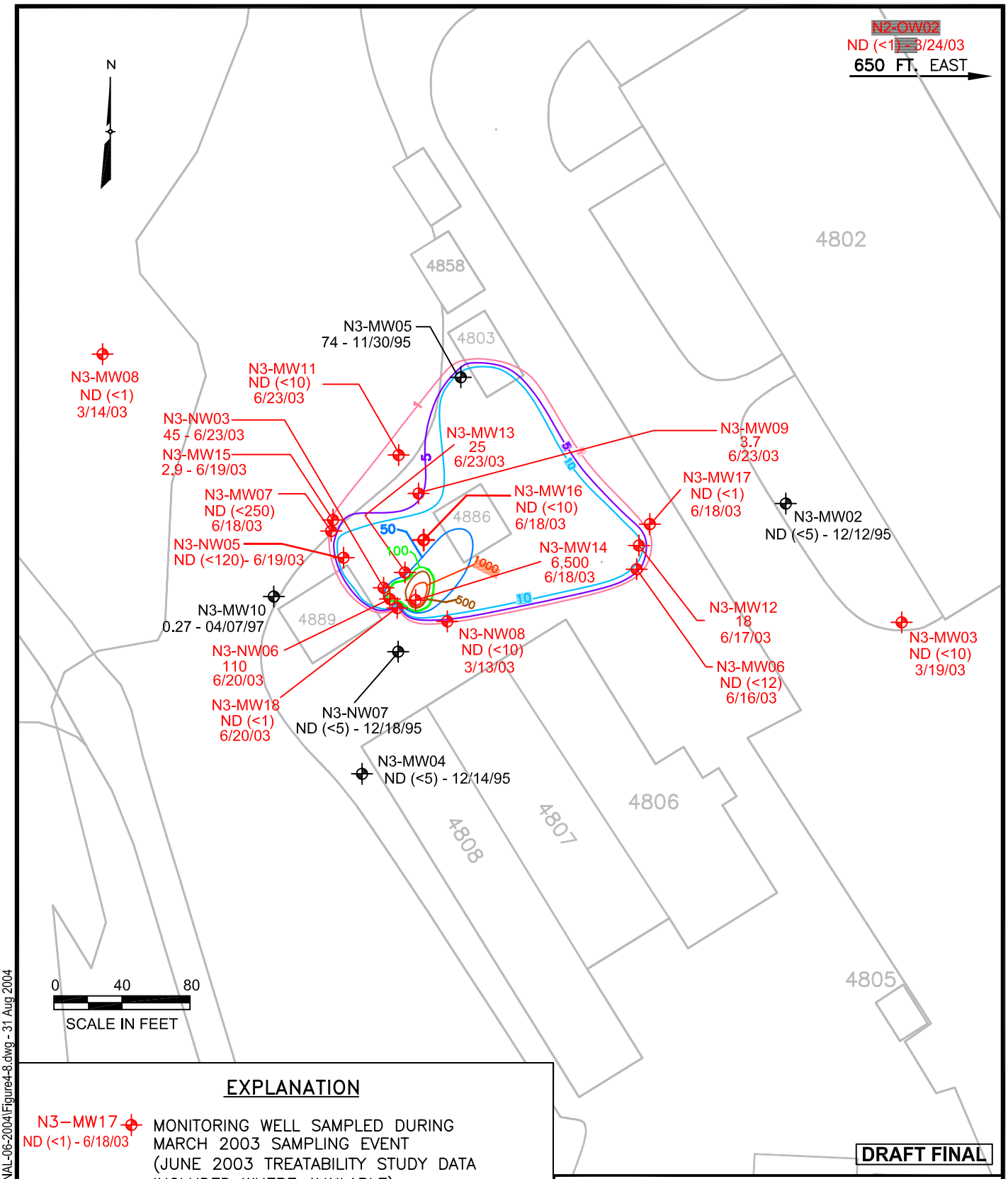
east (refer to inset, Figure 1-3). Selected wells have been sampled since 1988. Based upon laboratory analytical results from samples collected at those wells, concentration peaks are observed following periods of unusually high rainfall, which suggests that contamination in the vadose zone is dissolved by the rising groundwater. BTEX and total TPH concentrations are variable at Site N3 with some wells increasing in concentration and others decreasing. Results for the nested wells indicate that groundwater TCE concentrations are higher in the deeper wells than in the shallow wells. TCE concentrations in deep well N3-MW07 were consistently higher than concentrations in the adjacent shallower well N3-NW05 for the duration of the groundwater monitoring program.

The highest TCE concentrations at Site N3 have generally been detected in samples collected from well N3-MW07. Historically, the TCE concentrations at this well have ranged from 5,200 to 65,000 μg/L, significantly exceeding the established California MCL of 5 μg/L. The results of the 2003 sampling indicated that the maximum TCE concentration was 10,000 μg/L, detected at well N3-MW07. TCE groundwater concentration contours for Site N3 based on data collected during the 2003 groundwater monitoring events are presented on Figure 1-3.

The laboratory analytical results from samples collected during the March 2003 groundwater monitoring event indicated that the maximum TVPH concentration was 110 mg/L detected at well N3-MW14. Other organic compounds detected at Site N3, which exceed the respective MCL, include BTEX, 1,2-dichloroethane (DCA), carbon tetrachloride, and *cis*-1,2-DCE. Benzene groundwater concentration contours for Site N3 based on data collected during the 2003 groundwater monitoring events are presented on Figure 4-8.

The most recent detected metals concentrations in groundwater samples were below values calculated as background with the exceptions of barium, boron, cadmium, cobalt, copper, iron, inorganic lead, magnesium, manganese, vanadium, silver and zinc as described in the following paragraphs.

Barium, copper, silver, and zinc concentrations detected above background concentrations in groundwater samples were below their respective MCLs. Although iron concentrations were detected in groundwater samples above the tap water PRG and MCL, the concentrations above background were detected after 2002 and are related to TS reagents injected into the subsurface. Detected boron and



EXPLANATION

N3–MW17 ND (<1) - 6/18/03 — MONITORING WELL SAMPLED DURING MARCH 2003 SAMPLING EVENT (JUNE 2003 TREATABILITY STUDY DATA INCLUDED WHERE AVAILABLE)

N3–MW05 74 - 11/30/95 — MONITORING WELL SAMPLED DURING PREVIOUS EVENTS

10 — BENZENE CONCENTRATION CONTOUR (INTERVALS = 1, 5, 10, 50, 100, 500, 1000)

ND = NOT DETECTED

ALL CONCENTRATIONS SHOWN AS MICROGRAMS PER LITER

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Benzene Groundwater Concentration Contours

Date 06–2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure 4-8
Project No. 54212		

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cadmium concentrations slightly exceeded their respective MCLs, though these concentrations were below their respective tap water PRGs. There is no MCL promulgated for cobalt; however, the most recent detected concentrations were below the tap water PRG. Although detected magnesium concentrations exceeded background concentrations in unfiltered samples, no MCL or tap water PRG has been promulgated. Although inorganic lead was detected in the most recent groundwater samples at concentrations that exceeded the background value and MCL, no tap water PRG has been promulgated for inorganic lead and these detections were in unfiltered samples. Although manganese and vanadium were detected in the most recent groundwater samples at concentrations that exceeded their respective background values, tap water PRGs, and MCLs, these detections were also in unfiltered samples.

No background concentration values exist for organic lead and hexavalent chromium, and no MCL is available for hexavalent chromium. The most recent detected organic lead concentrations were below the tap water PRG.

4.2.3.2 Soil Gas

The active soil-gas survey conducted in October 1995 did not detect any volatile compounds, and the November 1995 active soil-gas survey reported trace levels (less than 5 μg/L) of TCE at three of the sample locations in the southeast portion of the site. The passive soil-gas survey conducted from September through October 1995 detected a total of 16 compounds. Eight of the 16 compounds were chlorinated volatiles and the highest detections were on the west side of Building 4886 and the paved area west of the southwest corner of Building 4802 and northeast of Building 4806. The other eight compounds were aliphatic hydrocarbons, aromatic hydrocarbons, and naphthalene. Many of the compounds detected by the soil-gas survey were later confirmed by groundwater sampling at Site N3.

NDMA has been consistently detected in water samples collected from Site N3 wells. NDMA was detected in March 2003 at concentrations ranging from 0.0227 to 0.254 μg/L. An MCL has not been promulgated for NDMA.

4.2.3.3 Soil

The most widespread organic compounds detected in soil at Site N3 were oil and grease, with concentrations up to 8,290 mg/kg. These compounds were predominantly detected in shallow soil samples below the pavement and generally lacked volatile and semivolatile constituents that are

commonly associated with petroleum hydrocarbons, suggesting the detections represent heavy petroleum hydrocarbons or decaying organic matter. Chlorinated VOCs and pesticides were detected at concentrations below residential PRGs in samples collected near the Drainage Ditch. Several PAHs were detected above residential PRGs; however, the relatively immobile nature of these compounds and the presence of the asphalt cap limit the potential for exposure to humans.

4.2.4 CONTAMINANT FATE AND TRANSPORT

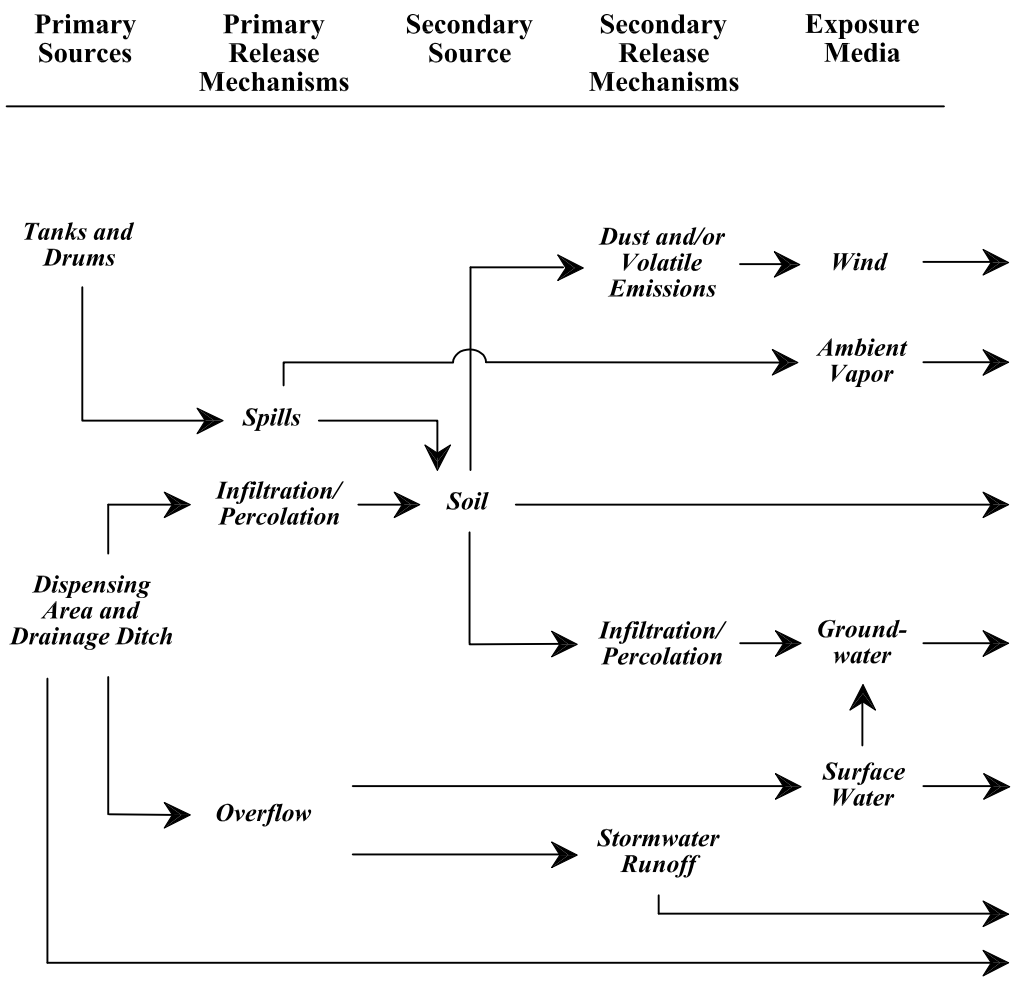
The subsurface contaminants of primary concern at Site N3 are chlorinated VOCs (primarily TCE), aromatic hydrocarbons (primarily benzene), and petroleum hydrocarbons in groundwater. The primary sources for the groundwater contamination were TCE spills at the Drum Dispensing Area and BTEX from leaking USTs. The Site N3 conceptual model is included in the OU6 RI (Earth Tech, 2000a), and the potential contaminant exposure pathways are illustrated on Figure 4-9.

Due to the distance (over 6 miles) between the Site N3 plume and the nearest potential water supply wells at North Edwards, contamination from this site does not threaten the potable water supply and, thus, does not represent an immediate threat to human health. Groundwater monitoring results indicate that the plume has reached steady-state conditions and migration toward the North Edwards wells is unlikely.

4.2.4.1 Plume Volume and Extent

TCE, *cis*-1,2,-DCE, BTEX, carbon tetrachloride and PCE concentrations attributable to on-site sources exceed MCLs in groundwater at Site N3. The current volumes of TCE and benzene dissolved in groundwater at Site N3 were estimated based on concentration contours shown on Figure 1-3 and Figure 4-8, respectively.

Assuming an effective bulk rock porosity of 0.30 (Earth Tech, 2003b) and thickness of the contaminated aquifer to be approximately 90 feet, the volumes of dissolved TCE contained within the 3,500 and between the 2,000 and 3,500, 1,000 and 2,000, 500 and 1,000, 100 and 500, 50 and 100, 10 and 50, and 5 and 10 μg/L concentration contour lines were estimated to be approximately 2.53, 0.45, 0.65, 1.64, 16.41, 1.04, 0.24, and 0.08 gallons, respectively, for a total of 23.04 gallons of TCE (Appendix D). The volumes of dissolved benzene contained within the 1,000, and between the 500 and



Receptor		Human		Ecological	
	Exposure Route	Current Industrial	Future Construction	Terrestrial	Aquatic
Wind	Inhalation	C	P	I	I
Ambient Vapor	Inhalation	N	N	N	N
Soil	Ingestion	C	P	I	I
	Dermal Contact	C	P	I	I
Ground-water	Ingestion	P	I	I	I
	Inhalation	P	I	I	I
	Dermal Contact	P	I	I	I
Surface Water	Ingestion	N	P	N	N
	Inhalation	N	P	N	N
	Dermal Contact	N	P	N	N
Stormwater Runoff	Ingestion	N	P	N	N
	Inhalation	N	P	N	N
	Dermal Contact	N	P	N	N

Notes:

I = Incomplete pathway
C = Complete pathway
P = Potential pathway, currently incomplete
N = Incomplete, not applicable due to change in facility use

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Site N3
Contaminant Exposure Pathway Model

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1,000, 100 and 500, 50 and 100, 10 and 50, 5 and 10, and 1 and 5 μg/L concentration contour lines were estimated to be approximately 0.09, 0.02, 0.02, 0.02, 0.09, 0.003, and 0.002 gallons, respectively, for a total of 0.245 gallons.

4.2.5 RISK ASSESSMENTS

4.2.5.1 Site N3 Ecological Risk Assessment Summary

Based upon the SERA results (USGS, 2003a), no complete, or potentially complete, pathways exist between facility-related contaminants and potential ecological receptors. No potential for biological receptors to be exposed to on-site contaminants was identified during the SERA.

4.2.5.2 Site N3 Human Health Risk Assessment Summary

The purpose of the HHRA was to summarize the potential risk to human health posed by chemicals that have been released into the environment at Site N3 (Earth Tech, 2003a). Although residential use scenarios were considered in the OU6 assessment, the sites/AOCs in OU6 are not currently used for residential purposes, nor is such use anticipated (HB&A, 2001). Because the estimated risks for the residential scenarios do not reflect the current site conditions, the following summary of potential cancer risks and non-cancer hazards only include industrial use considerations.

Groundwater – Groundwater is not used at this location for any potable, industrial, or agricultural uses. The nearest groundwater wells used for potable purposes are located at North Edwards, approximately 6 miles from the site. Therefore, pathways involving direct exposure to groundwater are not considered complete. However, indirect exposure to VOCs in groundwater was evaluated, and found to have risks and hazards less than the CERCLA risk criteria.

Soil – The results of the site-specific risk assessment indicated potential cancer risks associated with the site were driven primarily by benzo(*a*)pyrene (detected in 9 out of 45 samples) in soil, and the total noncarcinogenic hazard was driven primarily by organic lead (detected in 34 out of 35 samples) in soil. Although the total carcinogenic risk at Site N3 was estimated to be in excess of 1×10^{-6} and the total noncarcinogenic hazard was estimated to exceed 1, no complete pathways currently exist for exposure to soil containing these chemicals due to asphalt and concrete paving of the area. The detections of

benzo(*a*)pyrene were from surface samples collected through the asphalt pavement, and are likely related to the asphalt and thus do not appear to be representative of site-wide conditions.

It should be noted that the detections of organic lead are "Ja" qualified, indicating that results are detected above the detection limit, but below the reporting limit, and thus are considered quantitatively uncertain. In addition, the site is capped with asphalt and administrative controls (such as excavation permits) are in place to limit worker exposure. Based on the arguments provided above and those included in the Site Status Memorandum (Appendix A), the RPMs agreed to a decision of No Action Required for Soil for Site N3.

4.2.5.3 Site N3 Risk Summary

Based upon the current and future industrial land use planned at Site N3, the HHRA and SERA results indicated that potential risk to human health and the environment is not likely to be significant.

4.2.6 SUMMARY OF CONTAMINANTS OF CONCERN

The groundwater plume associated with Site N3 has commingled with the plumes originating from Sites N2 and N7. The analytes (detected in wells associated with Site N3 during the 2003 sampling event) that exceed MCLs are presented in Table 4-2 along with their respective maximum detected concentrations.

4.3 SITE N7

4.3.1 SITE DESCRIPTION AND HISTORY

Site N7, Building 4827 Former Drum Storage Areas, is located south of Building 4827 along the southern boundary of Dryden (Figure 1-2). The drum storage areas (Figure **Error! Reference source not found.**) were identified as AOC Numbers A4827/1 and A4827/2 in the Expanded Source Investigation/RCRA Facility Assessment document (The Earth Technology Corporation, 1993). AOC Number A4827/1 was located approximately 15 feet south of Building 4827, while AOC Number A4827/2 was located approximately 60 feet east of AOC Number A4827/1.

TABLE 4-2. SITE N3 STATE MAXIMUM CONTAMINANT LEVEL EXCEEDANCES

	Maximum Concentration Detected in 2003 (µg/L)	Historical High (µg/L)	California Primary MCL (µg/L)
1,2-Dichloroethane	170	1,900	0.5
Benzene	1,300	19,000	1
Carbon tetrachloride	1,300	14,000	0.5
Chloroform	2,300	4,200	100
cis-1,2-Dichloroethene	670	2,000	6
Ethylbenzene	1,300	2,600	700
Methylene chloride	180	20,000	5
Toluene	190	37,000	150
Trichloroethene	10,000	65,000	5
Xylenes	5,100	25,400	1,750

Notes:

µg/L = micrograms per liter
MCL = maximum contaminant level

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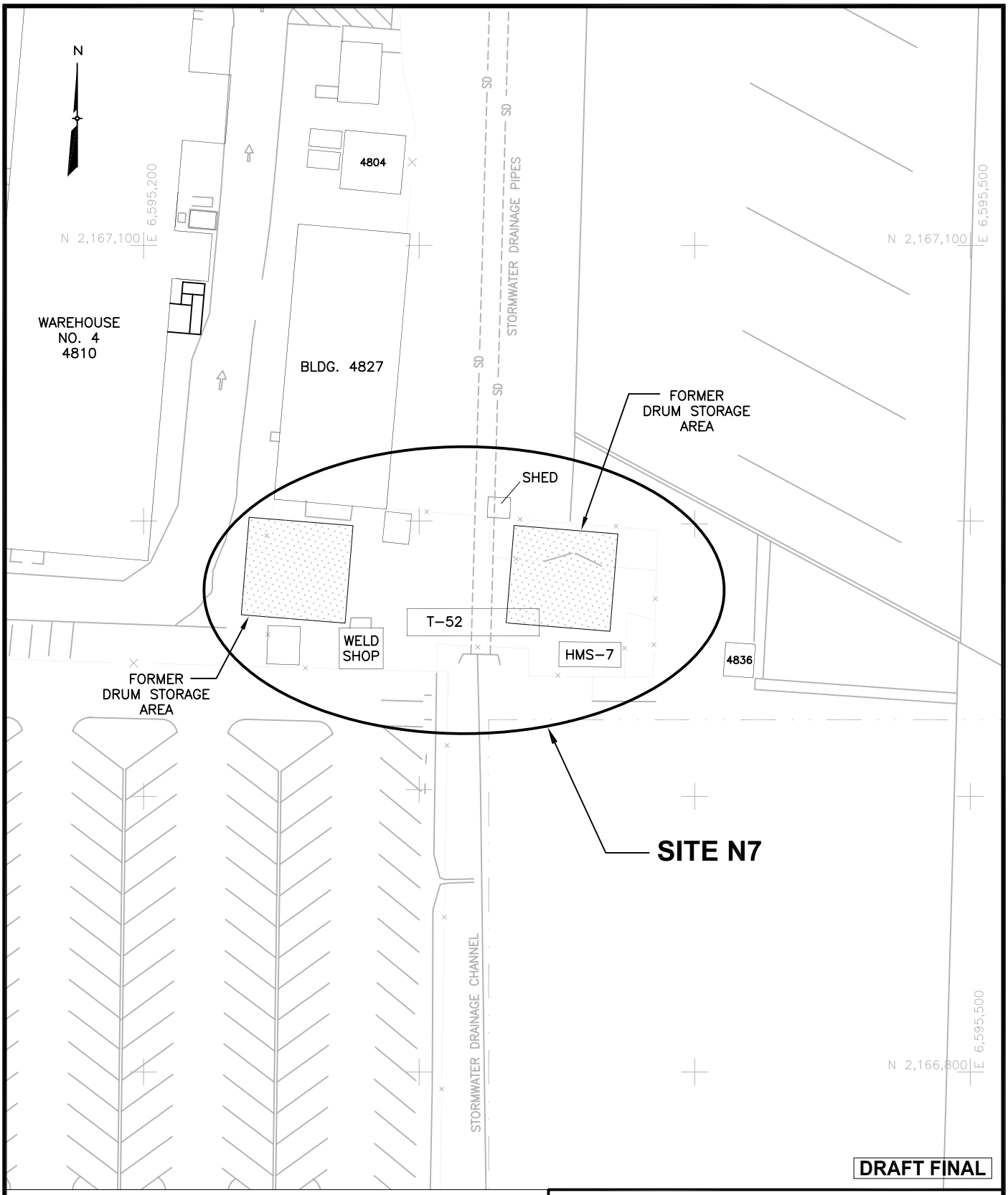

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SCALE IN FEET

Site Map
Site N7

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The storage areas were reportedly used for storage of drummed hazardous materials and wastes such as paints, paint thinners, and petroleum, oils, and lubricants. During a 1992 site visit, drums containing antifreeze, motor oil, and paint primer were observed. The drum storage areas were reportedly used from before 1980 until 1993. A stormwater drainage channel, which manages stormwater runoff from Forbes Avenue and the northern portion of the Main Base area, passes north to south through the site.

4.3.2 REMEDIAL ACTIVITIES

4.3.2.1 Remedial Investigations

Earth Tech conducted a previous field investigation at Site N7 from 1994 to 1995. The investigation consisted of sampling eight soil-gas points, three soil borings, and one groundwater monitoring well. Sampling points were placed adjacent to both the Drum Storage Areas and the stormwater drainage channel, which passes through the site.

In 1996, Rust conducted an initial passive soil-gas survey to screen for volatile compounds in soil and/or groundwater at 26 locations. The soil-gas samples were analyzed for a variety of compounds, including aromatic volatile compounds BTEX, chlorinated VOCs, and total aliphatic hydrocarbons (Quadrel, 1996). Later in 1996, Rust conducted a supplemental passive soil-gas survey to screen for volatile compounds in soil and/or groundwater at 18 locations. The purpose of the survey was to further characterize the extent of target compounds in soil-gas at Site N7. The soil-gas samples were analyzed for the same suite of organic compounds as the initial survey.

RI activities performed by Rust in 1997 included well installations, soil sampling, packer testing, downhole video logging and pump testing. One nested air sparge/SVE well (N7-ASW1A/B), one dual-extraction well (N7-DEW1), six vapor monitoring wells (N7-VW02 through N7-VW06 and N7-VW01A/B), and seven groundwater monitoring wells (N7-MW02 through N7-MW08) were drilled and installed at Site N7 between February and March 1997. Soil samples were collected using a hand auger from between 0 to 6 feet bgs and selected samples were analyzed for metals, VOCs, SVOCs, chloride/nitrogen/sulfate, and TOC. Packer testing was conducted during drilling of six boreholes (N7-DEW1, N7-MW02 through N7-MW06) to evaluate the in-situ permeabilities of bedrock intervals prior to selecting well screen intervals. At Site N7, packer test data indicated bedrock horizontal hydraulic conductivity ranged from 2.27×10^{-4} to 1.42 ft/day. A downhole video tool was used to

create video logs of boreholes N7-DEW1 and N7-MW02 through N7-MW04 to provide data for orientation, dip and strike of bedding, joints, fractures, and shear planes as well as measurement of locations of fluid entry and fluid levels. In August 1997, a 7.75-hour groundwater pumping test was conducted at well N7-DEW1. Groundwater samples were collected from wells N7-ASW1, N7-DEW1, and N7-MW02 through N7-MW08 after installation and development. Selected samples were analyzed for VOCs, SVOCs, pesticides/PCBs, metals, chloride/nitrogen/sulfate, cyanide, and sulfide.

RI activities performed by Rust in 1998 included a seismic survey, well installations, packer testing, and groundwater sampling. In January 1998, a 3-D seismic reflection survey was conducted to assist in selecting well locations. Two well boreholes (N7-MW09A/B/C and N7-VW07) were drilled at Site N7 in March and April 1998. Packer testing was conducted during drilling of the two boreholes to gather data for the estimation of in-situ permeabilities of bedrock intervals prior to selecting well screen intervals. One vapor monitoring well (N7-VW07) and one nested groundwater monitoring well (N7-MW09A/B/C) were installed in March 1998. A step-drawdown test was conducted at well N7-MW09A in April 1998. Groundwater samples were collected from well N7-MW09A/B/C after installation and development. Groundwater samples were also collected from multiple intervals in the borehole for well N7-MW09 during packer testing. Selected samples were analyzed for VOCs, jet fuel number 5 (JP-5)/diesel, metals, bromide/chloride/nitrogen/sulfate, fluoride, and sulfide.

4.3.2.2 Groundwater Monitoring

Groundwater monitoring has been performed at Site N7 since 1995. The current groundwater monitoring program, conducted by Rust/Earth Tech, began in 1996. The most recent event addressed in this FS was completed in March 2003. The event consisted of groundwater level measurement, groundwater sample collection, and the laboratory analysis of those samples. Groundwater samples collected during the March 2003 monitoring event were analyzed for alkalinity, TOC, VOCs, SVOCs, TVPH, metals, perchlorate, and NDMA.

4.3.2.3 Pilot Study

A pilot study of dual-extraction and air sparge/SVE systems was performed by Rust in July 1997. The primary pilot study objective was to collect site-specific engineering data necessary for the selection of an effective extraction technology and the design of a cost-effective long-term treatment system for

Site N7. Pertinent data collected during the pilot study were groundwater and vapor extraction flow rates, groundwater and vapor contaminant concentrations, and groundwater and vapor capture zones.

Based on the site geology and the results of the pilot study, it was concluded that SVE, air sparging, and dual extraction appeared to be effective, in the short-term, at reducing concentrations of volatile subsurface contaminants. Because the technologies were considered potentially applicable for treating areas of Edwards AFB where groundwater in fractured bedrock is contaminated with halogenated organic compounds, a TS at the most contaminated area of Site N7 was recommended.

Because of the significant increase in SVE flows observed during groundwater extraction, and the potential of this technology to expose an increased surface area of bedrock fractures to SVE, dual extraction was recommended as the treatment technology for the Site N7 TS. Although longer-term SVE showed a higher halogenated VOC removal rate than the other technologies tested, it was modified in the field to include lowering of the water table by 30 feet to expose the well screens and therefore, closely resembled a longer-term dual-extraction approach. Further information regarding the pilot study is discussed in the *Site N7 Pilot Study Results and Treatability Study Recommendations Report*, *Final* (Rust, 1997d).

4.3.2.4 Treatability Studies

Dual Extraction

A TS was performed in order to assess the long-term viability of the dual-extraction technique in treating the TCE groundwater plume. The TS was initiated in October 1998 and completed in April 1999 with an interruption in operation from December 1998 to February 1999 due to mechanical difficulties.

Laboratory analytical results from groundwater samples collected from the influent stream indicated that the highest TCE concentration (2,100 μg/L) was detected in November 1998. The lowest TCE concentration (330 μg/L) was detected in the sample collected immediately prior to the completion of the TS. Laboratory analytical results from soil-vapor samples collected from the influent stream indicated that TCE concentrations declined from 3,000 ppb v/v (the highest concentration detected during the study) in November 1998 to 4.6 ppb v/v in April 1999.

A total of approximately 7.95 lbs of major contaminants (including 6.37 lbs of TCE) were removed from soil vapor and 0.65 lbs of contaminants (including 0.35 lbs of TCE) were removed from groundwater. Although the TS data indicated a downward trend in major contaminant concentrations in both soil vapor and groundwater, the success of dual extraction was deemed temporary. The post-TS groundwater monitoring data revealed groundwater contaminant concentrations have rebounded since the completion of the TS, most likely due to the influx of contaminated water from the surrounding formation. The results of the longest-term TS (Site N3) indicated that the limits of the dual extraction implementation have been met.

Chemical Oxidation

An in-situ chemical oxidation TS using potassium permanganate was conducted at Site N7 in August 2000 and was designed to destroy contaminants in situ, determine the injection ROI, optimize bedrock injection methods, monitor permanganate persistence, and evaluate groundwater quality effects. In August 2000, 7,450 gallons of 1.8 percent potassium permanganate solution were serially injected into eight screened wells and two boreholes over 5 days. Groundwater samples collected periodically for 60 days following treatment were analyzed for permanganate, metals, and VOCs. TCE and *cis*-1,2-DCE remained below detection limits (from pre-injection concentrations of 6,500 and 790 µg/L, respectively) (Earth Tech, 2000b). The groundwater samples collected in March 2003 indicated that TCE and *cis*-1,2-DCE levels have rebounded. TCE and *cis*-1,2-DCE concentrations of 2,000 and 340 µg/L, respectively, were detected in former injection well N7-MW01. Elevated metal concentrations following treatment have decreased to less than 80 percent of their post-injection maxima, with the exception of chromium and nickel. Monitoring results indicated a horizontal ROI between 30 and 55 feet and a vertical ROI of at least 28 feet. Groundwater samples collected in March 2003 showed permanganate persisting in only one of the former injection wells, N7-MW01 at a concentration of 24 mg/L.

4.3.3 NATURE AND EXTENT OF CONTAMINATION

Based on the RI activities performed at Site N7, VOCs in groundwater are considered the most significant contaminants due to the widespread, relatively high, concentrations. Groundwater is contaminated with TCE and other chlorinated VOCs associated with the past use of Site N7.

4.3.3.1 Groundwater

Based on the site characterization work conducted by Earth Tech from 1994 to 1995, TCE and *cis*-1,2-DCE were detected in samples collected from well N7-MW01 at concentrations of 4,500 and 850 µg/L, respectively. Lower TCE concentrations have been detected in subsequent semiannual groundwater sampling. The highest TCE concentration detected at Site N7 during the March 2003 sampling event was 2,000 µg/L reported at well N7-MW01. This concentration significantly exceeds the established California MCL for TCE of 5 µg/L. TCE groundwater concentration contours for Site N7 based on data collected during the 2003 groundwater monitoring events are presented on Figure 1-3. Other organic compounds detected in groundwater samples collected at Site N7 included *cis*-1,2-DCE and *trans*-1,2-DCE, which are anaerobic breakdown products of TCE, and carbon tetrachloride. The maximum *cis*-1,2-DCE and *trans*-1,2-DCE concentrations were 1,100 and 11 µg/L, detected at wells N7-MW12 and N7-MW01, respectively.

Metals concentrations detected in the most recent groundwater samples collected at Site N7 were sporadic and below background concentrations with the exception of antimony, total chromium, cobalt, cyanide, manganese, mercury, molybdenum, nickel, selenium, silver, vanadium, and zinc as described below.

Although total chromium, manganese, and nickel concentrations were detected in groundwater samples above the respective tap water PRG and/or MCL, these concentrations are related to TS reagents injected into the subsurface and will dissipate over time. Cyanide, selenium, vanadium, and zinc concentrations were below the respective MCLs. Although mercury was detected at concentrations above the MCL, the detections were below the tap water PRG.

The most recent detected concentration of silver exceeded the tap water PRG and secondary MCL; however, this detection was in an unfiltered sample (unfiltered samples are likely to contain naturally-occurring insoluble metals) collected from well N7-MW04 in January 2001. Concentrations of silver were not detected in samples collected subsequently from nearby wells N7-MW01, N7-MW02, N7-MW03, and N7-MW11. No MCL has been promulgated for molybdenum, cobalt, or antimony. The March 2002 sample collected from well N7-MW03 contained concentrations of molybdenum, which only slightly exceeded the tap water PRG. Concentrations of molybdenum were below background concentrations in samples collected subsequently from nearby wells N7-MW01,

N7-MW02, and N7-MW11. Cobalt concentrations were below the tap water PRG. The most recent samples collected from well N7-ASW1B and N7-MW02 contained antimony at concentrations that exceeded the tap water PRG in unfiltered samples. Concentrations of antimony were below background concentrations in samples collected subsequently from nearby wells N7-MW01, N7-MW02, N7-MW03, and N7-MW11.

No background concentration values exist for boron and no MCL is available for hexavalent chromium. Boron concentrations detected in 2003 were below the tap water PRG. The most recent samples collected from well N7-MW09B and N7-MW02 contained hexavalent chromium at concentrations that slightly exceeded the tap water PRG in unfiltered samples. Concentrations of hexavalent chromium were below reporting limits in the most recently collected samples from nearby wells N7-MW04 and N7-MW11.

NDMA was detected in 2003 at concentrations ranging from 0.0016 to 0.002 μg/L. An MCL has not been promulgated for NDMA.

4.3.3.2 Soil Gas

Based on the site characterization work conducted by Earth Tech from 1994 to 1995, VOCs were not detected as part of the soil-gas survey. The passive soil-gas survey conducted by Rust in 1996 suggested a former TCE release in the vicinity of well N7-MW01 and a groundwater plume that spread laterally as it moved downgradient to the east-southeast.

4.3.3.3 Soil

Based on the site characterization work conducted by Earth Tech from 1994 to 1995 and Rust from 1997 to 1998, VOCs, SVOCs, TPH, and metals were not detected above threshold screening levels.

4.3.4 CONTAMINANT FATE AND TRANSPORT

The subsurface contaminants of primary concern at Site N7 are chlorinated VOCs, primarily TCE, *cis*-1,2-DCE, and carbon tetrachloride in groundwater. The primary sources for the groundwater contamination at Site N7 were TCE spills associated with the Drum Storage Areas and/or Paint Shop.

The Site N7 conceptual model is included in the OU6 RI (Earth Tech, 2000a), and potential contaminant exposure pathways are illustrated on Figure 4-11.

Due to the distance (over 6 miles) between the Site N7 plume and the nearest potential water supply wells at North Edwards, contamination from this site does not threaten the potable water supply and, thus, does not represent an immediate threat to human health. Groundwater monitoring results indicate that the plume has reached steady-state conditions and migration toward the North Edwards wells is unlikely.

4.3.4.1 Plume Volume and Extent

TCE, *cis*-1,2,-DCE, and carbon tetrachloride concentrations, attributable to on-site sources, exceed MCLs in groundwater at Site N7. The current volume of TCE dissolved in groundwater at Site N7 was estimated based on concentration contours shown on Figure 1-3. Assuming an effective bulk rock porosity of 0.30 (Earth Tech, 2003b) and thickness of the contaminated aquifer to be 90 feet, the volumes of dissolved TCE contained within the 1,000, and between the 500 and 1,000, 100 and 500, 50 and 100, 10 and 50, and 5 and 10 μg/L concentration contours were estimated to be approximately 0.12, 0.47, 11.88, 0.99, 0.27, and 0.04 gallons, respectively, for a total of 13.77 gallons (Appendix D).

4.3.5 RISK ASSESSMENT SUMMARY

4.3.5.1 Site N7 Ecological Risk Assessment Summary

Based upon the SERA (USGS, 2003a) results, no complete, or potentially complete, pathways exist between facility-related contaminants and potential ecological receptors. No potential for biological receptors to be exposed to on-site contaminants was identified during the SERA.

4.3.5.2 Site N7 Human Health Risk Assessment Summary

The purpose of the HHRA was to summarize the potential risk to human health posed by chemicals that have been released into the environment at OU6 (Earth Tech, 2003a). Although residential use scenarios were considered in the OU6 risk assessment, the sites/AOCs in OU6 are not currently used for residential purposes, nor is such use anticipated (HB&A, 2001). Because the estimated risks for the

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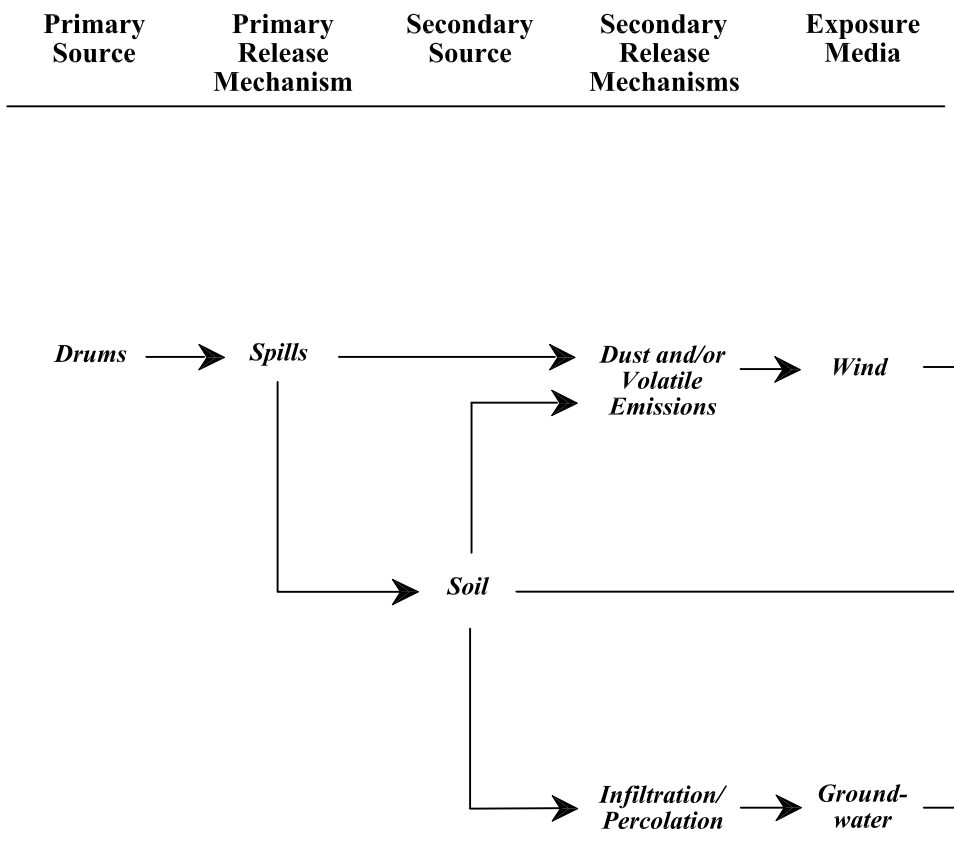

Receptor

Exposure Route	Human: Current Industrial	Human: Future Construction	Ecological: Terrestrial	Ecological: Aquatic
Inhalation	C	P	I	I
Ingestion	C	P	I	I
Dermal Contact	C	P	I	I
Ingestion	P	P	I	I
Inhalation	C	P	I	I
Dermal Contact	I	P	I	I

Notes:

I = Incomplete pathway
C = Complete pathway
P = Potential pathway, currently incomplete
N = Incomplete, not applicable due to change in facility use

DRAFT FINAL

Site N7
Contaminant Exposure Pathway Model

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure
Project No. 54212		4-11

residential scenarios do not reflect the current site conditions, the following summary of potential cancer risks and non-cancer hazards only include industrial use considerations.

Groundwater – Groundwater is not used at this location for any potable, industrial, or agricultural uses. The nearest groundwater wells used for potable purposes are located at North Edwards, approximately 6 miles from the site. Therefore, pathways involving direct exposure to groundwater are not considered complete. However, indirect exposure to VOCs in groundwater was evaluated and found to have risks and hazards less than the CERCLA risk criteria.

Soil – The results of the site-specific risk assessment indicated the potential cancer risks (3.23×10^{-5}) associated with the site were driven primarily by benzo(*a*)anthracene, benzo(*b*)fluoranthene, benzo(*k*)fluoranthene, dibenz(*a,h*)anthracene, and benzo(*a*)pyrene (each analyte detected in 1 out of 8 samples) in soil. The total noncarcinogenic hazard was estimated to be below 1.

Although the total carcinogenic risk at Site N7 was estimated to be in excess of 1×10^{-6}, no complete soil exposure pathways currently exist due to asphalt and concrete paving of the area. PAHs such as benzo(*a*)pyrene are associated with relatively unrefined products such as asphalt. PAHs were detected in only 1 of 8 samples, collected at the location of well N7-VW05, and do not appear to be representative of site-wide conditions. In addition to the site being capped with asphalt, administrative controls (such as excavation permits) are in place to limit worker exposure to surface soil. Based on the arguments provided above and those included in the Site Status Memorandum (Appendix A), the RPMs agreed to a decision of No Action Required for Soil for Site N7.

4.3.5.3 Site N7 Risk Summary

Based upon the current and future industrial land use planned at Site N7, the HHRA and SERA results indicated that potential risk to human health and the environment is not likely to be significant.

4.3.6 SUMMARY OF CONTAMINANTS OF CONCERN

The groundwater plume associated with Site N7 has commingled with the plumes originating from Sites N2 and N3. The analytes (detected in wells associated with Site N7 during the March 2003 sampling event), which have historically exceeded MCLs, are presented in Table 4-3 along with their respective maximum detected concentrations.

TABLE 4-3. SITE N7 STATE MAXIMUM CONTAMINANT LEVEL EXCEEDANCES

	Maximum Concentration Detected in March 2003 (μg/L)	Historical High (μg/L)	California Primary MCL (μg/L)
1,2-Dichloroethane	0.69	130	0.5
Benzene	ND	2.7	1
Bromoform	2.3	510	80
Carbon tetrachloride	96	96	0.5
cis-1,2-Dichloroethene	1,100	3,700	6
Trichloroethene	2,000	7,100	5

Notes:

μg/L = micrograms per liter
MCL = maximum contaminant level
ND = not detected

5.0 OPERABLE UNIT 6 PLUME MASS AND EXTENT

The OU6 groundwater plume has been characterized based upon the primary contaminant of concern (COC) – TCE. The approximate areal extent of the OU6 TCE plume (Appendix D) is 2,168,861 square feet (approximately 50 acres). The approximate TCE volume is 39.95 gallons (486 lbs). The approximate areal extent of the secondary COC, benzene, is 19,482 square feet (approximately 0.5 acre) and the approximate benzene volume is 0.245 gallons (1.73 lbs). The approximate TCE plume extent, based on concentration contour lines derived from the March 2003 groundwater monitoring event and the June 2003 chemical oxidation treatability study groundwater performance monitoring, is shown on Figure 1-3.

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6.0 IDENTIFICATION OF REMEDIAL ACTION OBJECTIVES

6.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

CERCLA requires that remedial actions attain a degree of cleanup and control of hazardous substances that complies with ARARs of federal environmental laws and more stringent state environmental and facility siting laws. The NCP defines applicable requirements as "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site". Relevant and appropriate requirements are "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not 'applicable' to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site".

ARARs (and "to be considered" [TBC] criteria necessary for protection) must be attained for hazardous substances, pollutants, or contaminants remaining on-site at the completion of the remedial action, unless a waiver of an ARAR is justified. An alternative that does not meet ARARs under federal environmental or state environmental or facility siting laws may be selected under the following circumstances:

- The alternative is an interim measure and will become part of a total remedial action that will attain the applicable or relevant and appropriate federal or state requirement.
- Compliance with the requirement will result in greater risk to human health and the environment than other alternatives.
- Compliance with the requirement is technically impracticable from an engineering perspective.
- The alternative will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, or limitation through use of another method or approach.
- With respect to a state requirement, the state has not consistently applied, or demonstrated the intention to consistently apply, the promulgated requirement in similar circumstances at other remedial actions within the state.

- For Fund-financed response actions only, an alternative that attains the ARAR will not provide a balance between the need for protection of human health and the environment at the site and the availability of Fund monies to respond to other sites that may present a threat to human health and the environment.

There are three kinds of ARARs: chemical-specific, location-specific, and action-specific. Chemical-specific ARARs are health- or risk-based concentration limits for various media (i.e., groundwater, surface water, air, and soil), which are established for a specific chemical that may be present in a specific medium at the site, or that may be discharged during removal activities. Federal, state, and local location-specific ARARs are restrictions placed on activities within specific locations (e.g., flood plains, historic places, and sensitive ecosystems or habitats). Action-specific ARARs are technology- or activity-based restrictions that are triggered by the type of removal activity under consideration. Potential ARARs identified for the remedial action for the Dryden groundwater contaminant plume are provided in Appendix E.

In addition to ARARs, non-promulgated criteria advisories and guidance that do not meet the definition of ARARs, but may assist in determining what is necessary to be protective of human health and the environment, may also be applied to the remedial action. These TBCs criteria may be used to determine cleanup levels when ARARs do not exist or when ARARs alone would not be sufficiently protective of human health and the environment. Although TBCs are not legally binding, and the selection of TBCs as performance standards is discretionary and not mandatory, if a TBC is chosen as a cleanup requirement, it becomes a performance standard to which the chosen remedy must comply. TBCs are also listed in Appendix E.

The ARARs and relevant TBCs included in this FS are identified based on the information presented in the OU6 RI (Earth Tech, 2000a). Regulations, policies, and guidelines that may be ARARs, or are TBCs, for OU6 remedial actions were evaluated to ensure that the actions carried out under the ERP were consistent with the regulations presented in Appendix E and the following:

- CERCLA (42 United States Code [U.S.C.] 9601 et seq.)
- SARA (42 U.S.C. 9601 et seq.)
- NCP (40 CFR 300)
- CFR Title 29
- CCR (California Code of Regulations) Title 14
- CCR Title 22

- CCR Title 23
- CCR Title 27

6.2 WORKER PROTECTION AND GENERAL CONSTRUCTION-RELATED REGULATIONS

General industry regulations are implemented and enforced by the Occupational Safety and Health Administration (OSHA) to safeguard the workers performing remedial action activities at sites requiring remedial action. Conformance with these standards should be adhered to during all phases of the recommended remedial action. Generally, OSHA coverage extends to all private sector employers and employees in the 50 states. Those not covered under these standards include self-employed persons, certain state and local government employees, and federal employees covered under other federal statutes. The requirements are summarized in Appendix E.

6.3 REMEDIAL ACTION OBJECTIVES

The RAOs and approach were developed based upon CERCLA and NCP requirements, human health and ecological risk evaluations, and the ARARs. Although, based upon current and future land use scenarios, risks associated with COC concentrations in soil and groundwater are mitigated by the lack of complete exposure pathways, ARARs exist that drive a remedial action for groundwater. The overall RAO is to reduce, to acceptable levels, the risk associated with the COCs identified in the OU6 RI. In order to achieve this objective, the remedial action will entail the following:

- Protection of human health by preventing exposure to water-borne contaminants that pose a total excess cancer risk of 10^{-6} or a noncarcinogenic hazard index of greater than 1 under current and projected land use.
- Protection of human health by preventing exposure to water-borne contaminants that exceed MCLs.
- Protection of the environment by preventing exposure of sensitive flora and fauna to site contaminants.
- Disposal of waste streams generated by the remedial action.

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7.0 IDENTIFICATION, DEVELOPMENT, AND SCREENING OF TECHNOLOGIES

The FS guidance (U.S. EPA, 1988) allows for flexibility in the approach to the evaluation process due to the wide range of variables that may exist from site to site. Following the identification of RAOs, the next phase of the FS process is the identification, development, and screening of technologies. This phase may include the following six steps followed by a detailed evaluation:

1. Identification of potential treatment and disposal technologies as response options
2. Screening of potential treatment and disposal technologies based on technical implementability
3. Evaluation of process options based on effectiveness, implementability, and relative cost
4. Selection of a representative process for each technology type
5. Combination of media-specific technologies into alternatives
6. Screening of alternatives

The subsurface lithology at Dryden is comprised of fractured bedrock, with minimal groundwater existing within the overlying alluvium. This hydrogeological setting, and the limited well yields observed during previous TS activities at Dryden, impose limitations on the number of implementable technologies that may be considered for Dryden. Because of the limited number of implementable options, steps 3, 4, and 6 were not performed and all options considered implementable in the initial screening were retained for detailed evaluation.

7.1 DEVELOPMENT OF GENERAL RESPONSE ACTIONS

A total of five general response actions were identified that may be instituted and/or combined to satisfy the RAOs for the project. These include:

- Institutional Controls
- Collection
- Treatment
- Discharge
- Containment

Additionally, as required by the NCP, the No Action alternative will be retained throughout the FS process. Although the FS process may present the No Action alternative as some type of environmental monitoring, no monitoring or additional institutional controls will be considered under No Action. No Action may be appropriate if no threats, either current or potential, to human health or the environment

exist. The No Action alternative is included to provide a baseline for the comparison of other alternatives. Because no remedial activities would be implemented with the No Action alternative, long-term human health and environmental risks for the site essentially would be the same as those identified in the baseline risk assessment (Earth Tech, 2003a). No complete exposure pathways exist to receptors at the site.

Institutional controls are administrative and legal actions designed to eliminate risks to the environment by controlling exposure pathways in lieu of contaminant reduction or removal. Institutional controls involve minimal remedial activity, and the technologies considered under institutional controls include "access restrictions", "alternate water supply", and "natural attenuation and/or monitoring".

Collection involves the removal of groundwater from the aquifer, and the technologies considered under collection include "extraction" and "subsurface drains". The process options considered are usually associated with treatment and discharge.

Treatment can be performed either in situ or ex situ following the collection of groundwater. The ex-situ process options considered under the treatment response action include "biological treatment", "physical/chemical treatment", "thermal destruction", and "off-site treatment". The in-situ treatment process options considered under the treatment response action include "bioremediation", "sparging with vapor extraction", "permeable treatment beds", and "chemical reaction".

Discharge is usually related to tasks that follow collection and/or extraction and, if necessary, treatment of the collected groundwater. Discharge is the determination of the final disposition of the groundwater. The technologies considered under discharge include on- and off-site.

Containment prevents the migration of groundwater and the associated plume through the manipulation and control of the aquifer. The intent of the containment approach is to eliminate the potential for exposure to contaminated media through immobilization of contaminants. The technologies considered under containment include "capping", "vertical barriers", "horizontal barriers", and "hydraulic barriers". General response actions are presented in Table 7-1.

TABLE 7-1. PRELIMINARY SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS - DRYDEN

Response Action	Remedial Technology	Process Options	Description	Screening Comments Based Upon Technical Implementability
No Action	None	Not Applicable	No Action	Required by NCP for consideration.
Institutional Controls	Access Restrictions	Deed/Personnel Restrictions	Control of access to the site through legal, administrative, and physical controls.	Potentially applicable.
	Alternate Water Supply	City Water Supply	Extension of existing municipal well system to serve residents in the area of influence.	Screened out – Not a drinking water supply.
		New Community Well	New well installations to serve residents in the area of influence.	Screened out – Not a drinking water supply.
	Natural Attenuation and/or Monitoring	Groundwater Monitoring/ Hydrologic Control	Ongoing monitoring of wells.	Potentially applicable.
Collection	Groundwater Extraction	Extraction Wells	Series of wells to extract contaminated groundwater.	Screened out – Practical extent has been reached during treatability studies.
		Extraction/Injection Wells	Injection wells deliver uncontaminated water to increase flow to extraction wells	Screened out – Practical extent has been reached during treatability studies.
	Subsurface Drains	Interception Trenches	Perforated pipe in trenches backfilled with porous media to collect contaminated water.	Screened out – Collection at depth of contamination not feasible.
Treatment	Biological Treatment	Aerobic	Degradation of organics using microorganisms in an aerobic environment.	Screened out – Extraction not feasible, no ex-situ treatment necessary.
		Anaerobic	Degradation of organics using microorganisms in an anaerobic environment.	Screened out – Extraction not feasible, no ex-situ treatment necessary.
	Physical/Chemical Treatment	Precipitation	Alteration of equilibria to reduce solubility of contaminants.	Screened out – Extraction not feasible, no ex-situ treatment necessary.
		Stripping	Mixing large volumes of air with water in a packed column to promote transfer of volatile organic compounds (VOCs) to air.	Screened out – Extraction not feasible, no ex-situ treatment necessary.
		Carbon Adsorption	Adsorption of contaminants onto activated carbon by passing water through a carbon column.	Screened out – Extraction not feasible, no ex-situ treatment necessary.
		Reverse Osmosis	Use of high pressure to force water through a membrane leaving contaminants behind.	Screened out – Extraction not feasible, no ex-situ treatment necessary.
		Ion Exchange	Contaminated water is passed through a resin bed where ions are exchanged.	Screened out – Extraction not feasible, no ex-situ treatment necessary.
	Thermal Destruction	Rotary Kiln	Combustion in a horizontally rotating cylinder designed for uniform heat transfer.	Screened out – Extraction not feasible, no ex-situ treatment necessary.
		Fluidized Bed	Waste injected into hot agitated bed of sand where combustion occurs.	Screened out – Extraction not feasible, no ex-situ treatment necessary.
	Off-site Treatment	POTW	Extracted groundwater discharged to local POTW.	Screened out – Extraction not feasible, no ex-situ treatment necessary.
		RCRA Facility	Extracted groundwater discharged to licensed RCRA facility for treatment and/or disposal.	Screened out – Extraction not feasible, no ex-situ treatment necessary.
	In-situ Treatment	Bioremediation	System of injection and extraction wells introduce bacteria and nutrients to degrade contamination.	Screened out – Not feasible due to aerobic bedrock aquifer conditions.
		Sparging with Vapor Extraction	System of wells to inject air into groundwater to remove volatiles by air stripping.	Screened out – Not feasible due to shallow depth to bedrock.
		Permeable Treatment Beds	Downgradient trenches backfilled with activated carbon to remove contaminants from water.	Screened out – Not feasible due to shallow depth to bedrock.
		Chemical Reaction	System of injection wells to inject oxidizer to degrade contaminants.	Potentially applicable.
Discharge	On-site Discharge	Surface Impound	Construct settling basins for evaporation.	Screened out – Extraction not feasible, no discharge necessary.
		Reinjection	Reinjection of treated water into the aquifer.	Screened out – Extraction not feasible, no discharge necessary.
	Off-site Discharge	Deep Well Injection	Extracted water discharged to deep well injection system.	Screened out – Extraction not feasible, no discharge necessary.
		POTW	Extracted water discharged to local POTW for treatment.	Screened out – Extraction not feasible, no discharge necessary.
		Pipeline to Stream	Extracted water discharged to offsite stream.	Screened out – Extraction not feasible, no discharge necessary.
Containment	Cap	Clay and Soil	Compacted clay with soil over areas of contamination.	Screened out – No risk reduction to potential receptors.
		Asphalt	Asphalt layer over areas of contamination.	Screened out – No risk reduction to potential receptors.
		Concrete	Concrete slab over areas of contamination.	Screened out – No risk reduction to potential receptors.
		Multimedia Cap	Clay and synthetic membrane covered by soil over areas of contamination.	Screened out – No risk reduction to potential receptors.
	Vertical Barriers	Slurry Wall	Trench around areas of contamination is filled with bentonite slurry.	Screened out – Not feasible due to depth of contamination.
		Grout Curtain	Pressure injection of grout in a regular pattern of drilled holes.	Screened out – Not feasible due to depth of contamination.
		Vibrating Beam	Vibrating force to advance beams into the ground with injection of slurry as beam is withdrawn.	Screened out – Not feasible due to depth of contamination.
	Horizontal Barriers	Grout Injection	Pressure injection of grout at depth through closely spaced drilled holes.	Screened out – Not feasible due to depth of contamination.
		Block Displacement	In conjunction with vertical barriers, injection of slurry in notched injection holes.	Screened out – Not feasible due to depth of contamination.
	Hydraulic Barriers	Extraction Wells	Series of wells to extract contaminated groundwater.	Screened out – Not feasible for intercepting contamination in bedrock at Dryden.

Notes:

POTW = publicly-owned treatment works

RCRA = Resource Conservation and Recovery Act

7.2 IDENTIFICATION AND SCREENING OF TECHNOLOGY TYPES AND PROCESS OPTIONS

7.2.1 IDENTIFICATION AND INITIAL SCREENING OF TECHNOLOGIES

For each response action, remedial technologies and process options were identified and screened based upon their technical implementability and their applicability to the site. Remedial technologies and process options were screened and eliminated from consideration primarily due to the constraints of the fractured bedrock medium.

7.2.1.1 Institutional Controls

Institutional controls are implemented to reduce the chances of exposure to site contaminants through legal, physical, and educational actions. Institutional controls are not designed to reduce contaminant concentrations and are instituted to eliminate exposure to site contaminants through site controls such as fences, signage, deed restrictions, and water supply restrictions. The use of institutional controls is generally not considered a substitute for active response measures (e.g., treatment and/or containment of source material, restoration of groundwaters to their beneficial uses) as the sole remedy unless active measures are determined not to be practicable.

The "access restrictions" technology includes the restriction of activities that may lead to exposure to contaminants and the control of land use to minimize potential exposures. Although some institutional controls will be included in all active responses, the "access restrictions" technology was retained for further consideration as a sole remedy.

The "alternate water supply" technology was removed from consideration because it does not apply to the site. Beneficial use water supply wells are not impacted by the groundwater contamination and no alternative supply to those wells is necessary.

"Natural attenuation and/or groundwater monitoring" generally entails the sampling of groundwater to monitor contaminant concentrations and naturally-occurring processes of attenuation, which, at some sites, may include biodegradation, dispersion, dilution, sorption, volatilization, and/or chemical and biochemical stabilization. Because the conditions at the site are not amenable to the natural attenuation processes (Appendix C and Appendix F), the "groundwater monitoring/hydrologic control" process

option will be retained for further consideration to represent "natural attenuation and/or groundwater monitoring" technology.

7.2.1.2 Collection

Collection is implemented to manage groundwater for direction to proper treatment and/or disposal. Exposure to site contaminants is controlled through the subsequent removal of contaminants from the groundwater medium or the disposal of collected groundwater.

The "groundwater extraction" technology was removed from consideration because the aquifer is comprised of fractured bedrock. Treatability studies using dual extraction have demonstrated that extraction of groundwater from the bedrock at Dryden cannot be implemented in a manner that proves effective in the removal of contaminants beyond that which has been previously implemented due to low well yields (Section 2.1.1).

The "subsurface drain" technology was removed from consideration because the aquifer is comprised of fractured bedrock. Construction of subsurface drains in the bedrock at Dryden is not technically feasible.

7.2.1.3 Treatment

The ex-situ treatment process options include *aerobic* and *anaerobic* "biological treatments", *precipitation*, *stripping*, *carbon adsorption*, *reverse osmosis*, *ion exchange*, *rotary kiln*, *fluidized bed*, and "off-site treatment" at a *publicly-owned treatment works* (*POTW*) or a *RCRA facility*. The ex-situ treatment technologies were removed from consideration because they rely on the success of the collection response action to make the groundwater available for treatment. Because the collection response action is not implementable at the site, no ex-situ treatment is possible.

The "in-situ treatment" process options include *bioremediation*, *sparging with vapor extraction*, *permeable treatment beds* and *chemical reaction*. Three of the "in-situ treatment" process options (*bioremediation, sparging with vapor extraction*, and *permeable treatment beds*) were removed from consideration. Treatability studies conducted at Dryden have concluded that air sparging of groundwater within the bedrock at Dryden cannot be implemented in a manner that proves effective in the removal of contaminants. *Permeable treatment beds* was removed from consideration due to the

shallow depth to bedrock at the site. *Bioremediation* is a process in which microbes break down hydrocarbons to produce carbon dioxide, water, and, in the case of halogenated contaminants, inorganic salts. Although biodegradation processes can occur under either aerobic or anaerobic conditions, the best studied bioremediation technique for chlorinated VOCs, reductive dechlorination, occurs in anaerobic conditions. Since aquifer conditions within the Dryden plume are aerobic, with consistently high concentrations of dissolved oxygen (Appendix F), this option was removed from consideration. The *chemical reaction* process option, the injection of reagents directly into the subsurface to destroy organic contaminants, was retained for further consideration.

7.2.1.4 Discharge

The "on-site discharge" process options included *surface impound* and *reinjection,* and the "off-site discharge" process options included *deep well injection*, *discharge to POTW*, and *pipeline to stream*. The discharge response action was removed from consideration because it relies on the success of the collection and treatment response actions to make the groundwater available for discharge. Because the collection and discharge response actions are not implementable at the site, no discharge is necessary. All of the discharge technologies and related process options were removed from further consideration.

7.2.1.5 Containment

The "capping" process options included the use of *clay and soil*, *asphalt*, *concrete*, and *multimedia*. "Vertical barriers" include *slurry walls*, *grout curtains*, and *vibrating beams*. "Horizontal barriers" include *grout injection* and *block displacement*. An additional technology is "hydraulic barrier" by *groundwater extraction*.

The containment response action category (including "capping", "vertical barriers", "horizontal barriers", and "hydraulic barriers" technologies) was removed from consideration because the response action is not applicable to the site. The area is currently paved with concrete and asphalt. Groundwater monitoring results indicate that the plume has reached steady-state conditions, and the rate of advance is approximately equal to the rate of attenuation.

7.2.1.6 Initial Screening Summary

Based on the initial screening consideration of technical implementability, four process options were retained for preliminary evaluation. With the exception of the No Action alternative, remedial technologies and process options were screened out due to their lack of technical implementability. These screened out options are identified in Table 7-1.

7.2.2 EVALUATION OF TECHNOLOGIES

Based upon the initial screening of remedial technologies and process options, three process options were determined to be implementable:

- Deed/Personnel Restrictions
- Groundwater Monitoring/Hydrologic Control
- Chemical Reaction

Although the next step of the FS involves the evaluation of the process options for effectiveness, implementability, and cost, due to the lack of implementable options imposed by the fractured bedrock medium, all implementable process options and "No Action" were retained for detailed evaluation. Thus, this step (described as Step 3 in Section 7.0) was not performed.

7.2.3 SELECTION OF REPRESENTATIVE PROCESS OPTIONS

Following initial screening and process option evaluation, one process is generally selected to represent each technology type and each process option is then screened again for effectiveness, implementability and cost. Due to the lack of implementable options imposed by the fractured bedrock medium, all implementable process options were retained for detailed evaluation and this screening step (described as Step 4 in Section 7.0) was not performed.

8.0 DEVELOPMENT OF ALTERNATIVES

The retained process options were combined to form alternatives. Technology types were utilized for more than one alternative as presented in Table 8-1.

TABLE 8-1. ALTERNATIVE ASSEMBLY

Technology to be Employed	Area	Alternative 1: Access Restrictions	Alternative 2: Groundwater Monitoring/ Hydrologic Control	Alternative 3: Chemical Reaction	Alternative 4: Source Control and Hydrologic Control with Groundwater Monitoring	Alternative 5: No Action
Access Restrictions	Dryden	√	√	√	√	--
Natural Attenuation and/or Monitoring	Plume Area	--	√	√	√	--
In-Situ Treatment/ Chemical Reaction	Plume Area	--	--	√	√[1]	--

Note:
[1] trichloroethene source areas

A summary of the assumed approach for each assembled alternative is presented in Table 8-2.

Although the assembled alternatives are generally screened for short- and long-term aspects of three broad criteria (effectiveness, implementability, and cost) to reduce the number of alternatives that will undergo a more thorough and extensive analysis, due to the lack of implementable options imposed by the fractured bedrock medium, all of the defined alternatives were retained for detailed evaluation and this screening step (described as Step 6 in Section 7.0) was not performed.

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TABLE 8-2. SUMMARY OF EVALUATED ALTERNATIVES
(Page 1 of 3)

	Alternative 1: Access Restrictions	Alternative 2: Groundwater Monitoring/Hydrologic Control	Alternative 3: Chemical Reaction		Alternative 4: Source Control and Hydrologic Control with Groundwater Monitoring	Alternative 5: No Action
General Description	Access restrictions are intended to eliminate exposure to site contaminants through site controls such as fences, signage, deed restrictions, and water supply restrictions. Access restrictions may be implemented within the scope of other remedial action approaches.	Groundwater monitoring/hydrologic control differs from the "No Action" alternative in that it requires that supporting documentation, including groundwater monitoring results and modeling predictions, be supplied to demonstrate that contaminant concentrations can be reduced to cleanup levels in a reasonable time frame. This approach relies on naturally occurring processes to achieve remedial action objectives (RAOs) and compliance with ARARs within a reasonable time frame. It is best applied at sites where those processes have been observed and where immediate threats to human health and the environment do not exist. Groundwater monitoring/hydrologic control may be implemented within the scope of other remedial action approaches.	Chemical reaction involves the injection of reagents directly into the subsurface to destroy organic contaminants. Based upon treatability studies, the potentially suitable oxidizing agents are Fenton-based reagent at some portions of the site and permanganate at separate areas.		This alternative includes both long-term groundwater monitoring and chemical reaction (using permanganate) technologies as described under Alternative 2 and Alternative 3, respectively.	This alternative provides a baseline for comparing other alternatives. Long-term human health and environmental risks for the site essentially would be the same as those currently identified for the site.
Remedial Approach	Site access is limited and activity permits allow for the tracking and control of intrusive activities that may allow exposure to site contaminants.	Usually entails the biodegradation, dispersion, dilution, sorption, volatilization, and/or chemical and biochemical stabilization of contaminants to effectively reduce contaminant toxicity, mobility, or volume to levels that are protective of human health and the ecosystem. At the site only the processes of dilution and dispersion are anticipated. These processes appear to be particularly pronounced at the plume's leading edge, which has not advanced during the past 8 years of groundwater monitoring, providing hydrologic control of the plume.	The use of Fenton-based reagent combines soluble iron (catalyst) with low concentrations of hydrogen peroxide to produce hydroxyl radicals. These oxidizers attack the carbon double bonds of the chlorinated hydrocarbons present in groundwater.	Permanganate is used to oxidize chlorinated contaminants such as trichloroethene (TCE) to four components: manganese dioxide, chloride ions, hydronium ions, and carbon dioxide.	Permanganate is used to oxidize chlorinated contaminants such as TCE to four components: manganese dioxide, chloride ions, hydronium ions, and carbon dioxide. Although chlorinated solvents should be readily oxidized by permanganate, impact to aromatics will be minimal. Aromatics readily biodegrade in the aerobic conditions found at Site N3. Based upon chemical reaction monitoring results, very limited-scale enhanced bioremediation for aromatics may be undertaken at some Site N3 wells to accelerate biodegradation.	No remedial action is taken.
Site Access	Access to the site is limited to authorized workers.	Access to the site is limited to authorized workers.	Access to the site is limited to authorized workers.		Access to the site is limited to authorized workers.	Although access to the site is limited to authorized personnel, no cost is assumed for such limitation.
Geographic Information System (GIS)	Includes the maintenance of the Edwards Air Force Base (AFB) GIS as it relates to the extent of contamination at the site (as part of a base-wide program). This information is used to control site activities, such as excavation, and/or determine proper protective equipment to be employed during intrusive activities.	Includes the maintenance of the Edwards AFB GIS as it relates to the extent of contamination at the site (as part of a base-wide program). This information, as well as well location data, are used to control site activities (such as excavation) and/or determine proper protective equipment to be employed during intrusive activities.	Includes the maintenance of the Edwards AFB GIS as it relates to the extent of contamination at the site (as part of a base-wide program). This information, as well as remediation equipment and well location data, are used to control site activities (such as excavation) and/or determine proper protective equipment to be employed during intrusive activities.		Includes the maintenance of the Edwards AFB GIS as it relates to the extent of contamination at the site (as part of a base-wide program). This information, as well as remediation equipment and well location data, are used to control site activities (such as excavation) and/or determine proper protective equipment to be employed during intrusive activities.	Although maintenance of the Edwards AFB GIS as it relates to the extent of contamination at the site is included as part of a base-wide program, no cost is assumed for these activities under this option.

TABLE 8-2. SUMMARY OF EVALUATED ALTERNATIVES
(Page 2 of 3)

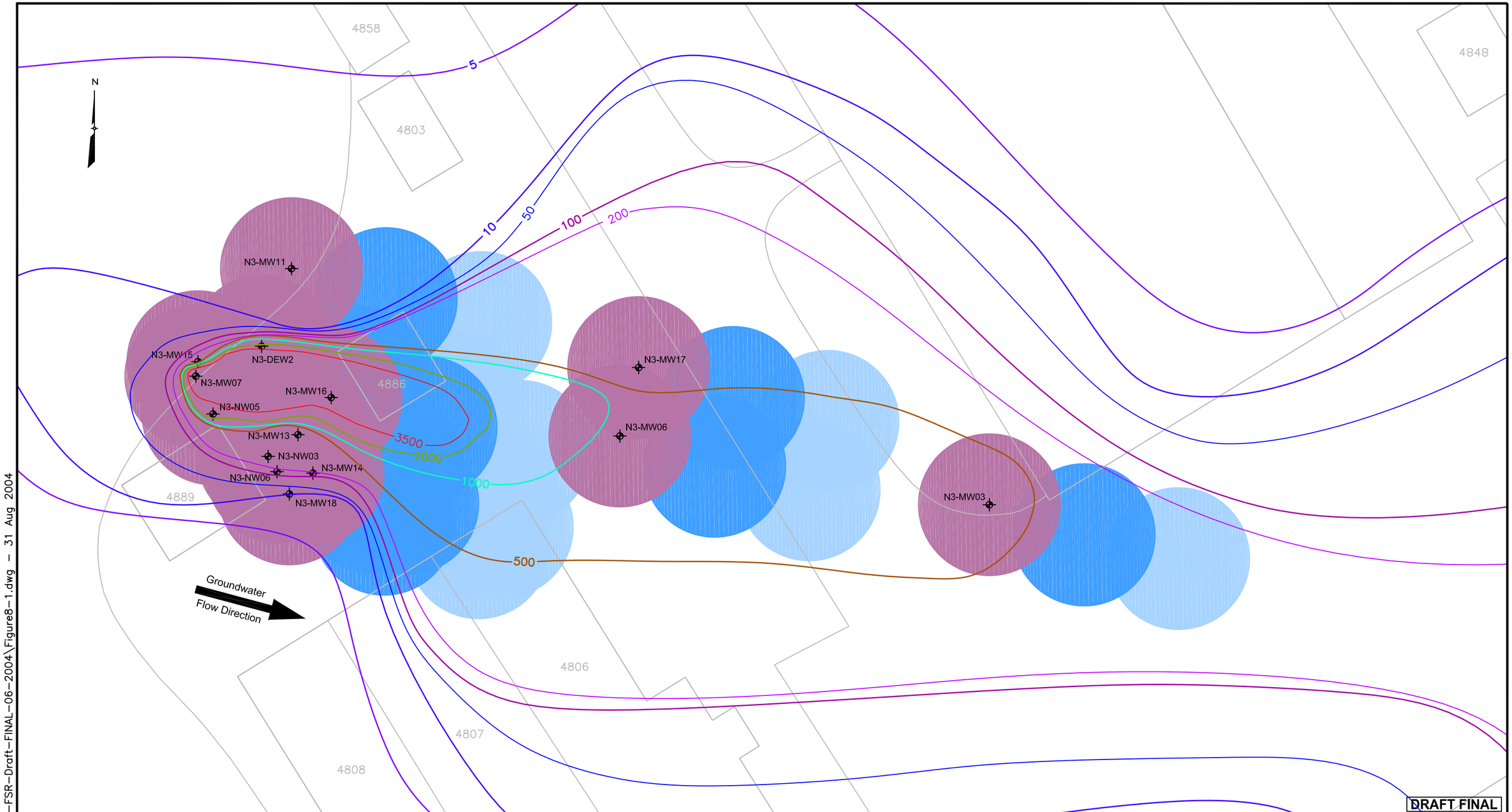
	Alternative 1: Access Restrictions	Alternative 2: Groundwater Monitoring/ Hydrologic control	Alternative 3: Chemical Reaction		Alternative 4: Source Control and Hydrologic Control with Groundwater Monitoring	Alternative 5: No Action
Reviews	Includes 5-year reviews.	Includes 5-year reviews and associated data acquisition through groundwater sampling.	Includes 5-year reviews and associated data acquisition through groundwater sampling.		Includes 5-year reviews and associated data acquisition through groundwater sampling.	--
Existing Well Use For Injection	--	--	A total of 12 existing monitoring wells are used for Fenton-based reagent injection.	A total of 17 existing monitoring wells are used for permanganate injection.	A total of 22 existing monitoring wells are used for permanganate injection.	--
Proposed Well Construction	Construction of one additional monitoring well is recommended downgradient of Site N7.	Construction of one additional monitoring well is recommended downgradient of Site N7.	Construction of one additional monitoring well is recommended downgradient of Site N7.		Construction of one additional monitoring well is recommended downgradient of Site N7. The number and placement of injection wells will be refined during the remedial design.	No additional well construction is necessary.
			A total of 2,027 specialized vertical wells are constructed for Fenton-based reagent injection. Wells are installed at 20-foot intervals (based upon a 314 square-foot assumed area of injection influence) throughout the focus area (area above TCE maximum contaminant level) - including roads and taxiways.	A total of 520 specialized vertical wells are constructed for permanganate injection. Wells are installed at 60-foot intervals (based upon a 2,827 square-foot assumed area of injection influence) throughout the focus area (area above TCE maximum contaminant level) - including roads and taxiways.		
Equipment Staging Space Requirements	No space for construction or staging is required.	No space for construction or staging is required.	Approximately 1,200 square feet of temporary equipment staging area are required.		Approximately 1,200 square feet of temporary equipment staging area are required.	No space for construction or staging is required.
Reagent Volume	--	--	A total of 3,670,200 gallons of Fenton-based reagent are injected.	A total of 1,611 gallons of permanganate are injected.	A total of 66 gallons of permanganate are injected.	--
Injection Locations and Approach	--	--	A total of 2,039 well locations are utilized for Fenton-based reagent injection during three events. The total Fenton-based reagent injection phase duration is 10 months.	A total of 537 well locations are utilized for permanganate injection during three events (treatability study results indicate better dispersion in phased events). The total permanganate injection phase duration is 9 months and must occur at least 1 year after the completion of the Fenton-based reagent injection.	A total of 22 well locations are utilized for permanganate injection with a phased approach (Figures 8-1 and 8-2). The number and placement of injection wells will be reevaluated during the remedial design. For cost estimation purposes, three injection events (separated by 1 year) were assumed. The injection time intervals, number of events, and remedial action duration will be refined during the remedial design and further refined based upon injection monitoring results.	--

TABLE 8-2. SUMMARY OF EVALUATED ALTERNATIVES
(Page 3 of 3)

	Alternative 1: Access Restrictions	Alternative 2: Groundwater Monitoring/Hydrologic Control	Alternative 3: Chemical Reaction	Alternative 4: Source Control and Hydrologic Control with Groundwater Monitoring	Alternative 5: No Action
Well Sampling	No well purging or sampling is required.	A total of 16 existing wells are purged and sampled.	A total of 30 existing wells are purged and sampled.	A total of 40 existing wells and one new well are purged and sampled.	No well purging or sampling is required.
Laboratory Analysis Requirements	No laboratory analysis is required.	Laboratory analytical results are utilized to monitor physical properties of the groundwater contaminant plume, predict future trends, and generate annual groundwater monitoring reports.	Laboratory analytical results are utilized to generate annual groundwater monitoring reports for 7 years following treatment to verify effectiveness.	Laboratory analytical results are utilized to monitor physical properties of the groundwater contaminant plume, verify treatment effectiveness, predict future trends, and generate annual groundwater monitoring reports.	No laboratory analysis is required.
Wastes Generated	No wastes are generated.	Purge water generated during groundwater monitoring activities is treated and discharged to the Base sanitary sewer system.	Purge water generated during groundwater monitoring activities is treated and discharged to the Base sanitary sewer system. If permanganate is present in purge water generated from sampling activities it would be gravity fed into up gradient Site N2 wells.	Purge water generated during groundwater monitoring activities is treated and discharged to the Base sanitary sewer system. If permanganate is present in purge water generated from sampling activities it would be reintroduced into the injection wells.	No wastes are generated.
Off-site Disposal Requirements	No off-site waste disposal is required.	Some off-site waste disposal may be required. Final disposition of soil cuttings from well installation will be determined based upon laboratory analytical results.	Some off-site waste disposal may be required. Final disposition of soil cuttings from well installation will be determined based upon laboratory analytical results.	Some off-site waste disposal may be required. Final disposition of soil cuttings from well installation will be determined based upon laboratory analytical results.	No off-site waste disposal is required.
Time Frame	Time frame is indefinite.	Time frame is indefinite. Monitoring will consist of annual events for 5 years followed by 2 biannual events followed by events every 5 years. Groundwater monitoring results indicate that the plume is stable and hydrologically contained.	Time frame is approximately 3 years of injection and processing time followed by long-term monitoring. Monitoring will consist of annual events for 7 years.	Injection time frame is based upon conditions encountered in the field, potentially 3 years. Monitoring time frame is indefinite and will consist of annual events for 5 years followed by 2 biannual events followed by events every 5 years (intervals are relatively long due to the documented stability of the plume).	No time frame is associated with this alternative.
Permits	No required permits.	Digging permits are required for well drilling activities.	Digging permits are required for well drilling activities.	Digging permits are required for well drilling activities.	No required permits.
Summary	No monitoring or injection activities are performed.	Existing wells for monitoring – 15 New wells for monitoring – 1 Total monitoring locations – 16	<u>Permanganate</u> Existing wells for injection – 12 New wells for injection – 2,027 Total injection locations – 2,029 Reagent – 3,670,200 gallons <u>Fenton-based Reagent</u> Existing wells for injection – 17 New wells for injection – 520 Total injection locations – 537 Reagent – 1,611 gallons <u>Injection Schedule</u> Fenton-based reagent – 10 months Down time – 1 year Permanganate – 9 months Existing wells for monitoring – 30 New wells for monitoring – 1 Total monitoring locations – 31	<u>Permanganate</u> Existing wells for injection – 22 New wells for injection – 0 Total injection locations – 22 Reagent – 66 gallons <u>Fenton-based Reagent</u> Not used. <u>Injection Schedule</u> To be determined in the field. Costs based upon 3 injection events at 1-year intervals. Existing wells for monitoring – 40 New wells for monitoring –1 Total monitoring locations – 41	No activities are performed.

Notes:

AFB = Air Force Base
ARAR = applicable or relevant and appropriate requirement
GIS = Geographic Information System
RAO = remedial action objective
TCE = trichloroethene



EXPLANATION

N3-MW11 — MONITORING WELL (TO BE USED FOR INJECTION) LOCATION AND POTENTIAL AREA OF INFLUENCE (30-FOOT RADIUS OF INFLUENCE BASED ON TREATABILITY STUDY DATA)

CONCEPTUALIZED AREA OF TREATED GROUNDWATER 1 YEAR FOLLOWING INJECTION

CONCEPTUALIZED AREA OF TREATED GROUNDWATER 2 YEARS FOLLOWING INJECTION

— 2000 — SEPTEMBER 2003 TRICHLOROETHENE (TCE) CONCENTRATION CONTOUR (INTERVALS = 5, 10, 50, 100, 200, 500, 1,000, 2,000, 3,500) ALL CONCENTRATIONS SHOWN AS MICROGRAMS PER LITER (µg/L)

SPACING BETWEEN CONCEPTUALIZED TREATED GROUNDWATER AREAS IS BASED ON A 42 FEET/YEAR GROUNDWATER FLOW RATE. THE CONCEPTUALIZED RESULTS OF THREE ANNUAL INJECTION EVENTS ARE SHOWN.

0 20 40
SCALE IN FEET

Site N3
Conceptualized Treatment Area for Alternative 4

Date 06–2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure
Project No. 54212		8-1

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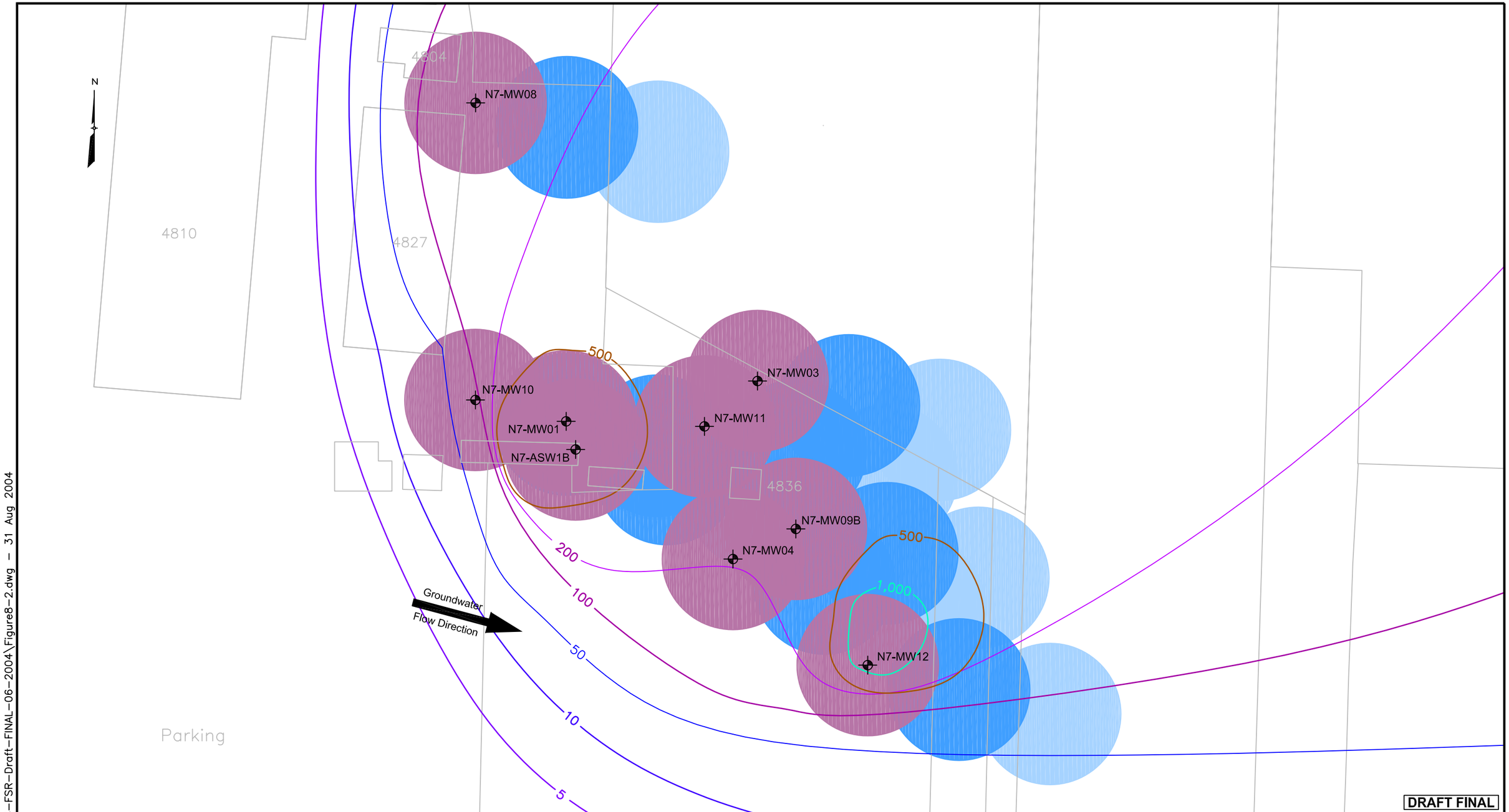

EXPLANATION

N7-MW11 — MONITORING WELL (TO BE USED FOR INJECTION) LOCATION AND POTENTIAL AREA OF INFLUENCE (30-FOOT RADIUS OF INFLUENCE BASED ON TREATABILITY STUDY DATA)

CONCEPTUALIZED AREA OF TREATED GROUNDWATER 1 YEAR FOLLOWING INJECTION

CONCEPTUALIZED AREA OF TREATED GROUNDWATER 2 YEARS FOLLOWING INJECTION

1000 — SEPTEMBER 2003 TRICHLOROETHENE (TCE) CONCENTRATION CONTOUR (INTERVALS = 5, 10, 50, 100, 200, 500, 1,000) ALL CONCENTRATIONS SHOWN AS MICROGRAMS PER LITER (µg/L)

SPACING BETWEEN CONCEPTUALIZED TREATED GROUNDWATER AREAS IS BASED ON A 42 FEET/YEAR GROUNDWATER FLOW RATE. THE CONCEPTUALIZED RESULTS OF THREE ANNUAL INJECTION EVENTS ARE SHOWN.

0 20 40
SCALE IN FEET

Site N7
Conceptualized Treatment Area for Alternative 4

Date 06–2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure
Project No. 54212		8-2

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9.0 DETAILED ANALYSIS OF ALTERNATIVES

Due to the limited number of viable process options, a screening of the retained alternatives was not performed. Based upon the RAOs presented in Section 6.0 of this report, three remaining process options were retained for detailed analysis as the following (Table 8-2):

- Alternative 1 — Access restrictions
- Alternative 2 — Groundwater monitoring/hydrologic control
- Alternative 3 — Chemical reaction
- Alternative 4 — Source control and hydrologic control with groundwater monitoring
- Alternative 5 — No action

The purpose of the detailed analysis is to assess the retained alternatives against the following criteria, subcriteria, factors, and considerations:

Threshold criteria based upon statutory findings

- Overall protection of human health and the environment
- Compliance with ARARs and TBCs

Primary balancing factors

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability (includes feasibility and availability of services and materials)
- Cost

Modifying considerations

- Regulatory agency acceptance
- Public acceptance

9.1 THRESHOLD CRITERIA

To evaluate each alternative against threshold criteria, consideration was given to the overall protection of human health and the environment and compliance with ARARs and TBCs. Table 9-1 provides an evaluation of each alternative when compared to these criteria:

TABLE 9-1. THRESHOLD CRITERIA EVALUATION SUMMARY

Threshold Criterion	Alternative 1: Access Restrictions	Alternative 2: Groundwater Monitoring/Hydrologic Control	Alternative 3: Chemical Reaction	Alternative 4: Source Control and Hydrologic Control with Groundwater Monitoring	Alternative 5: No Action
Overall Protection of Human Health and Environment	No significant risk to human and ecological receptors exists at the site. The alternative is protective of human health and the environment by maintaining the current incomplete exposure pathways. No protection verification mechanisms are included. --	No significant risk to human and ecological receptors exists at the site. The alternative is protective of human health and the environment by monitoring site conditions to ensure that contaminant concentrations remain below those that pose a significant risk to human and ecological receptors. --	No significant risk to human and ecological receptors exists at the site. The alternative is protective of human health and the environment by monitoring site conditions to ensure that contaminant concentrations remain below those that pose a significant risk to human and ecological receptors. Treatability studies were conducted verifying that the technology is effective in reducing VOC concentrations in groundwater.	No significant risk to human and ecological receptors exists at the site. The alternative is protective of human health and the environment by monitoring site conditions to ensure that contaminant concentrations remain below those that pose a significant risk to human and ecological receptors. Treatability studies were conducted verifying that the technology is effective in reducing VOC concentrations in groundwater.	No significant risk to human and ecological receptors exists at the site. No protection verification mechanisms are included. --
Compliance with ARARs and TBCs	May not comply with the identified ARARs and TBCs, no compliance verification mechanisms are included.	May not comply with the identified ARARs and TBCs.	Achieves compliance with MCLs in groundwater and, thus, compliance with ARARs and TBCs within 10 years.	Eventually achieves compliance with ARARs and TBCs, but requires an extended time frame.	May not comply with the identified ARARs and TBCs. No compliance verification mechanisms are included.

Notes:

ARAR = applicable or relevant and appropriate requirement
MCL = maximum contaminant level
TBC = to be considered
VOC = volatile organic compound

- **Overall protection of human health and the environment -** The ability of an alternative to eliminate, reduce, or control the risks associated with contaminants and exposure pathways. Exposure pathways include direct contact, ingestion, potential migration, and inhalation.
- **Compliance with ARARs and TBCs -** The potential for an alternative to comply with chemical-specific, location-specific, and action-specific ARARs and TBCs.

9.2 PRIMARY BALANCING FACTORS

To evaluate each alternative using primary balancing factors, consideration was given to the ability of each alternative to reduce toxicity, mobility, or volume through treatment, the short- and the long-term effectiveness of the alternative, as well as the implementability and cost of each alternative. Tables 9-2, 9-3, 9-4, 9-5, and 9-6 provide an evaluation of each alternative for these factors:

- **Long-term effectiveness and permanence** – The ability of an alternative to protect human health and the environment after the remedial action is complete.
- **Reduction of toxicity, mobility, or volume through treatment** – The ability of an alternative to eliminate or significantly reduce the toxicity, mobility, or volume of contaminants.
- **Short-term effectiveness** – The protectiveness of human health and the environment during the construction and implementation of an alternative.
- **Implementability** – The technical feasibility, administrative feasibility, and availability of services and materials. Below is a brief description of the implementability criteria:
  - Technical feasibility – The level of difficulty to implement an alternative at the site, the reliability of the technology or technologies associated with the alternative, unknowns associated with the alternative, and the need for treatability studies.
  - Administrative feasibility – The regulatory agency concurrence, the need for permits or waivers, the need for land use restrictions.
  - Availability of services and materials – The mobilization requirements, accessibility to equipment, availability of materials, and availability of trained personnel required to implement the alternative.
- **Cost** – Capital costs to implement an alternative. These include direct costs (equipment, labor, and materials for remedial action implementation) and indirect costs (engineering and other costs not directly associated with construction) as well as expected annual operation and maintenance expenditures. Present value costs are used for comparative analysis. Assumptions, cost details, and summaries are included in Appendix G.

9.3 MODIFYING CONSIDERATIONS

Two additional criteria were considered in the evaluation of each alternative, regulatory agency acceptance and projected public acceptance. Although these considerations will be further evaluated in

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TABLE 9-2. PRIMARY BALANCING FACTOR – LONG-TERM EFFECTIVENESS AND PERMANENCE EVALUATION SUMMARY

Alternative 1: Access Restrictions	Alternative 2: Groundwater Monitoring/Hydrologic Control	Alternative 3: Chemical Reaction	Alternative 4: Source Control and Hydrologic Control with Groundwater Monitoring	Alternative 5: No Action
Although this alternative may provide long-term effectiveness (due to the current lack of risk to human health or the environment), it offers no protection verification mechanisms.	Although this alternative may provide long-term effectiveness (due to the current limited risk to human health or the environment), and it offers protection verification mechanisms, minimal (or no) effectiveness may be attributable to natural biodegradation processes present at the site (Appendix F).	Attains long-term effectiveness and permanence by reducing contaminant concentrations to concentrations below those that pose an acceptable risk to human health and the environment.	Attains long-term effectiveness and permanence by reducing contaminant concentrations to concentrations that, in treated areas, represent an acceptable risk to human health and the environment. Over time the treated areas will affect the downgradient areas (by groundwater movement) and surrounding areas (by dilution and dispersion).	Although this alternative may provide long-term effectiveness (due to the current lack of risk to human health or the environment), it offers no protection verification mechanisms.
Reduction of contaminant concentrations to below MCLs is unlikely, even over an extended time frame (Appendix C).	Reduction of contaminant concentrations to below MCLs is unlikely, even over an extended time frame (Appendix C).	--	Reduction of contaminant concentrations to below MCLs is expected over an extended time frame.	Reduction of contaminant concentrations to below MCLs is unlikely, even over an extended time frame (Appendix C).
--	Requires the monitoring of site conditions to ensure that contaminant concentrations remain below those posing an unacceptable risk to human health and the environment.	--	Requires the monitoring of site conditions to ensure that contaminant concentrations remain below those posing an unacceptable risk to human health and the environment.	--
Probable residual risk will not exceed that which currently exists.	Probable residual risk will not exceed that which currently exists.	Probable residual risk will not exceed that which currently exists.	Probable residual risk will not exceed that which currently exists.	Probable residual risk will not exceed that which currently exists.
Only currently existing controls are necessary and reliability is high.	Minimal controls are necessary and reliability is high.	Minimal controls are necessary, reliability is high, and provides long-term permanence.	Minimal controls are necessary, reliability is high, and provides long-term permanence in the source area.	No controls are necessary.
No performance requirements.	No performance requirements.	Treatability studies indicate that performance requirements should be met.	Treatability studies indicate that performance requirements should be met.	No performance requirements.
No component replacement is necessary.	No difficulties associated with component replacement are anticipated.	No difficulties associated with component replacement are anticipated.	No difficulties associated with component replacement are anticipated.	No component replacement is necessary.
No long-term difficulties are anticipated.	No long-term difficulties are anticipated.	No long-term difficulties are anticipated.	No long-term difficulties are anticipated.	No long-term difficulties are possible.
Should this remedial action fail and require replacement, no increase in risk is encountered.	Should this remedial action fail and require replacement, no increase in risk is encountered.	Should this remedial action fail and require replacement, the replacement remedial action could not be implemented for 1 year due to potential reagent incompatibilities. No increase in risk is encountered if the remedial action requires replacement.	Should this remedial action fail and require replacement, the replacement remedial action could not be implemented for 1 year due to potential reagent incompatibilities. No increase in risk is encountered if the remedial action requires replacement.	Potential problems do not cause a long-term increase in risk.
No waste disposal uncertainties are anticipated.	No waste disposal uncertainties are anticipated.	No waste disposal uncertainties are anticipated.	No waste disposal uncertainties are anticipated.	No waste disposal uncertainties.

Note:

MCL = maximum contaminant level

TABLE 9-3. PRIMARY BALANCING FACTOR – REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT SUMMARY

Alternative 1: Access Restrictions	Alternative 2: Groundwater Monitoring/Hydrologic Control	Alternative 3: Chemical Reaction	Alternative 4: Source Control and Hydrologic Control with Groundwater Monitoring	Alternative 5: No Action
May provide no reduction and offers no reduction verification mechanisms.	Although no treatment is performed and mobility and volume are not reduced, toxicity may be reduced through monitored natural processes, though these processes are not likely to be significant.	Reduces contaminant volume through chemical reaction, and, thus, reduces contaminant toxicity.	Reduces contaminant volume in the source area through chemical reaction, and, thus, reduces contaminant toxicity.	May provide no reduction and offers no reduction verification mechanisms.
Principal contaminant, i.e. TCE, is not addressed.	Principal contaminant, i.e. TCE, is not addressed.	Principal contaminant, i.e. TCE, is addressed.	Principal contaminant, i.e. TCE, is addressed.	Principal contaminant, i.e. TCE, is not addressed.
There are no special treatment process requirements.	There are no special treatment process requirements.	Although the entire scope of injection is considered a relatively new process, requirements are standard for the process.	Although the entire scope of injection is considered a relatively new process, requirements are standard for the process.	There are no special treatment process requirements.
No target contamination is destroyed and impacted groundwater is not treated.	No target contamination is destroyed and impacted groundwater is not treated.	Approximately 100 percent of contamination above MCLs is destroyed, including 40 gallons of TCE.	Approximately 12 percent of contamination above MCLs is destroyed (based upon assumed well influence), including 4.8 gallons of TCE.	No target contamination is destroyed and impacted groundwater is not treated.
Contaminant mobility is not affected.	Contaminant mobility is not affected.	Mobility of any remaining contamination is not affected.	Mobility of any remaining contamination is not affected.	Contaminant mobility is not affected.
No chemical destruction occurs.	No chemical destruction occurs.	Chemical destruction of contamination is irreversible.	Chemical destruction of contamination is irreversible.	No chemical destruction occurs.
Residuals include all existing contamination and these residuals pose acceptable risks to human health and the environment.	Residuals include all existing contamination and these residuals pose acceptable risks to human health and the environment.	Residuals include manganese dioxide and heavy metals, all of which will pose an acceptable risk to human health and the environment.	Residuals include TCE in the untreated areas and manganese dioxide and heavy metals in the treated areas, all of which will pose an acceptable risk to human health and the environment.	Residuals include all existing contamination and these residuals pose acceptable risks to human health and the environment.
--	--	No impact to aquifer permeability by manganese dioxide precipitation has been observed in the treatability study. Trace heavy metals are present in permanganate ores and, although elevated levels of metals were detected during a treatability study at Operable Unit 6, those levels fell to pre-injection levels in subsequent months. Hexavalent chromium, a known human carcinogen, may be converted from trivalent chromium during permanganate injections. However, this is a transitional state, the hexavalent chromium will convert back to trivalent chromium when the treatment zone resumes its normal alkaline state.	No impact to aquifer permeability by manganese dioxide precipitation has been observed in the treatability study. Trace heavy metals are present in permanganate ores and, although elevated levels of metals were detected during a treatability study at Operable Unit 6, those levels fell to pre-injection levels in subsequent months. Hexavalent chromium, a known human carcinogen, may be converted from trivalent chromium during permanganate injections. However, this is a transitional state, the hexavalent chromium will convert back to trivalent chromium when the treatment zone resumes its normal alkaline state.	--

Notes:

MCL = maximum contaminant level
TCE = trichloroethene

TABLE 9-4. PRIMARY BALANCING FACTOR – SHORT-TERM EFFECTIVENESS

Alternative 1: Access Restrictions	Alternative 2: Groundwater Monitoring/Hydrologic Control	Alternative 3: Chemical Reaction	Alternative 4: Source Control and Hydrologic Control with Groundwater Monitoring	Alternative 5: No Action
This alternative does not result in unacceptable short-term risks to the community or the environment and achieves protectiveness of any site workers during implementation.	This alternative does not result in unacceptable short-term risks to the community or the environment and achieves protectiveness of the workers during implementation.	This alternative does not result in unacceptable short-term risks to the community or the environment and achieves protectiveness of the workers during implementation. Permanganate will convert naturally occurring trivalent chromium to hexavalent chromium, a carcinogen. However, the hexavalent chromium is transitional and will return to the trivalent form within days or weeks once oxidation conditions recede. Iron concentrations in the injected Fenton-based reagent do not exceed those which occur naturally within the aquifer.	This alternative does not result in unacceptable short-term risks to the community or the environment and achieves protectiveness of the workers during implementation. Permanganate will convert naturally occurring trivalent chromium to hexavalent chromium, a carcinogen. However, the hexavalent chromium is transitional and will return to the trivalent form within days or weeks once oxidation conditions recede.	Provides short-term effectiveness. Because no implementation is undertaken, no worker exposure or increased short-term risk to the environment exists. No action taken.
	An unexpected release of well purge water is unlikely. Such a spill would cause negligible risk to human health and the environment.	An unexpected release of well purge water is unlikely. Such a spill would cause negligible risk to human health and the environment.	An unexpected release of well purge water is unlikely. Such a spill would cause negligible risk to human health and the environment.	
	Involves conventional decontamination practices with standardized environmental monitoring procedures, PPE, and engineering controls to mitigate concerns regarding contact with contaminated groundwater. Therefore, workers would be protected during implementation of this alternative.	Involves conventional decontamination practices with standardized environmental monitoring procedures, PPE, and engineering controls to mitigate concerns regarding contact with contaminated groundwater and permanganate. Therefore, workers would be protected during implementation of this alternative.	Involves conventional decontamination practices with standardized environmental monitoring procedures, PPE, and engineering controls to mitigate concerns regarding contact with contaminated groundwater and permanganate. Therefore, workers would be protected during implementation of this alternative.	No action taken.
Although human health and the environment are protected throughout implementation of this alternative, the long-term duration of the alternative slightly increases the minimal risks to all potential receptors when compared to Alternative 3.	Although human health and the environment are protected throughout implementation of this alternative, the long-term duration of the alternative slightly increases the minimal risks to all potential receptors when compared to Alternative 3.	The relatively short-term duration of this alternative minimizes potential threats to human health and the environment for the duration of the remedial action. Target cleanup levels are achieved within 3 years. Non-detectable levels are not achieved.	Although human health and the environment are protected throughout implementation of this alternative, the long-term duration of the alternative slightly increases the minimal risks to all potential receptors when compared to Alternative 3.	Effectiveness during the remedial action was not evaluated because no action is taken.

Notes:

PPE = personal protective equipment

TABLE 9-5. PRIMARY BALANCING FACTOR – IMPLEMENTABILITY SUMMARY

Implement-ability Criteria	Alternative 1: Access Restrictions	Alternative 2: Groundwater Monitoring/Hydrologic Control	Alternative 3: Chemical Reaction	Alternative 4: Source Control and Hydrologic Control with Groundwater Monitoring	Alternative 5: No Action
Technical Feasibility	No equipment, beyond that currently utilized, is required.	Uses conventional equipment and methods for groundwater sampling, analysis, reporting, and waste disposal.	Uses conventional equipment for chemical injection.	Uses conventional equipment for chemical injection.	No action taken.
	--	--	Difficulty achieving dispersion of oxidizing agents in fractured bedrock may be encountered.	Difficulty achieving dispersion of oxidizing agents in fractured bedrock may be encountered.	--
	--	Implementation of the alternative does not rely on well spacing that includes placement in roadways and taxiways.	Success of the remediation relies partially on the well placement and injection in roadways and taxiways. Such an implementation would compromise mission-critical activities by limiting aircraft movement.	Implementation of the alternative does not rely on wells placed in roadways and taxiways.	--
	No construction is required.	No construction (other than well installation) is required.	No construction (other than well installation) is required.	No construction (other than well installation) is required.	--
	No reliability issues are associated with the technology.	No reliability issues are associated with the technology.	No reliability issues are associated with the technology.	No reliability issues are associated with the technologies.	--
	Future remedial actions may be necessary.	No future remedial actions will be necessary.	No future remedial actions will be necessary.	No future remedial actions will be necessary.	--
	Exposure pathways and contaminant behavior are not monitored.	Exposure pathways and contaminant behavior are easily monitored.	Exposure pathways and contaminant behavior are easily monitored.	Exposure pathways and contaminant behavior are easily monitored.	--
Administrative Feasibility	No coordination with governmental agencies is required.	Involves minimal coordination with governmental agencies when compared to Alternatives 3 and 4.	Involves intensive coordination with governmental agencies.	Involves intensive coordination with governmental agencies.	No action taken.
	--	--	Requires Base permits for injection well installation.	Requires Base permits for injection well installation.	--
Availability of Services and Materials	No equipment or contractors, beyond those currently utilized, are required.	Equipment and contractors performing this service are readily available.	Equipment and contractors performing this service are readily available.	Equipment and contractors performing this service are readily available.	No action taken.
	--	--	More than one vendor is available for competitive bid.	More than one vendor is available for competitive bid.	--
	Further technology development is not required for implementation.	Further technology development is not required for implementation.	Technology has been sufficiently demonstrated and no further technology development is required for immediate implementation.	Technologies have been sufficiently demonstrated and no further technology development is required for immediate implementation.	--
	Existing disposal capacity does not apply.	Existing disposal capacity is adequate.	Existing disposal capacity is adequate.	Existing disposal capacity is adequate.	--

TABLE 9-6. PRIMARY BALANCING FACTOR – COST SUMMARY

		Alternative 1: Access Restrictions	Alternative 2: Groundwater Monitoring/ Hydrologic Control	Alternative 3: Chemical Reaction	Alternative 4: Source Control and Hydrologic Control with Groundwater Monitoring	Alternative 5: No Action
	Period of Performance	Indefinite	Indefinite	10 years	Indefinite	--
Cost[1]	Period of Analysis	30 years	30 years	10 years	30 years	--
	Capital Cost	$2,800	$159,600	$43,948,100	$464,300	--
	Total O&M Cost	$82,400	$1,540,300	$28,196,900	$1,885,600	--
	Total Periodic Cost	$109,200	$109,200	$1,464,800	$109,200	--
	Total Cost	$194,400	$1,809,100	$73,609,800	$2,459,100	--
	Total Escalated Cost	$284,000	$2,451,400	$81,114,500	$3,243,200	--
	Present Value	$125,600	$1,342,500	$71,458,900	$1,905,800	--
	Discount Rate	3.2%	3.2%	3.2%	3.2%	--

Note:

[1] See Appendix G for cost details and costs related to a reduced chemical oxidation field effort.

future versions of the FS report and later in the CERCLA process, a preliminary evaluation of each alternative is provided in Table 9-7. The modifying considerations include:

- Regulatory agency acceptance – Addresses technical and administrative concerns that the agencies may raise during the review process.
- Projected public acceptance. Evaluates the concerns that the public may have and the anticipated level of acceptance by the public.

9.4 COMPARATIVE ANALYSIS OF REMEDIAL ACTION ALTERNATIVES

This section provides a comparative analysis, using the NCP evaluation criteria, of those alternatives retained after the preliminary screening. Each alternative is evaluated against criteria of effectiveness, implementability, acceptance and cost (Tables 9-2 through 9-6) as detailed in Table 9-8. Based on these scores, a comparative analysis of the five retained alternatives is presented in the following sections.

9.4.1 ALTERNATIVE 1: ACCESS RESTRICTIONS

Although *Alternative 1* achieves protectiveness (because no complete exposure pathways exist) the alternative does not meet the threshold criterion for compliance with ARARs and TBCs. The alternative requires the management of a Geographic Information System (GIS) for the lifetime of the plume (a model duration of 100+ years indicates little to no plume reduction).

Alternative 1 was assigned the highest possible ranking in two of the seven ranked categories (implementability and cost as present value). These rankings are equal to those assigned to *Alternative 2* and *Alternative 5* for the same two criteria. *Alternative 1* is easier to implement and far less expensive than *Alternative 3* and *Alternative 4*. *Alternative 1* has been instituted at the site and requires minimal effort to maintain.

Alternative 1 achieves long-term effectiveness (due to the current lack of pathways), though the alternative's permanence ranking was slightly reduced due to the (minimal) chance of land use modifications and the (limited) potential for an increase in the number of receptors in the area. The permanence of the alternative also requires the management of a GIS for the lifetime of the plume. *Alternative 1* received the same ranking as *Alternative 2, Alternative 4,* and *Alternative 5* and a slightly lower ranking than *Alternative 3* for this criterion.

TABLE 9-7. MODIFYING CONSIDERATIONS – EVALUATION SUMMARY

Modifying Considera-tions	Alternative 1: Access Restrictions	Alternative 2: Groundwater Monitoring/ Hydrologic Control	Alternative 3: Chemical Reaction	Alternative 4: Source Control and Hydrologic Control with Groundwater Monitoring	Alternative 5: No Action
Regulatory Agency Acceptance	Regulatory agency acceptance was evaluated based upon comments to the draft submittal of this document (Appendix B). Regulatory agencies generally prefer techniques that treat or alter the contaminants and an alternative that addresses groundwater contamination in the source area is required, making this alternative less favorable than Alternatives 3 and 4.	Regulatory agency acceptance was evaluated based upon comments to the draft submittal of this document (Appendix B). Regulatory agencies generally prefer techniques that treat or alter the contaminants and an alternative that addresses groundwater contamination in the source area is required, making this alternative less favorable than Alternatives 3 and 4.	Regulatory agency acceptance was evaluated based upon comments to the draft submittal of this document (Appendix B). Regulatory agencies generally prefer techniques that treat or alter the contaminants and an alternative that addresses groundwater contamination in the source area is required, making this alternative more favorable than Alternatives 1, 2 and 5.	Regulatory agency acceptance was evaluated based upon comments to the draft submittal of this document (Appendix B). Regulatory agencies generally prefer techniques that treat or alter the contaminants and an alternative that addresses groundwater contamination in the source area is required, making this alternative more favorable than Alternatives 1, 2 and 5.	The regulatory agencies required a remedial action, making Alternative 5 the least favorable alternative.
Projected Community Acceptance	It is anticipated that the public would find this alternative acceptable. A public comment period will be provided during the Proposed Plan submittal, such that written or oral comments may be made. Substantial comments will be addressed in the Proposed Plan.	It is anticipated that the public would find this alternative acceptable. A public comment period will be provided during the Proposed Plan submittal, such that written or oral comments may be made. Substantial comments will be addressed in the Proposed Plan.	It is anticipated that the public would find this alternative acceptable. A public comment period will be provided during the Proposed Plan submittal, such that written or oral comments may be made. Substantial comments will be addressed in the Proposed Plan.	It is anticipated that the public would find this alternative acceptable. A public comment period will be provided during the Proposed Plan submittal, such that written or oral comments may be made. Substantial comments will be addressed in the Proposed Plan.	It is anticipated that the public would not find this alternative acceptable. A public comment period will be provided during the Proposed Plan submittal, such that written or oral comments may be made. Substantial comments will be addressed in the Proposed Plan.

TABLE 9-8. ALTERNATIVE EVALUATION SUMMARY

	Criteria	Alternative 1: Access Restrict.	Alternative 2: Groundwater Monitoring/ Hydrologic Control	Alternative 3: Chemical Reaction	Alternative 4: Source Control and Hydrologic Control with Groundwater Monitoring	Alternative 5: No Action
Threshold Factors	Overall Protectiveness of Human Health/Environment -Factor requirements "Met" if Protective -Factor requirements "Not Met" if not Protective	Met	Met	Met	Met	Met
	Compliance with ARARs and TBCs -Factor requirements "Met" if compliant -Factor requirements "Not Met" if not compliant	Not Met	Not Met	Met	Met[1]	Not Met
Primary Balancing Factors	Long-Term Effectiveness and Permanence Excellent if Highly Effective Poor if Not Effective	Very Good	Very Good	Excellent	Very Good	Very Good
	Reduction of Toxicity, Mobility, or Volume Through Treatment Excellent if Reduces all Contaminants Poor if No Reduction	Poor	Poor	Excellent	Very Good	Poor
	Short-Term Effectiveness Excellent if Highly Effective Poor if Not Effective	Very Good	Good	Good	Good	Excellent
	Implementability Excellent if Highly Feasible and Available Poor if Not Feasible and Available	Excellent	Excellent	Good	Very Good	Excellent
	Present Value Excellent if < $5,000,000 $10,000,000 > Very Good if > $5,000,000 $15,000,000 > Good if > $10,000,000 $20,000,000 > Fair if > $15,000,000 Poor if > $20,000,000	Excellent	Excellent	Poor	Excellent	Excellent
Modifying Considerations	Regulatory Agency Acceptance Very Good if Highly Acceptable Poor if Not Acceptable	Good	Good	Very Good	Very Good	Poor
	Public Acceptance[2] Very Good if Highly Acceptable Poor if Not Acceptable	Fair	Very Good	Good	Very Good	Poor

Notes:

The scale, from lowest to highest, is: Poor, Fair, Good, Very Good, Excellent.
Text Sections 9.4.1 through 9.4.5 contain descriptive comparative analyses of the alternatives.
[1] Over an extended period.
[2] Public acceptance is projected and comments will be solicited in the Proposed Plan.

ARAR = applicable or relevant and appropriate requirement
TBC = to be considered

Impacted groundwater is not treated; toxicity, mobility, and volume are not reduced under *Alternative 1*. This criterion received the lowest possible ranking, a ranking equal to that assigned to *Alternative 2* and *Alternative 5,* but is far lower than that assigned to *Alternative 3* and *Alternative 4*.

Alternative 1 received a slightly reduced ranking for short-term effectiveness (i.e., effectiveness of the alternative during the implementation of the remedial action) because it is a passive process with no verification mechanisms. It received a higher ranking for this criterion than *Alternative 2, Alternative 3,* and *Alternative 4* and a lower ranking than *Alternative 5*. Because regulatory agencies generally prefer techniques that treat or alter the contaminants, *Alternative 1* is less acceptable than *Alternative 3* and *Alternative 4*. The public is projected to prefer alternatives that include groundwater monitoring as a protection verification mechanism. Because *Alternative 1* lacks a protection verification mechanism, it is projected to be less acceptable than *Alternative 2, Alternative 3,* and *Alternative 4.* Public input will be solicited by the Proposed Plan and public acceptance will be reevaluated based on comments received.

9.4.2 ALTERNATIVE 2: GROUNDWATER MONITORING/HYDROLOGIC CONTROL

Although *Alternative 2* achieves protectiveness (because no complete exposure pathways exist) the alternative does not meet the threshold criterion for compliance with ARARs and TBCs. The alternative requires the management of a GIS for the lifetime of the plume (a model duration of 100+ years indicates little to no plume reduction).

Alternative 2 was assigned the highest possible ranking in two of the seven ranked categories (implementability and cost as present value). These rankings are equal to those assigned to *Alternative 1* and *Alternative 5* for the same two criteria. *Alternative 2* is easier to implement than *Alternative 3 and Alternative 4* and far less expensive than *Alternative 3*. A groundwater monitoring program has been instituted at the site and requires minimal effort to maintain and/or modify.

Alternative 2 achieves long-term effectiveness (due to the current lack of pathways), though the alternative's permanence ranking was slightly reduced due to the (minimal) chance of land use modifications and the (limited) potential for an increase in the number of receptors in the area. The permanence of the alternative also requires the maintenance of a monitoring program for the lifetime of

the plume. *Alternative 2* received the same ranking as *Alternative 1, Alternative 4,* and *Alternative 5* and a slightly lower ranking than *Alternative 3* for this criterion.

Impacted groundwater is not treated; toxicity, mobility, and volume are not reduced under *Alternative 2. Alternative 2* received the lowest possible ranking for this criterion. This ranking is equal to that assigned to *Alternative 1* and *Alternative 5,* but is far lower than that assigned to *Alternative 3* and *Alternative 4*.

Alternative 2 received a reduced ranking for short-term effectiveness because monitoring personnel could be exposed to contaminated groundwater. It received the same ranking for this criterion as that assigned to *Alternative 3* and *Alternative 4* and a lower ranking than that assigned to *Alternative 1* and *Alternative 5*. Because regulatory agencies generally prefer techniques that treat or alter the contaminants, *Alternative 2* is less acceptable than *Alternative 3* and *Alternative 4*. The public is projected to prefer alternatives that include groundwater monitoring as a protection verification mechanism. Because *Alternative 2* has a protection verification mechanism, it is projected to be more acceptable than *Alternative 1* and *Alternatives 5*. Public input will be solicited by the Proposed Plan and public acceptance will be reevaluated based on comments received.

9.4.3 ALTERNATIVE 3: CHEMICAL REACTION

Alternative 3 achieves protectiveness due to the ability of the technology to chemically alter chemical contaminants. The alternative requires the management of a GIS for the lifetime of the remedial action (approximately 10 years). Additionally, it was the only alternative to meet the threshold criterion for compliance with ARARs and TBCs within a relatively short time frame.

Alternative 3 was assigned the highest possible ranking in two of the seven ranked categories (long-term effectiveness and reduction of toxicity, mobility, or volume). These rankings are higher than those assigned to the other alternatives for the same two criteria. *Alternative 3* has a very high potential to remediate the entire plume.

Alternative 3 received a reduced ranking for short-term effectiveness because remediation personnel could be exposed to contaminated groundwater and reagents. It received the same ranking for this

criterion as that assigned to *Alternative 2* and *Alternative 5* and a lower ranking than that assigned to *Alternative 1* and *Alternative 4*.

Alternative 3 received a reduced ranking (lower than all of the other alternatives) for implementability because it is a labor-intensive technology. Dispersion of the oxidizing agents is likely to be difficult. Success of the remediation relies on well placement and injection in roadways and taxiways, compromising mission-critical activities. Although the duration is shorter than the other alternatives, the field effort is considered significant.

Alternative 3 received a lower ranking than the other alternatives for cost as present value because of the extremely high cost associated with its implementation. Because the regulatory agencies generally prefer techniques that treat or alter the contaminants, *Alternative 3* is more acceptable than the other alternatives. The public is projected to find *Alternative 3* less acceptable than *Alternative 2* and *Alternative 4* due to *Alternative 3's* high implementation costs (it is assumed that the public would want tax dollars applied to less expensive alternatives that are also protective of human health and the environment), but more acceptable than *Alternative 1* and *Alternative 5* because it includes a protection verification mechanism. Public input will be solicited by the Proposed Plan and public acceptance will be reevaluated based on comments received.

9.4.4 ALTERNATIVE 4: SOURCE CONTROL AND HYDROLOGIC CONTROL WITH GROUNDWATER MONITORING

Although *Alternative 4* achieves protectiveness (because no complete exposure pathways exist) the alternative may require an extended time frame to comply with ARARs and TBCs. The alternative requires the management of a GIS for the lifetime of the plume.

Alternative 4 was assigned the highest possible ranking in no categories. *Alternative 4* achieves long-term effectiveness (due to the current lack of pathways), though the alternative's permanence rank was reduced due to the (minimal) chance of land use modifications and the (limited) potential introduction of receptor pathways to the area. The permanence of the alternative also requires the maintenance of a monitoring program for the lifetime of the plume. *Alternative 4* received the same ranking as *Alternative 1*, *Alternative 2*, and *Alternative 5*, and a slightly lower ranking than *Alternative 3* for this criterion.

Some impacted groundwater is treated; toxicity, mobility, and volume are reduced under *Alternative 4*. *Alternative 4* received a slightly reduced ranking for this criterion because only a portion of the plume is treated. This ranking is slightly lower than *Alternative 3* and higher than that assigned to *Alternative 1*, *Alternative 2*, and *Alternative 5*.

Alternative 4 received a reduced ranking for short-term effectiveness because remediation personnel could be exposed to contaminated groundwater and reagents. It received the same ranking for this criterion as that assigned to *Alternative 2* and *Alternative 3* and a lower ranking than that assigned to *Alternative 1* and *Alternative 5*.

Alternative 4 received a reduced ranking (lower than *Alternative 1, Alternative 2, and Alternative 5*) for implementability because it is a labor-intensive technology, though far less so than *Alternative 3*. Although dispersion of the oxidizing agents is likely to be difficult, the area to be treated is limited.

Alternative 4 received a higher ranking than *Alternative 3* for cost as present value. Because the regulatory agencies generally prefer techniques that treat or alter the contaminants, *Alternative 4* is more acceptable than *Alternative 1*, *Alternative 2*, and *Alternative 5*. The public is projected to find *Alternative 4* acceptable. Public input will be solicited by the Proposed Plan and public acceptance will be reevaluated based on comments received.

9.4.5 ALTERNATIVE 5: NO ACTION

Although *Alternative 5* achieves protectiveness (because no complete exposure pathways exist) the alternative does not meet the threshold criterion for compliance with ARARs and TBCs.

Alternative 5 was assigned the highest possible ranking in three of the five ranked categories (short-term effectiveness, implementability, and cost as present value). These rankings are equal to those assigned to *Alternative 1* and *Alternative 2* for the latter two criteria. *Alternative 5* is easier to implement and far less expensive than the other alternatives and ranked higher for short-term effectiveness than the other alternatives because it does not subject remedial action personnel to potential exposure.

Alternative 5 achieves long-term effectiveness (due to the current lack of pathways), though the alternative's permanence ranking was slightly reduced due to the (minimal) chance of land use modifications and the (limited) potential for an increase in the number of receptors in the area.

Alternative 5 received the same ranking as *Alternative 1*, *Alternative 2*, and *Alternative 4* and a slightly lower ranking than *Alternative 3* for this criterion.

Impacted groundwater is not treated; toxicity, mobility, and volume are not reduced under *Alternative 5*. This criterion received the lowest possible ranking. This ranking is equal to that assigned to *Alternative 1* and *Alternative 2*, but is lower than that assigned to *Alternative 3* and *Alternative 4*. Because the regulatory agencies generally prefer techniques that treat or alter the contaminants, *Alternative 5* is less acceptable than *Alternative 3* and *Alternative 4*. The public is projected to prefer alternatives that include groundwater monitoring as a protection verification mechanism. Because *Alternative 5* lacks a protection verification mechanism, it is projected to be less acceptable than *Alternative 2*, *Alternative 3*, and *Alternative 4*. Public input will be solicited by the Proposed Plan and public acceptance will be reevaluated based on comments received.

9.5 RECOMMENDED REMEDIAL ALTERNATIVE

Based on the screening of alternatives, evaluation and comparative analysis of retained alternatives, and the intended industrial use of Dryden, *Alternative 4* (source control and hydrologic control with groundwater monitoring) is recommended as the preferred alternative for the Proposed Plan. The alternative is protective of human health and the environment. This alternative consists of the following:

- Chemical oxidation of contaminants at the plume source areas.
- The natural dispersion and dilution of residual contaminants to effectively reduce contaminant concentrations to below those specified by ARARs downgradient of the source areas and at the leading edge of the plume. Dispersion and dilution will likely be pronounced at the interfaces of the plume and each treated zone.
- Management of the Edwards AFB GIS as it relates to the extent of contamination at the site (as part of a base-wide program). This information, in addition to well location data, are used to control site activities (such as excavation) and/or determine proper protective equipment to be employed during intrusive activities.
- Five-year reviews and associated data acquisition through groundwater sampling. Supporting documentation, including groundwater monitoring results, is used to evaluate progress toward reducing concentrations to cleanup levels.

The Base's General Plan (HB&A, 2001) specifies that Dryden will continue to be used for industrial purposes, which limits the potential completion of human exposure pathways. Additionally, groundwater monitoring results (quarterly since 1992 [Smith, 1995; ECC, 1996] and then semiannually starting in 1996) indicate that the commingled plume is essentially contained, and has reached steady-

state conditions - the rate of advance approximately equals the rate of attenuation. This further mitigates potential risk to human receptors and potential degradation of beneficial use water supplies.

10.0 REFERENCES

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APPENDIX A

OPERABLE UNIT 6 SITE STATUS MEMORANDUM AND NO FURTHER INVESTIGATION LETTERS

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

20 February 2003

MEMORANDUM FOR RECORD

SUBJECT: CERCLA Status of Sites and AOCs, Operable Unit (OU) 6, Edwards AFB, California.

The purpose of this letter is to clarify which sites at the National Aeronautical and Space Administration (NASA) Operable Unit Number 6 (OU6) were closed as part of a Site Inspection study, and which sites are active in the Remedial Investigation phase of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process as defined by the criteria contained in *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final, OSWER Directive 9355.3-01* (U.S. Environmental Protection Agency, 1988).

An investigation of OU6 at Edwards AFB was conducted between 1993 and 1999 under the Environmental Restoration Program. The investigation included both Site Inspection (SI) phase studies of locations identified under the *Expanded Source Investigation/RCRA Facility Assessment, Technical Report, Volume , Appendix E, NASA/Ames-Dryden Flight Research Facility (OU6)* (The Earth Technology Corporation, 1993)) as "Potential Release Locations (PRLs)" and known release areas identified as "Sites". (Note: In 1997, all PRLs were redesignated as Areas of Concern (AOCs) by the Air Force.)

To expedite the investigation process, a single document entitled "*Remedial Investigation/Feasibility Study, Field Sampling Plan, NASA Operable Unit No. 6, Edwards AFB, CA* " (The Earth Technology Corporation, 1994) was produced. This document included proposed RI activities at Sites that were previously investigated for which a source area for contaminants was identified, and proposed SI activities at PRLs, where no confirmation of a release existed. Subsequent Site/PRL reports were prepared where no significant contamination was found.

The Sites included in the planning documents were 205 (NASA designation N1), 206 (N2), 207 (N3), 208 (N4), and 211 (N7); the PRLs included were 209 and 210 (N14 and N6), 212-217 (N8-N13), 307-311 (N15-N19), and 363 (N5).

Site 308 (N16), and AOCs (PRLs) 363 (N5), 309 (N17), and 351 were locations where the potential or actual release was from a petroleum-only source. The Kern County Environmental Health Services Department (KCEHSD) and the California Regional Water Quality Control Board (RWQCB)-Lahontan Region oversaw the restoration, where required, of these sites. The Air Force has removed these Sites and AOCs from the CERCLA process.

AOCs 215 (N11), 216 (N12), and 217 (N13) were locations where no significant contamination was found during the SI phase. The Air Force will not carry these AOCs forward in the Remedial Investigation/Feasibility Study process and they will not be included in the OU6 Record of Decision.

Sites 206 (N2), 207 (N3), and 211 (N7) are the source sites for groundwater contamination at OU6. These AOCs will be retained in the CERCLA process.

AOCs 210 (N6), 212 (N8), 213 (N9), 214 (N10), 310 (N18), and 311 (N19) had NFI letters signed by the RPMs but were identified as having low levels of risk by the human health risk assessment conducted for OU6. The identified risks were due to contamination in the groundwater only. The groundwater contamination at AOCs 210 (N6) and 310 (N18) was not related to the AOC locations and will be remediated at the three source Sites. Groundwater contamination at AOCs 212 (N8), 213 (N9), 214 (N10), and 311 (N19) appeared to be naturally occurring as

background levels were only slightly exceeded. The potential risks identified in the risk assessment will be evaluated by assessing the indoor air quality of affected buildings under our occupational health (OH) program, compared with OH standards for the CERCLA contaminates at the specific AOC, and appropriate actions will be taken to ensure worker health and safety. Additionally, administrative controls such as digging permits are used to regulate worker exposure to contaminated groundwater. Furthermore, the groundwater is not currently nor planned for use as a drinking water source. Therefore, the Air Force will not carry these AOCs forward in the Remedial Investigation/Feasibility Study process and they will not be included in the OU6 Record of Decision.

Sites 205 (N1), 208 (N4), and 209 (N14) had NFI letters signed by the RPMs, but were identified as having low levels of risk following the performance of ecological or human health risk assessments for OU6 and will be retained in the CERCLA process due to soil contamination. Sites 205 (N1) and 208 (N4) were also identified as having risks due to groundwater contamination. However, the groundwater contamination was not related to these Sites and will be remediated at the three source Sites (206 [N2], 207 [N3], and 211 [N7]). The identified risks due to contamination in the soil are summarized below:

- Site 205 (N1): The Site 205 human health risk assessment found that the potential risk to industrial users of the site exceeded the benchmark risk levels for carcinogens and noncarcinogens as a result of exposure to soil containing iron and polyaromatic hydrocarbons (PAHs), particularly benzo(a)pyrene. Site 205 consists of a series of topographic depressions that lie along the eastern edge of Dryden. Site activities contributing to site contamination may have included solvent discharges, deluge water and aqueous film forming foam (fire suppressant) releases, and cooling tower blowdown wastewater discharges.

- Site 208 (N4): The Site 208 human health risk assessment found that the potential risk to industrial users of the site exceeded the benchmark risk level for carcinogens as a result of exposure to soil containing PAHs, particularly benzo(a)pyrene. Site 208 consists of an unlined, 4 acre-area retention pond and a wash rack (concrete ramp sloping down to the retention pond). Site activities contributing to site contamination may have included solvent discharges and spills, aircraft and aerospace ground equipment steam cleaning, alcohol fuel and hydrogen peroxide oxidizer discharges during jettison valve testing, and cooling tower blowdown wastewater discharges.

- AOC 209 (N14): The AOC 209 ecological risk assessment found metals in soil to be a potential risk to the ecological environment. AOC 209 is a RCRA Part B permitted facility used for storing Space Shuttle fuel and oxidizer neutralizing solutions. The AOC is also used to store personal protective equipment generated while processing the Space Shuttle for return to the east coast. No known releases have ever occurred at this site. Contaminants are believed to reflect local background levels.

The AOC 307 (N15) human health risk assessment results exceeded benchmark risk levels for the residential scenario only. An analysis of exposure at NASA Dryden indicates that it is an aircraft development and test area, zoned mainly for aircraft test, engineering test, and buffer zone uses in the vicinity of the OU6 sites. The U.S. Air Force has no plans to change the NASA Dryden land use, and Edwards AFB is not part of the Base Realignment and Closure Program of the Department of Defense. Accordingly, the future use of OU6 property is not anticipated to support residential uses. Therefore, AOC 307 (N15) will not be retained in the CERCLA process.

A summary table listing the CERCLA status of the Sites and AOCs in OU6 is attached. As discussed above, the decision to not carry Sites and AOCs forward in the Remedial Investigation/Feasibility Study process is based on either the site containing petroleum-derived waste only, groundwater contamination that will be addressed under the source Site, or the finding during the SI phase that the site contained no significant contamination.

If you have any questions or comments, please contact Ms. Mary Liang-Spencer at (661) 277-1474.

We, the undersigned, concur with the site status findings contained in this Memorandum.

MARY LIANG-SPENCER — 20 Feb 03 DATE
Remedial Project Manager
U.S. Air Force

SHERYL LAUTH — 2/20/03 DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region 9

JOHN A. O'KANE, JR. — 2-20-03 DATE
Remedial Project Manager
California Department of Toxic
Substances Control, Region 1

ELIZABETH LAFFERTY — 2/20/03 DATE
Remedial Project Manager
California Regional Water
Quality Control Board, Region 6

1 Attachment: CERCLA STATUS OF SITES AND AOCS IN NASA OU6

CERCLA STATUS OF SITES AND AOCS IN NASA, OU6

Site/AOC	Continue in RI/FS Process	Primary Reason for No Further Action				Date of No Further Investigation (NFI) Letter
		Petroleum Only		No Significant Contamination		
		Finding	Supporting Reference	Finding	Supporting References	
Site 205 (N1)	X	-		-	a	12/12/96
Site 206 (N2)	X	-		-	-	-
Site 207 (N3)	X	-		-	-	-
Site 208 (N4)	X	-		-	-	12/12/96
AOC 363 (N5)	-	X	a, b	-	-	3/19/96
AOC 210 (N6)	-	-		X[1]	a, b	12/12/96
Site 211 (N7)	X	-		-	-	-
AOC 212 (N8)	-	-		X[2]	a, b	3/19/96
AOC 213 (N9)	-	-		X[3]	a, b	3/19/96
AOC 214 (N10)	-	-		X[4]	a, b	3/19/96
AOC 215 (N11)	-	-		X	a, b	3/19/96
AOC 216 (N12)	-	-		X	a, b	3/19/96
AOC 217 (N13)	-	-		X	a, b	12/12/96
AOC 209 (N14)	X	-		-	-	12/12/96
Site 307 (N15)	-	-		-	a, b	12/12/96
Site 308 (N16)	-	X	a, b	-	-	3/19/96
AOC 309 (N17)	-	X	a, b	X	-	3/19/96
AOC 310 (N18)	-	-		X[1]	a, b	12/12/96
Site 311 (N19)	-	-		X[3]	a, b	3/19/96
AOC 351	-	X	c	-	-	-

Note:

(1) Underlying groundwater contamination is not site-related and is being administered using the source site. Administrative controls will be used appropriately.

(2) Groundwater metal contamination does not appear to be site-wide as only one metal exceeded naturally occurring background levels. Administrative controls will be used appropriately.

(3) Groundwater metal contamination does not appear to be site-activity related and is most likely naturally occurring.

(4) Groundwater organic concentrations are below California maximum contaminant levels. Groundwater metal contamination does not appear to be site-wide as only one metal minimally exceeded naturally occurring background levels.

References:

(a) Reports have been prepared for these AOCs to substantiate the NFI decision.

(b) Decision Documents to Support No Further Remedial Action Planned have been prepared for these AOCs.

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

12 December 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION: Col James Doolittle III

FROM: AFFTC/EM
5 East Popson Avenue
Edwards AFB, California 93524-1130

SUBJECT: NFI Status for Site N1 (IRP Site 205), Northern Retention Pond
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1. This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of Site N1 (IRP Site 205). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Groundwater beneath the site is contaminated, however, investigation does not indicate that Site N1 is the source of this contamination. Based on current requirements and policies, No Further Investigation is warrented at this time. Further assessment of the underlying groundwater plume will be performed as part of the Site N2 (IRP Site 206) investigation.

2. It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health or environment.

3. If you have any questions or comments, please call Mr. Robert W. Wood at (805) 277-1407.

We the undersigned concur with the recommendation of No Further Investigation for this Site.

12/12/96
ROBERT W. WOOD — DATE
Remedial Project Manager
U.S. Air Force

12/12/96
RICHARD T. RUSSELL — DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region IX

12/12/96
JOHN A. O'KANE, JR. — DATE
Remedial Project Manager
Environmental Restoration Division
Department of Toxic Substances
Control, Region 1

12/12/96
CINDI MITTON — DATE
Remedial Project Manager
California Regional Water Quality California
Control Board, Lahontan Region

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

12 December 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION: Col James Doolittle III

FROM: AFFTC/EM
5 East Popson Avenue
Edwards AFB, California 93524-1130

SUBJECT: NFI Status for Site N4 (IRP Site 208), South Retention Pond and LOX Wash Rack
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1. This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of Site N4 (IRP Site 208). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Groundwater beneath the site is contaminated, however, investigation does not indicate that Site N4 is the source of this contamination. Based on current requirements and policies, No Further Investigation is warrented at this time. Further assessment of the underlying groundwater plume will be performed as part of the Site N7 (IRP PRL 211) investigation.

2. It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health or the environment.

3. If you have any questions or comments, please call Mr. Robert W. Wood at (805) 277-1407

We the undersigned concur with the recommendation of No Further Investigation for this Site.

12/12/96
ROBERT W. WOOD — DATE
Remedial Project Manager
U.S. Air Force

12/12/96
RICHARD T. RUSSELL — DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region IX

12/12/96
JOHN A. O'KANE, JR — DATE
Remedial Project Manager
Environmental Restoration Division
Department of Toxic Substances
Control, Region 1

12/12/96
CINDI MITTON — DATE
Remedial Project Manager
California Regional Water Quality California
Control Board, Lahontan Region

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

19 March 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION: Col. Vernon Saxon

FROM: AFFTC/EM
5 East Popson Avenue, Building 2650A
Edwards AFB, California 93524-6470

SUBJECT: Closure of Site N5 (IRP PRL 363), CATSITE Building 4892 Removed UST
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1. This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of Site N5 (IRP PRL 363). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Based on current requirements and policies, No Further Investigation is indicated at this time.

2. It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health and the environment.

3. If you have any questions or comments, please call Mr. Robert W. Wood at (805) 277-1407.

We the undersigned concur with the above selected remedy of No Further Investigation for this Site.

19 March 96
ROBERT W. WOOD DATE
Remedial Project Manager
U.S. Air Force

3/19/96
RICHARD T. RUSSELL DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region IX

3/19/96
JOHN A. O'KANE, JR. DATE
Remedial Project Manager
Environmental Restoration Division
California Department of Toxic Substances
Control, Region 1

3-19-96
CINDI MITTON DATE
Remedial Project Manager
California Regional Water Quality
Control Board, Lahontan Region

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

12 December 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION: Col James Doolittle III

FROM: AFFTC/EM
5 East Popson Avenue
Edwards AFB, California 93524-1130

SUBJECT: NFI Status for PRL N6 (IRP PRL 210), Building 4821 Former Drum Storage Areas
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1. This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of PRL N6 (IRP PRL 210). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Groundwater beneath the site is contaminated, however, investigation does not indicate that PRL N6 is the source of this contamination. Based on current requirements and policies, No Further Investigation is warrented at this time. Further assessment of the underlying groundwater plume will be performed as part of the Site N2 (IRP Site 206) investigation.

2. It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health or the environment.

3. If you have any questions or comments, please call Mr. Robert W. Wood at (805) 277-1407.

We the undersigned concur with the recommendation of No Further Investigation for this PRL

12/12/96
ROBERT W. WOOD — DATE
Remedial Project Manager
U.S. Air Force

RICHARD T. RUSSELL — DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region IX

12/12/96
JOHN A. O'KANE, JR — DATE
Remedial Project Manager
Environmental Restoration Division
Department of Toxic Substances
Control, Region 1

12/12/96
CINDI MITTON — DATE
Remedial Project Manager
California Regional Water Quality California
Control Board, Lahontan Region

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

19 March 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION: Col. Vernon Saxon

FROM: AFFTC/EM
5 East Popson Avenue, Building 2650A
Edwards AFB, California 93524-6470

SUBJECT: Closure of PRL N8 (IRP PRL 212), Building 4826 Accumulation Point
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1. This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of PRL N8 (IRP PRL 212). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Based on current requirements and policies, No Further Investigation is indicated at this time.

2. It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health and the environment.

3. If you have any questions or comments, please call Mr. Robert W. Wood at (805) 277-1407.

We the undersigned concur with the above selected remedy of No Further Investigation for this PRL.

Robert W. Wood 19 Mar 96
ROBERT W. WOOD DATE
Remedial Project Manager
U.S. Air Force

Richard T. Russell 3/19/96
RICHARD T. RUSSELL DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region IX

John A. O'Kane Jr. 3/19/96
JOHN A. O'KANE, JR. DATE
Remedial Project Manager
Environmental Restoration Division
California Department of Toxic Substances
Control, Region 1

Cindi Mitton 3-19-96
CINDI MITTON DATE
Remedial Project Manager
California Regional Water Quality
Control Board, Lahontan Region

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

19 March 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION: Col. Vernon Saxon

FROM: AFFTC/EM
5 East Popson Avenue, Building 2650A
Edwards AFB, California 93524-6470

SUBJECT: Closure of PRL N9 (IRP PRL 213), Building 4845 Former UST
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1. This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of PRL N9 (IRP PRL 213). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Based on current requirements and policies, No Further Investigation is indicated at this time.

2. It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health and the environment.

3. If you have any questions or comments, please call Mr. Robert W. Wood at (805) 277-1407.

We the undersigned concur with the above selected remedy of No Further Investigation for this PRL.

Robert W Wood 19 Mar 96
ROBERT W. WOOD DATE
Remedial Project Manager
U.S. Air Force

Richard T. Russell 3/19/96
RICHARD T. RUSSELL DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region IX

John A. O'Kane 3/19/96
JOHN A. O'KANE, JR. DATE
Remedial Project Manager
Environmental Restoration Division
California Department of Toxic Substances
Control, Region 1

Cindi Mitton 3-19-96
CINDI MITTON DATE
Remedial Project Manager
California Regional Water Quality
Control Board, Lahontan Region

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

19 March 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION: Col. Vernon Saxon

FROM: AFFTC/EM
5 East Popson Avenue, Building 2650A
Edwards AFB, California 93524-6470

SUBJECT: Closure of PRL N10 (IRP PRL 214), Building 4833 Accumulation Point
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1. This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of PRL N10 (IRP PRL 214). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Based on current requirements and policies, No Further Investigation is indicated at this time.

2. It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health and the environment.

3. If you have any questions or comments, please call Mr. Robert W. Wood at (805) 277-1407.

We the undersigned concur with the above selected remedy of No Further Investigation for this PRL.

Robert W. Wood 19 Mar 96
ROBERT W. WOOD DATE
Remedial Project Manager
U.S. Air Force

Richard T. Russell 3/19/96
RICHARD T. RUSSELL DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region IX

John A. O'Kane 3/19/96
JOHN A. O'KANE, JR. DATE
Remedial Project Manager
Environmental Restoration Division
California Department of Toxic Substances
Control, Region 1

Cindi Mitton 3-19-96
CINDI MITTON DATE
Remedial Project Manager
California Regional Water Quality
Control Board, Lahontan Region

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

19 March 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION: Col. Vernon Saxon

FROM: AFFTC/EM
5 East Popson Avenue, Building 2650A
Edwards AFB, California 93524-6470

SUBJECT: Closure of PRL N11 (IRP PRL 215), Building 4892 Substation 3
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1. This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of PRL N11 (IRP PRL 215). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Based on current requirements and policies, No Further Investigation is indicated at this time.

2. It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health and the environment.

3. If you have any questions or comments, please call Mr. Robert W. Wood at (805) 277-1407.

We the undersigned concur with the above selected remedy of No Further Investigation for this PRL.

Robert W. Wood 19 MAR 96
ROBERT W. WOOD DATE
Remedial Project Manager
U.S. Air Force

Richard T. Russell 3/19/96
RICHARD T. RUSSELL DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region IX

John A. O'Kane Jr. 3/19/96
JOHN A. O'KANE, JR. DATE
Remedial Project Manager
Environmental Restoration Division
California Department of Toxic Substances
Control, Region 1

Cindi L. Mitton 3-19-96
CINDI MITTON DATE
Remedial Project Manager
California Regional Water Quality
Control Board, Lahontan Region

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

19 March 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION: Col. Vernon Saxon

FROM: AFFTC/EM
5 East Popson Avenue, Building 2650A
Edwards AFB, California 93524-6470

SUBJECT: Closure of PRL N12 (IRP PRL 216), Building 4850 Substation 16
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1. This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of PRL N12 (IRP PRL 216). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Based on current requirements and policies, No Further Investigation is indicated at this time.

2. It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health and the environment.

3. If you have any questions or comments, please call Mr. Robert W. Wood at (805) 277-1407.

We the undersigned concur with the above selected remedy of No Further Investigation for this PRL.

Robert W Wood 19 Mar 96
ROBERT W. WOOD DATE
Remedial Project Manager
U.S. Air Force

Richard T. Russell 3/19/96
RICHARD T. RUSSELL DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region IX

John A. O'Kane Jr. 3/19/96
JOHN A. O'KANE, JR. DATE
Remedial Project Manager
Environmental Restoration Division
California Department of Toxic Substances
Control, Region 1

Cindi Mitton 3-19-96
CINDI MITTON DATE
Remedial Project Manager
California Regional Water Quality
Control Board, Lahontan Region

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

12 December 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION: Col. James Doolittle III

FROM AFFTC/EM
5 East Popson Avenue
Edwards AFB, California 93524-1130

SUBJECT NFI Status for PRL N13 (IRP PRL 217), Building 4888 Substation 4
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1. This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of PRL N13 (IRP PRL 217). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Based on current requirements and policies, No Further Investigation is warrented at this time.

2. It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health or the environment.

3. If you have any questions or comments, please call Mr. Robert W. Wood at (805) 277-1407.

We the undersigned concur with the recommendation of No Further Investigation for this PRL.

12/12/96
ROBERT W. WOOD — DATE
Remedial Project Manager
U.S. Air Force

12/12/96
RICHARD T. RUSSELL — DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region IX

12/12/96
JOHN A. O'KANE, JR. — DATE
Remedial Project Manager
Environmental Restoration Division
Department of Toxic Substances
Control, Region 1

12/12/96
CINDI MITTON — DATE
Remedial Project Manager
California Regional Water Quality California
Control Board, Lahontan Region

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

12 December 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION: Col. James Doolittle III

FROM: AFFTC/EM
5 East Popson Avenue
Edwards AFB, California 93524-1130

SUBJECT: NFI Status for PRL N14 (IRP PRL 209), Building 4855 Fuel Farm
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1. This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of PRL N14 (IRP PRL 209). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Based on current requirements and policies, No Further Investigation is warrented at this time.

2. It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health or the environment.

3. If you have any questions or comments, please call Mr. Robert W. Wood at (805) 277-1407.

We the undersigned concur with the recommendation of No Further Investigation for this PRL.

12/12/96
ROBERT W. WOOD — DATE
Remedial Project Manager
U.S. Air Force

RICHARD T. RUSSELL — DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region IX

12/12/96
JOHN A. O'KANE, JR. — DATE
Remedial Project Manager
Environmental Restoration Division
Department of Toxic Substances
Control, Region 1

12/12/96
CINDI MITTON — DATE
Remedial Project Manager
California Regional Water Quality California
Control Board, Lahontan Region

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

12 December 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION: Col James Doolittle III

FROM AFFTC/EM
5 East Popson Avenue
Edwards AFB, California 93524-1130

SUBJECT NFI Status for PRL N15 (IRP PRL 307), Former Disposal Site
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1 This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of PRL N15 (IRP PRL 307). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Based on current requirements and policies, No Further Investigation is warrented at this time.

2 It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health or the environment.

3 If you have any questions or comments, please call Mr Robert W. Wood at (805) 277-1407.

We the undersigned concur with the recommendation of No Further Investigation for this PRL.

12/12/96
ROBERT W. WOOD DATE
Remedial Project Manager
U.S. Air Force

12/12/96
RICHARD T. RUSSELL DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region IX

12/12/96
JOHN A. O'KANE, JR. DATE
Remedial Project Manager
Environmental Restoration Division
Department of Toxic Substances
Control, Region 1

12/12/96
CINDI MITTON DATE
Remedial Project Manager
California Regional Water Quality California
Control Board, Lahontan Region

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

19 March 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION: Col. Vernon Saxon

FROM: AFFTC/EM
5 East Popson Avenue, Building 2650A
Edwards AFB, California 93524-6470

SUBJECT: Closure of PRL N16 (IRP PRL 308), Building 4853 Diesel Tanks
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1. This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of PRL N16 (IRP PRL 308). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Based on current requirements and policies, No Further Investigation is indicated at this time.

2. It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health and the environment.

3. If you have any questions or comments, please call Mr. Robert W. Wood at (805) 277-1407.

We the undersigned concur with the above selected remedy of No Further Investigation for this PRL.

Robert W Wood 19 Mar 96
ROBERT W. WOOD DATE
Remedial Project Manager
U.S. Air Force

Richard T. Russell 3/19/96
RICHARD T. RUSSELL DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region IX

John A. O'Kane Jr. 3/19/96
JOHN A. O'KANE, JR. DATE
Remedial Project Manager
Environmental Restoration Division
California Department of Toxic Substances
Control, Region 1

Cindi Mitton 3-19-96
CINDI MITTON DATE
Remedial Project Manager
California Regional Water Quality
Control Board, Lahontan Region

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

19 March 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION: Col. Vernon Saxon

FROM: AFFTC/EM
5 East Popson Avenue, Building 2650A
Edwards AFB, California 93524-6470

SUBJECT: Closure of PRL N17 (IRP PRL 309), Building 4838 Diesel Spill
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1. This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of PRL N17 (IRP PRL 309). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Based on current requirements and policies, No Further Investigation is indicated at this time.

2. It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health and the environment.

3. If you have any questions or comments, please call Mr. Robert W. Wood at (805) 277-1407.

We the undersigned concur with the above selected remedy of No Further Investigation for this PRL.

Robert W Wood 19 Mar 96
ROBERT W. WOOD DATE
Remedial Project Manager
U.S. Air Force

Richard T. Russell 3/19/96
RICHARD T. RUSSELL DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region IX

John A. O'Kane Jr. 3/19/96
JOHN A. O'KANE, JR. DATE
Remedial Project Manager
Environmental Restoration Division
California Department of Toxic Substances
Control, Region 1

Cindi Mitton 3-19-96
CINDI MITTON DATE
Remedial Project Manager
California Regional Water Quality
Control Board, Lahontan Region

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

12 December 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION Col James Doolittle III

FROM AFFTC/EM
5 East Popson Avenue
Edwards AFB, California 93524-1130

SUBJECT NFI Status for PRL N18 (IRP PRL 310), Drainage Pit
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1 This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of PRL N18 (IRP PRL 310). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Groundwater beneath the site is contaminated, however, investigation does not indicate that PRL N18 is the source of this contamination. Based on current requirements and policies, No Further Investigation is warrented at this time. Further assessment of the underlying groundwater plume will be performed as part of the Site N7 (IRP PRL 211) investigation

2 It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health or the environment.

3 If you have any questions or comments, please call Mr. Robert W. Wood at (805) 277-1407

We the undersigned concur with the recommendation of No Further Investigation for this PRL

12/12/96
ROBERT W. WOOD DATE
Remedial Project Manager
U S Air Force

12/12/96
RICHARD T. RUSSELL DATE
Remedial Project Manager
U S Environmental Protection Agency
Region IX

12/12/96
JOHN A O'KANE, JR. DATE
Remedial Project Manager
Environmental Restoration Division
Department of Toxic Substances
Control, Region 1

12/12/96
CINDI MITTON DATE
Remedial Project Manager
California Regional Water Quality California
Control Board, Lahontan Region

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FLIGHT TEST CENTER (AFMC)
EDWARDS AIR FORCE BASE, CALIFORNIA

19 March 1996

MEMORANDUM FOR AFFTC/CC
ATTENTION: Col. Vernon Saxon

FROM: AFFTC/EM
5 East Popson Avenue, Building 2650A
Edwards AFB, California 93524-6470

SUBJECT: Closure of PRL N19 (IRP PRL 311), Stormwater Drainage Ditch
NASA Operable Unit 6, Edwards Air Force Base, California
INFORMATION MEMORANDUM

1. This is to inform you that this Office has reviewed the project results for the field investigation associated with the closure of PRL N19 (IRP PRL 311). Based upon the Site/PRL Report and the sample results received, this Office is satisfied that the assessment is complete. Based on current requirements and policies, No Further Investigation is indicated at this time.

2. It is important to note that this letter does not relieve Edwards AFB of further responsibilities mandated under CERCLA, the California Health and Safety Code, and California Water Code if additional or previously unidentified contamination at the subject site causes or threatens to cause pollution or nuisance or is found to pose a significant threat to public health and the environment.

3. If you have any questions or comments, please call Mr. Robert W. Wood at (805) 277-1407.

We the undersigned concur with the above selected remedy of No Further Investigation for this PRL.

Robert W. Wood 19 Mar 96
ROBERT W. WOOD DATE
Remedial Project Manager
U.S. Air Force

Richard T. Russell 3/19/96
RICHARD T. RUSSELL DATE
Remedial Project Manager
U.S. Environmental Protection Agency
Region IX

John A. O'Kane Jr. 3/19/96
JOHN A. O'KANE, JR. DATE
Remedial Project Manager
Environmental Restoration Division
California Department of Toxic Substances
Control, Region 1

Cindi Mitton 3-19-96
CINDI MITTON DATE
Remedial Project Manager
California Regional Water Quality
Control Board, Lahontan Region

APPENDIX B

RESPONSES TO REGULATORY COMMENTS

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Environmental Restoration Program, Feasibility Study
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	General 1	First, results of the treatability studies for dual extraction and air sparging/soil vapor extraction (SVE) clearly indicated that those two technologies were successfully implemented with positive results at OU-6. Neither of these two technologies advanced past initial screening based in implementability. This appears to be contradictory since the chemical reaction technology was retained throughout the comparative evaluation with essentially the same implementation process as dual extraction and air sparging/SVE.	The effectiveness of the dual-extraction/sparging technologies is severely limited by the fractured bedrock medium and those limits have been documented in the TS reports. As demonstrated during the implementation of the TS, it is highly unlikely that significant contaminant mass could be removed with continued dual-extraction/sparging technology application. Because the benefits of dual-extraction/sparging technologies have already been realized, they were screened out early in the FS process. Please see responses to specific comments 9 and 15 for more details.
		Second, the cost estimate presented for Alternative 3 (chemical reaction) appeared to be excessive and without supportive technical detail.	As presented in the FS, the fractured bedrock medium at the site limits the extent of influence of injection. The extensive number of wells required to implement the injection program (and related costs) over the entire plume area are detailed in the report. A less expensive alternative consisting of hot spot treatment using chemical reaction will be added to the FS.
		Third, an alternative for source removal and monitored natural attenuation (MNA) wasn't even presented for initial screening. This approach is basically the corner stone of the feasibility study approach for Site 37 in Operable Unit Number 4. The OU-6 groundwater contaminant plume shares similar physical and chemical properties with the Site 37 contaminant plume. Based on the success experienced with both the regulatory agencies and the Air Force in promoting the remedial strategy at Site 37, it seems surprising that the same approach was not included in this FS.	An additional alternative will be added to the study: "Source Control and Hydrologic Control with Groundwater Monitoring". The alternative will consist of permanganate hot spot treatment for chlorinated solvents followed by natural attenuation and possibly enhanced-bioremediation of benzene. Plume movement will be monitored by sampling wells along the plume leading edge and downgradient of plume hot spots.

Reviewer	Comment #	Comment	Response
		Fourth, the model results presented in this FS predicted that, even after 125 years of MNA, the OU-6 groundwater contaminant plume would continue to contain concentrations of chlorinated organic compounds in excess of appropriate regulatory levels. Yet this alternative was presented to the regulators as the appropriate remedial action for the operable unit.	The additional alternative: "Source Control and Hydrologic Control with Groundwater Monitoring" will be added as the recommended remedial alternative.
Sheryl Lauth (USEPA)	General 2	Text in various portions of the Operable Unit Number 6 Feasibility Study (FS) states that groundwater monitoring results indicate that the contaminant plume in OU-6 has reached steady-state conditions (rate of groundwater advancement approximately equals the rate of attenuation) and shows no sign or limited signs of migration. However, the FS does not include this evaluation. Based on the primary document status of this feasibility study, please include the specific groundwater data and all other elements of the "steady-state" evaluation.	Emphasis will be placed on eight years of groundwater monitoring data, which demonstrates that the plume is at steady state. The modeling results verifying the steady-state status of the plume are summarized in Section 2 of the FS and detailed in the modeling appendix.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Environmental Restoration Program, Feasibility Study
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	General 3	The United States Environmental Protection Agency (EPA) provides guidance documents expressing the agency's expectation when proposing monitored natural attenuation (MNA) as a remedial alternative for a site. These guidance documents clarify EPA MNA policy and address the necessary technical components for a FS and subsequent inclusion into a record of decision (ROD). Please recognize the MNA guidance provided in Appendix B of *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Document (July 1999)* and *Use of MNA at Superfund, RCRA Corrective Action, and UST Sites (April, 1999)* as potential policy to be considered (TBC). This document will outline the EPA's expectations that should be addressed in the FS including performance monitoring, contingency measure(s), and institutional controls (IC).	A verification will be performed to ensure that relevant policies and expectations presented in the referenced documents have been included in the FS.
Sheryl Lauth (USEPA)	General 4	To support the development of the MNA alternative, EPA provides institutional control (IC) guidance. The guidance on understanding and selecting ICs include *Institutional Controls: A Reference Manual (USEPA Workgroup on Institutional Controls (March, 1998)* and *Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups (September, 2000).* We recommend reviewing these guidance documents and applying them as TBC for this site.	These guidance documents will be included as TBCs.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Environmental Restoration Program, Feasibility Study
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	General 5	In general, the modeling efforts appears to be adequate for the purpose of evaluating remedial alternatives during the feasibility study process based on the identified limitations. Those limitations are clearly stated in Section B5.0, Modeling Summary. As indicated in this section, use of the model for any other purposes would require further calibration and monitoring wells to aid in modeling of contaminant transport. Specific comments addressing the predictive modeling results are presented below.	Comment noted.
Sheryl Lauth (USEPA)	Specific 1	ES-2 The Executive Summary should include a brief description of OU-6 hydrogeology	A brief statement describing the fractured bedrock medium will be added.
Sheryl Lauth (USEPA)	Specific 2	ES-5 Section 1-2. Text states, "16 out of 19 sites were designated as Category 1. These sites were recommended for No Further Investigation (NFI) because soil and groundwater data were sufficient to characterize the sites and screening levels were not exceeded". Please cite the NFI letters for each specific site.	The citations will be added.
Sheryl Lauth (USEPA)	Specific 3	pg. 1-5 Second paragraph, first sentence. An explanation of the various "categories" should be included in this section of the FS.	An explanation of the categories will be added.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Environmental Restoration Program, Feasibility Study
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 4	pg. 1-5 Second paragraph, third sentence. Report text states "Sites/Areas of concern N1, N4, N5, N6, N8, N9, N10, N11, N12, N13, N14, N15, N16, N17, N18 and N19 were recommended for No Further Investigation (NFI) because soil and groundwater were sufficient to characterize the sites and screening levels were not exceeded." Text in the following paragraph states, "six sites (N1, N2, N3, N4, N7 and N14) were evaluated to identify the potential risk to human health". For clarity, it is recommended that a brief explanation for the human health risk assessments at these sites be included.	A brief explanation and reference to appropriate documents will be added.
Sheryl Lauth (USEPA)	Specific 5	pg. 1-9 First complete paragraph. With consideration to the nature of this primary document, it is recommended that Section B2.0, Conceptual Model of Appendix B, Groundwater Modeling Results, be presented in this section of the report rather than in an appendix.	The findings of the modeling were summarized in the main FS and the details of the modeling were provided in the appendix to provide for a well-organized and readable document. Furthermore, the FS will rely more on monitoring data and less on modeling results to document plume stability.
Sheryl Lauth (USEPA)	Specific 6	pg. 2-3 First paragraph, fifth sentence. Based on the text of this sentence, it would appear likely that source removal with MNA should have been included as a remedial alternative.	An additional alternative will be added to the FS: "Source Control and Hydrologic Control with Groundwater Monitoring". This alternative will allow for the treatment of the source areas with permanganate and the long-term monitoring of the remaining contaminant plume.
Sheryl Lauth (USEPA)	Specific 7	pg. 4-10 third complete paragraph, fourth sentence. Please cite the report that presented the indoor air evaluations.	A citation will be added.

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 8	pg. 4-14 third paragraph, first sentence. Although a fine point, the activities discussed in this sentence are more related to remedial investigation rather than remedial actions.	The sentence will be revised.
Sheryl Lauth (USEPA)	Specific 9	pg. 4-17 Section 4.2.2.4, Treatability Studies. A total of approximately 1071 pounds of major contaminants (including 968 pounds of total petroleum hydrocarbons and gasoline [TPHg]) were removed from soil vapor and 59 pounds of contaminants (including 29 pounds of trichloroethylene [TCE]) were removed from groundwater at Site N3. These results appear to be promising given that this system actually operated for a non-continuous period of seven months over a twenty-one month period. Although screened out for inclusion in the complete evaluation process, it would appear that this remedial process was successful especially when considering that it's application is very similar to a process (chemical reaction) that was retained for the complete evaluation process.	Section 4.2.2.4 will be expanded to present a more detailed account of the conclusions of the TS and additional data, including graphical representations, will be presented. The effectiveness of the dual-extraction/sparging technologies is severely limited by the fractured bedrock medium and those limits have been documented in the TS report. As demonstrated during the implementation of the TS, it is highly unlikely that significant contaminant mass could be removed with continued dual-extraction/sparging technology application. Because the benefits of dual-extraction/sparging technologies have already been realized, they were screened out early in the FS process.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Environmental Restoration Program, Feasibility Study
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 10	Table 4-2, Site N3 State Maximum Contaminant Level Exceedences. The information presented in this table was a bit confusing. It appears that the table was created by including the highest concentration detected from any well regardless of it's location for a specific sampling event. It would be difficult to determine a trend from this method of reporting since it is not possible to identify specific concentrations with a specific locations. In other words, individual wells that had a specific concentration during one sampling episode may in fact show declining or increasing trends over time but not be identified in this table due to the fact that a higher concentration may have been detected at a different location during the next sampling event. It appears that this table shows a relatively consistent persistence of a majority of groundwater contaminants over time.	The table will be revised to show the maximum concentrations detected in March 2003, the historical high and the MCLs. Historical plume figures will be added to Section 4 showing contaminant concentrations at monitoring wells over time.
Sheryl Lauth (USEPA)	Specific 11	pg. 4-28 Figure 4-6, Site Map, Site N7. The figure should specifically identify the areas of concern.	The source area at Site N7 will be noted in the figure.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Environmental Restoration Program, Feasibility Study
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 12	pg. 4-31 Section 4.3.2.4, Treatability Study. As discussed in the treatability study results for Site N3, a total of approximately 7.95 pounds of major contaminants (including 6.37 pounds of TCE) were removed from soil vapor and 0.65 pounds of contaminants (including 0.35 pounds of TCE) were removed from groundwater at Site N7. These promising results (operated for a non-continuous period of four months over a seven-month period) and the similarity of process methods with the chemical reaction method that was retained for complete evaluation presents a question as to why this method was not retained for complete evaluation.	Section 4.3.2.4 will be expanded to present a more detailed account of the conclusions of the TS and additional data, including graphical representations, will be presented. The effectiveness of the dual-extraction/sparging technologies is severely limited by the fractured bedrock medium and those limits have been documented in the TS report. As demonstrated during the implementation of the TS, it is highly unlikely that significant contaminant mass could be removed with continued dual-extraction/sparging technology application. Because the benefits of dual-extraction/sparging technologies have already been realized, they were screened out early in the FS process.
Sheryl Lauth (USEPA)	Specific 13	pg. 4-32 Fourth complete paragraph, first sentence. Based on the information presented in this sentence, isn't it reasonable to assume that the concentrations of total chromium, manganese, and nickel would decrease over time?	Agreed, the sentence will be revised.
Sheryl Lauth (USEPA)	Specific 14	pg. 4-33 First and second complete paragraphs. Based on the information presented in these paragraphs, there appears to be an inorganic contaminant problem in groundwater within OU-6.	Detections of inorganic contaminants above background concentrations and/or regulatory thresholds are sporadic and do not appear to be indicative of a contaminant problem. This point will be clarified in the FS.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Environmental Restoration Program, Feasibility Study
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 15	pg. 4-34 Section 4.3.4.1, Plume Volume and Extent. Previous text indicated that a total of 13.77 gallons of dissolved TCE was estimated to be in the groundwater at Site N7. The treatability study only operated for a short period between October 1998 to April 1999. Within this period there was an interruption in service from December 1998 to February 1999. This resulted in a treatability run of about 4 actual months out of a seven month total. The highest TCE influent groundwater concentration (2,100 micrograms per liter [ug/L]) was detected in November 1998. The high concentration of influent TCE occurred immediately prior to 3 months of treatment interruption. It appears that the treatability study was at least partially successful in spite of the fact that it operated for a short time period. The treatability study results also show that there still appears to be TCE in the unsaturated zone.	Appropriate sections will be expanded to present a more detailed account of the conclusions of the TS and additional data, including graphical representations, will be presented. The effectiveness of the dual-extraction/sparging technologies is severely limited by the fractured bedrock medium and those limits have been documented in the TS report. As demonstrated during the implementation of the TS, it is highly unlikely that significant contaminant mass could be removed with continued dual-extraction/sparging technology application. Because the benefits of dual-extraction/sparging technologies have already been realized, they were screened out early in the FS process. Conclusions will be amended to clarify that TCE is unlikely in the vadose zone. TCE recovered from the vapor stream most likely originated in the dewatered saturated zone.
Sheryl Lauth (USEPA)	Specific 16	pg. 5-1 First paragraph. It would be appropriate to reference Appendix C in this paragraph. Also, are the volumes included in this text the estimated cumulative total for all three sites (N2, N3, and N7)? Reference is also made to the contaminant plume's rate of attenuation. The reviewer was unable to find the FS section where the rate of attenuation is discussed in technical detail.	An appendix reference will be added. A reference to the modeling effort will be added to support the rate of advance statement.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Environmental Restoration Program, Feasibility Study
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 17	pg.6-1 Second paragraph, first sentence. Text states "…an alternative that does not meet an ARAR under federal environmental or state environmental or facility siting laws may be selected under the following circumstances:…" needs some clarification. The text should state that the ARARs (and TBCs necessary for protection) must be attained for hazardous substances, pollutants, or contaminants remaining on-site at the completion of the remedial action, unless waiver of an ARAR is justified. The six bullets that are presented are statutory ARARs waivers in CERCLA §121(d)(4).	The sentence will be revised.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Environmental Restoration Program, Feasibility Study
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 18	pg. 7-3 Table 7-1, Preliminary Screening of Technologies and Process Options - Dryden. Based on the success of both dual extraction and air sparging/soil vapor extraction when compared to their short application time, please explain why these treatment technologies were screened out. Especially when the technical application of these treatments are almost identical to a retained technology (chemical reaction).	Appropriate sections will be expanded to present a more detailed account of the conclusions of the TS and additional data, including graphical representations, will be presented. The effectiveness of the dual-extraction/sparging technologies is severely limited by the fractured bedrock medium and those limits have been documented in the TS reports. As demonstrated during the implementation of the TS, it is highly unlikely that significant contaminant mass could be removed with continued dual-extraction/sparging technology application. Because the benefits of dual-extraction/sparging technologies have already been realized, they were screened out early in the FS process. This point will be clarified in the FS. While, extraction technologies and chemical reaction (chemical oxidation) technologies are both limited by the radius of influence in the fractured bedrock, the technical application of the extraction technologies is quite different from the application of the chemical reaction technology.
Sheryl Lauth (USEPA)	Specific 19	pg. 7-5 Second paragraph, second sentence. Well yield technical data and information has not been presented in this FS.	Well yield data will be summarized in the FS.
Sheryl Lauth (USEPA)	Specific 20	pg. 7-5 Fifth paragraph, fourth sentence. No technical data or information supporting the contention that aquifer conditions within the Dryden plume are aerobic has been presented in this FS.	Data supporting the characterization of the Dryden plume as aerobic will be summarized in the FS.

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 21	pg. 7-6 Fifth paragraph, second bullet. This bullet should more appropriately identify "Access Restrictions" rather than "Personnel Restrictions."	The bullets are a list of "Process Options" one of which is "Personnel Restrictions". "Access Restrictions" is being presented in the FS as a technology, not a "Process Option".
Sheryl Lauth (USEPA)	Specific 22a	pg. 8-2 Table 8-2, Summary of Evaluated Alternatives, Alternative 2 column, first sentence. Based on model predictions presented in the FS, the contaminant plume in OU-6 will "persist a levels above regulatory levels to the end of the125 year simulation." Consistent with the information presented in this sentence and EPA Directive 9200.4-17P regarding attenuation "within a time frame that is reasonable compared to that offered by other more active methods," the predicted attenuation time frame presented in this FS is not reasonable when compared to remedial time frames offered by more active methods (Alternative 3). Further, the second sentence in this column states that these "naturally occurring processes" will be relied upon to achieve remedial action objectives and compliance with ARARs within a reasonable time frame. Again, the results of the FS predictive model states that it is likely that contaminant levels in excess of ARARs (specifically the State of California Maximum Contaminant Levels for TCE) will not be met by MNA of the OU-6 groundwater contaminant plume after the 125 year time frame.	Comment noted. Alternative 2 will be renamed and defined as "Long-term Monitoring/Hydrologic Control". Eight years of groundwater monitoring data will be summarized to demonstrate that the plume is hydrogeologically contained. Plume movement will be monitored by sampling wells along the plume leading edge. See above response.

Reviewer	Comment #	Comment	Response
		In addition, the third sentence in this column states that the application of MNA is best applied where "those processes have been observed." However, information presented in Appendix F, Operable Unit 6 Natural Attenuation Screening, indicates that, after completion of the EPA technical protocol developed for screening and categorizing groundwater contaminant plumes for natural attenuation potential, the OU-6 groundwater plume was determined to be the least likely (or possessing Type 3 behavior) to intrinsically biodegradate, predicting that "only limited intrinsic bioremediation of TCE is occurring" presumedly due to advection, dispersion and sorption. Since the groundwater plume at OU-6 has been reported to be in a state of stagnation in terms of groundwater movement relative to attenuation, apparently the only reduction in contaminant levels can be attributed to the least aggressive elements of natural attenuation (hence, the excessively long time frame scenario).	See above response.
Sheryl Lauth (USEPA)	Specific 22b	pg. 8-7 Table 8-2, Summary of Evaluated Alternatives, Alternative 2 column, first sentence. The primary use of laboratory analytical results (as derived from groundwater samples) is to monitor physical properties of the groundwater contaminant plume for evaluation of the attenuation process as presented in groundwater monitoring reports. An additional element of those groundwater reports should be an updated prediction of future trends in the attenuation process. The analytical results are not created for the sole purpose of supporting the natural attenuation predictive model.	The sentence will be revised to include trend prediction.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Environmental Restoration Program, Feasibility Study
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 23	pg. 9-4 Table 9.2, Primary Balancing Factor Evaluation Summary, Alternative 2 Column, second sentence. It is unclear why the Air Force has selected an alternative that their predictive model indicates cannot reach the applicable regulatory concentration for the site contaminants in a reasonable time frame and one that their natural attenuation screening process predicts little to no reductive dechlorination/removal of TCE.	An additional alternative will be added as the recommended alternative: "Source Control and Hydrologic Control with Groundwater Monitoring". This alternative will allow for the treatment of the source areas with permanganate and the long-term monitoring of the remaining contaminant plume.
Sheryl Lauth (USEPA)	Specific 24	pg. 9-5 Table 9-2, Primary Balancing Factor Evaluation Summary. This table is incorrectly titled on this page (Table 9-2, Summary of Evaluated Alternatives).	Table heading will be corrected.
Sheryl Lauth (USEPA)	Specific 25	pg. 9-5 Table 9-2, Primary Balancing Factor Evaluation Summary, Alternative 2 column, Technical Feasibility section. The installation of wells is a construction activity. As with the technical feasibility of Alternative 3, mission-critical activities would also be compromised with the implementation of this alternative as the need for new and more appropriately placed monitoring points are identified over the greater than 125 year life span of this alternative.	An effective injection well network requires well placement at 20- to 60-foot intervals, however an effective monitoring well network would be less densely spaced, with minimal interference to roadways and taxiways. This point will be clarified in the FS.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

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Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 26	pg. 9-5 Table 9-2, Primary Balancing Factor Evaluation Summary, Alternative 3 column, Technical Feasibility section. The installation of wells is a construction activity. The success of remediation does not solely rely on well placement and injection in roadways and taxiways. Mission-critical activities potentially compromised by the implementation of this alternative have not been presented or discussed in the FS text.	The text does not state that the success of remediation relies solely on well placement and injection in roadways and taxiways. As presented in Table 9-2 the taxiways and roadways would be compromised during injection well installation and injection events. Mission critical activities of an air base include the movement of aircraft on taxiways. This point will be clarified in the text.
Sheryl Lauth (USEPA)	Specific 27	pg. 9-5 Table 9-2, Primary Balancing Factor Evaluation Summary, Alternative 2, Administrative Feasibility section. Based on the following statement presented in this text "involves minimal coordination with governmental agencies for disposal of wastewater on site", it can be inferred that coordination with regulatory agencies required to review and approve of future progress reports, process modifications (new monitoring points, destruction of inappropriate or redundant monitoring points, changes in analytical processes and/or methods, etc.) have not been factored into this evaluation and cost estimate.	The sentence will be revised to clarify that, although coordination is minimal when compared to other technologies, the related reviews and coordination tasks have been accounted for in the FS and cost estimates.

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 28	pg. 9-5 Table 9-2, Primary Balancing Factor Evaluation Summary, Alternative 3, Administrative Feasibility section, first sentence. Since this process has already been implemented at the site, it is assumed that estimated costs associated with the "intensive coordination with governmental agencies" was appropriately evaluated to reflect the experience already achieved by all parties associated with the previous implementation of this process. In other words, it would be difficult to justify an estimated cost for this "intensive coordination" greater than what presently exists.	The assumption is correct - estimated costs associated with the "intensive coordination with governmental agencies" was appropriately evaluated to reflect the experience already achieved by all parties associated with the previous implementation of this process.
Sheryl Lauth (USEPA)	Specific 29	pg. 9-6 Table 9-3, Cost Summary. The reviewer was unable to verify or approximate the accuracy of the cost elements for Alternative 3. These costs appear to be extraordinarily high and there is a significant lack of supporting or justifying detail.	Costs are based upon "per well" subcontractor quotes and are supported in the appendix. These costs are extraordinarily high due to the high number of wells required to influence the entire plume area. These points are included in the FS text. A less expensive alternative consisting of hot spot treatment using chemical reaction will be added to the FS.
Sheryl Lauth (USEPA)	Specific 30	pg. 9-8 Section 9.4, Comparative Analysis of Remedial Action Alternatives. The "five tiered scale (poor, fair, good, very good, and excellent) used in this comparative analysis seems very subjective and would appears to arbitrarily exclude the a time factor for remediation. The NCP evaluation criteria do not include this scale. Please cite a reference for the scale. Where and by whom was it developed? Is it the product of identified industry standards or a relevant government agency?	There is no reference for this scale. This scale was developed for this document by Earth Tech to provide a relative ranking for simplified comparisons between alternatives. This scale is not a product of identified industry standards or a government agency.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Environmental Restoration Program, Feasibility Study
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 31	pg. 9-10 Third paragraph, third sentence. Text in this sentence states that "Alternative 2 has been instituted at the site...." A monitored natural attenuation monitoring plan has yet to be submitted for regulatory approval. It is presumptuous to assume the groundwater monitoring wells currently in place constitute an adequate and appropriate network prior to that review and approval. In addition, the maintenance requirements of an approved groundwater monitoring network have yet to be determined for the above reason.	Sentence will be revised to read, "A groundwater monitoring program has been instituted at the site and requires minimal effort to maintain and/or modify."
Sheryl Lauth (USEPA)	Specific 32	pg. 9-11 Fifth paragraph, second sentence. As identified previously, there has been no presentation of the potentially compromised mission-critical activities for discussion. Further, it has become standard industry practice for companies in the business of environmental investigation and remediation to adapt in cost effective and innovative ways to the implementation of remedial strategies and actions at Department of Defense (DOD) installations and private industries that service the DOD.	As presented in Table 9-2 the taxiways and roadways would be compromised during well installation and injection activities. Mission critical activities of an air base include the movement of aircraft on taxiways. This point will be clarified in the text.
Sheryl Lauth (USEPA)	Specific 33	pg. 9-12 First complete sentence. Please include the reasons or rationale for assuming that the public will find Alternative 3 less acceptable than Alternative 2 due to the estimated high implementation cost for Alternative 3.	A statement will be added to the paragraph to clarify that the public would find a relatively expensive alternative less acceptable. The assumption is that the public would want tax dollars applied to less expensive alternatives which are also protective of human health and the environment.
Sheryl Lauth (USEPA)	Specific 34	App. A Page 1. A signed copy of this Memorandum of Record should appear in the final version of the OU-6 FS.	A signed copy of the memorandum will be added.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Environmental Restoration Program, Feasibility Study
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 35	App. A Page 2, second paragraph, first sentence. Copies of the signed NFI letters for AOCs 210, 212, 213, 214, 310, and 311 should also be included in the OU-6 FS.	Signed copies of the NFI letters will be added.
Sheryl Lauth (USEPA)	Specific 36	App. B Page B5-2. Based on the following text: "Given the model's predictive uncertainties, modeling suggests that the contaminant plume at Dryden is persistent and will not naturally attenuate with a 125-year time frame" and, "The model assumes that all contaminants are in the dissolved phase and no fugitive dense non-aqueous phase liquid exists in pore spaces or fractures", two significant comments with regard to these statements must be addressed. As previously discussed in Specific Comment 15, a time period in excess of 125 years with no confirmed assurance of plume remediation is not reasonable. Secondly, the conjecture over the presence of DNAPL in fractures does not reflect a reasonable evaluation of site data. Additionally, the treatability study results for Sites N3 and N7 suggest that dual extraction and air sparging/SVE may not be effective at treating DNAPLs. Study results state that DNAPLs may exist, even though both pilot tests ran for relatively short treatment periods. However, the groundwater modeling section indicates that the model's predictive behavior is not appropriate if DNAPLs are present. Please address this inconsistency.	An additional alternative will be added to the FS: "Source Control and Hydrologic Control with Groundwater Monitoring". This alternative will allow for the treatment of the source areas with permanganate and the long-term monitoring of the remaining contaminant plume to verify that no migration occurs. The reference to DNAPLS in the discussion of the TS results are in the context of the decision making process of the study and not an affirmation of their existence at the site. The sections will be revised to clarify the decision-making process and the reference to DNAPLs will be removed.

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 37	App. C Tables C2 and C4 contain computation errors in the water volume, mass and volume of TCE. These numbers appear to be low by approximately 30 percent. For example, in Table C2, row 2, the mass of TCE should be 5.5 pounds rather than 4.3 pounds. Please review these calculations and revise the information in this table and appropriate text.	The calculations presented in the FS were made for a contaminant depth of 70 feet, the estimated contaminant depth was subsequently revised to 90 feet, the calculations will be updated accordingly.
Sheryl Lauth (USEPA)	Specific 38	App. D Table D-1, Page 6, third row. Underground Injection Control Program. There is a presumption that the waste at the Dryden site is a Resource Conservation and Recovery Act (RCRA) hazardous waste. Please explain if this was confirmed through waste characterization and evaluation or presumption.	It is not presumed that waste at Dryden is RCRA hazardous. A statement will be added to specify that if any RCRA hazardous waste is generated at the site, underground injection will not be a disposal method.
Sheryl Lauth (USEPA)	Specific 39	App. D Table D-2, Page 5, first row. Location Standards for Owners and Operators of Hazardous Waste Transfer, Treatment, Storage, and Disposal Facilities. By stating the hazardous waste requirement is applicable implies that the remedial action or the circumstances at the site satisfies all of the jurisdictional prerequisites of a requirement. If this is correct, please clearly state that an alternative being considered in this FS will be generating a RCRA or non-RCRA hazardous waste on-site.	A proper determination cannot be made until a waste is generated. A statement will be added specifying that wastes generated during the implementation of any alternative will be characterized and, if determined to be hazardous, will be handled accordingly.
Sheryl Lauth (USEPA)	Specific 40	App. D Table D-2, Page 9, third row. Please consider changing “endemic” to “endangered.”	The TBC referred to in this line item relates to species of special concern. “Endemic” is used in this context to refer to those species specifically located within the site boundary. To eliminate further confusion “Endemic” will be replaced with “Local”.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Environmental Restoration Program, Feasibility Study
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 41	App. D Table D-3, Pages 5 and 6, first, second, fourth and fifth rows. The occupational worker safety requirements do not meet the definition of ARARs as defined on page 6 of this FS. Please correct this accordingly.	Revised to TBC.
Sheryl Lauth (USEPA)	Specific 42	App. D Table D-3, Page 5, third row. Ambient Air Quality Standards. Each State has the primary responsibility for assuring that National Ambient Air Quality Standards are attained and maintained. The ambient air quality standards are not promulgated standards applied to stationary sources. Please reevaluate the applicability of this requirement.	Revised to TBC.
Sheryl Lauth (USEPA)	Specific 42	App. E The software, cost presentations, and assumptions in Sections E1.2 through E1.6 appear to be in order. However, the assumptions presented in Section E1.7 do not appear to be justified. For example, it is understood that this monitoring occurs after application of either Fenton-Based Reagent or Permanganate Reagent. Please explain and justify why monitoring events would be required every 2 years to the eleventh year and then every 5 years until year 30 after the completion of treatment and site restoration. Also, please explain (add detail) why multiple events are required for application of the reagents. Additionally, why is chemical reaction monitoring (shown in Section E1.7.3.3) required in addition to other monitoring in Section E1.7.2 (why can't the two activities be combined)?	Groundwater flow at the site is extremely limited, justifying a periodic monitoring regimen. An explanation of the reasoning will be added. Treatability study results indicate that multiple applications of chemical reagents are more effective than a single application. An explanation of the reasoning will be added.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Environmental Restoration Program, Feasibility Study
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
John A. O'Kane Jr. (DTSC)	General 1	U.S. EPA is correct in identifying that our historic methodology of Source Removal Plus XXXX as a cleanup option appears to have been overlooked by NASA in this document.	An additional alternative will be added to the FS: "Source Control and Hydrologic Control with Groundwater Monitoring". This alternative will allow for the treatment of the source areas with permanganate and the long-term monitoring of the remaining contaminant plume.
John A. O'Kane Jr. (DTSC)	General 2	NASA's TS's have had varying levels of success. Based upon the information given in the FS, some of the TS's could be an additional option. The FS document doesn't fully address why they were not considered for Source Removal or how one of them could be implemented as a Source Removal.	Appropriate sections will be expanded to present a more detailed account of the conclusions of the TS and additional data, including graphical representations, will be presented to support the contention that the technology implemented in the TSs will not provide effectiveness beyond that which has been previously documented. An additional alternative will be added to the FS: "Source Control and Hydrologic Control with Groundwater Monitoring". This alternative will allow for the treatment of the source areas with permanganate and the long-term monitoring of the remaining contaminant plume.
John A. O'Kane Jr. (DTSC)	General 3	The FS document fails to explain convincingly why MNA is the only option.	An additional alternative will be added to the FS as the recommended alternative: "Source Control and Hydrologic Control with Groundwater Monitoring". This alternative will allow for the treatment of the source areas with permanganate and the long-term monitoring of the remaining contaminant plume.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Environmental Restoration Program, Feasibility Study
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California
Draft, November 2003

Reviewer	Comment #	Comment	Response
John A. O'Kane Jr. (DTSC)	General 4	Some form of Source Removal &/Plus MNA should be evaluated as a final remedy.	An additional alternative will be added to the FS: "Source Control and Hydrologic Control with Groundwater Monitoring". This alternative will allow for the treatment of the source areas with permanganate and the long-term monitoring of the remaining contaminant plume.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Draft Final Feasibility Study dated June 2004
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	General 1	The newly developed alternative, *Source Control and Hydrologic Control with Groundwater Monitoring* appears to be both an appropriate and implementable alternative that should be acceptable to the regulatory agencies.	Comment noted.
Sheryl Lauth (USEPA)	Specific 1	The Air Force response to EPA Specific Comment 10 indicated that Table 4-2 "would be removed and the latest concentrations of contaminants that exceed MCLs will be added to the text" in the Draft Final version of the document. Table 4-2*, Site N3 State Maximum Contaminant Level Exceedences* remains in the Draft Final document. The text does not appear to have been modified. However, the intent of the comment has been met by the Air Force since the requested information has been presented in a table.	Comment noted. During the revision process it was deemed appropriate to include the 2003 groundwater sample results and Tables 4-1, 4-2, and 4-3 were retained to include that information. The text associated with these tables was revised appropriately (to reference the 2003 event) in the Draft Final version.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IX AND DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Draft Final Feasibility Study dated June 2004
Operable Unit 6, NASA Dryden, United States Air Force Flight Test Center, Edwards Air Force Base, California

Reviewer	Comment #	Comment	Response
Sheryl Lauth (USEPA)	Specific 2	The Air Force response to EPA Specific Comment 37 stated, "The calculations presented in the FS were made for a contaminant depth of 70 feet, the estimated contaminant depth was subsequently revised to 90 feet, the calculations will be updated accordingly." This comment was made in reference to information presented in Table C-2. *Calculation of Mass and Volume of TCE Dissolved in the Site N3 Groundwater Plume* of the Draft document. The Draft Final document contains Table D-2 *Calculation of Mass and Volume of TCE Dissolved in the Site N3 Groundwater Plume.* This table appears to contain the same information as Table C-2 of the Draft document without the update.	Although Tables C-1 and C-3 were corrected and included in the Draft Final version as Tables D-1 and D-3, respectively, the information in Tables C-2 and C-4 was not corrected. Tables D-2 and D-4 (formerly Tables C-2 and C-4, respectively) will be corrected and errata pages will be provided to replace affected pages in the Final version of the FS.
John A. O'Kane Jr. (DTSC)	General 1	LRWQCB gave their concurrence 7/20/04	Comment noted.
John A. O'Kane Jr. (DTSC)	Specific 1	Include as ARARs: • CCR Title 22, Section 67391, a, b, and d. This is the Land Use Covenants section. • Civil Code Section 1471, a and b.	Included as ARARs as noted.

APPENDIX C

GROUNDWATER MODELING RESULTS

ENVIRONMENTAL RESTORATION PROGRAM

GROUNDWATER MODELING RESULTS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
DRYDEN FLIGHT RESEARCH CENTER
OPERABLE UNIT 6

EDWARDS AIR FORCE BASE
CALIFORNIA

DRAFT FINAL

JUNE 2004

Prepared for:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
DRYDEN FLIGHT RESEARCH CENTER
SAFETY, HEALTH, AND ENVIRONMENTAL OFFICE
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AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE
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C1.0 INTRODUCTION

Remedial investigations at the National Aeronautics and Space Administration Dryden Flight Research Center (Dryden), Operable Unit 6, Edwards Air Force Base (AFB), California, have identified several commingled groundwater contaminant plumes (Figure C-1). The plumes have been characterized in both the horizontal and lateral extent and a three-dimensional (3-D) groundwater flow and transport model was developed for the portion of the unconfined aquifer underlying the Dryden facility and downgradient. This appendix details the modeling effort and presents the predicted groundwater flow regime at Dryden through the year 2125. Using the predicted transient flow conditions, the migration of trichloroethene (TCE) groundwater contamination was evaluated and future contaminant distributions were predicted.

C1.1 PURPOSE AND SCOPE

The modeling effort is intended to provide predictive input for evaluation of remedial alternatives during the feasibility study process. The model is both a predictive and interpretive tool to determine contaminant concentration persistence above remedial objectives. Groundwater flow has been modeled, and transport coupled, to show advective and dispersive contaminant transport, without representation of retardation and biodegradation mechanisms. The predictive quality of the model is influenced by the interpretation of geologic and hydraulic data. The 3-D, finite-element, groundwater flow and transport model, FEMWATER, was selected as an appropriate code to model the site due to the true 3-D nature of flow at the site. The modeling effort is based on information obtained during remedial investigations and treatability studies at Operable Units 6 and 8, and during regional modeling investigations in the North Muroc Subbasin (Earth Tech, 2003; Oberdorfer, 2003 and Rust, 1996).

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C2.0 CONCEPTUAL MODEL

C2.1 HYDROGEOLOGICAL FRAMEWORK

Dryden is located at the margin of Rogers Dry Lake and the North Muroc Subbasin (Figure C-2). Groundwater in the North Muroc Subbasin occurs within saturated alluvium (valley fill). The geologic materials range from fine-grained (clay) to coarse-grained (sand with gravel) and comprise a single, alluvial aquifer. The lacustrine deposits, that act as a confining layer further to the south, are not present in the north. The thickness of the saturated alluvium is variable. Near the margins of the alluvial deposits where the bedrock is shallow, the alluvium is not saturated. There is a subsurface bedrock high near the southern end of the subbasin.

Originally, the North Muroc Subbasin was an integral part of the much larger Antelope Valley Basin, with flow occurring from south to north. In the 1950s, in part due to increased pumping in the South Base area, a partial groundwater divide began to develop (Figure C-2), with some flow diversion to the cone of depression near the South Base well field on the west side and with flow continuing to the north, on the east side of the valley. This groundwater divide gradually expanded and migrated northward (Oberdorfer, 2003). By approximately 1980, a well-established groundwater divide had developed, so that the North Muroc Subbasin had a flow regime separate from that to the south. This divide is currently located approximately 1 mile south of well RL-MW04. It is a hydraulic divide, likely created by pumping from the aquifer, and not primarily a physical divide caused by the bedrock high in the area. With the creation of the groundwater divide, inflows from the south have ceased. Recharge to the alluvial aquifer occurs as groundwater influx from the surrounding bedrock. Water levels measured during investigations indicate migration of groundwater from the surrounding bedrock into the alluvium.

Dryden is underlain by a relatively thin deposit of alluvium or colluvium, which is situated on the top of granitic bedrock. The quartz monzonite bedrock is extremely weathered in the upper 20 to 30 feet. From west to east, the alluvium thickens and the bedrock surface dips. The depth to groundwater at Dryden ranges from 7 feet below ground surface (bgs) to more then 20 feet bgs.

C2.1.1 RECHARGE AND BOUNDARIES

Recharge to the aquifer underlying Dryden originates from the elevated bedrock hills to the west of the Dryden facility. Tritium studies have confirmed that recharge is limited to the bedrock hills to the west of the site. The unconfined aquifer at Dryden extends to the east to Rogers Dry Lake (Figure C-2). In the bedrock hills west of Dryden, groundwater occurs in fractured bedrock. However, in the region of Dryden depth to groundwater is much shallower and water exists in the more permeable, higher porosity alluvium and weathered bedrock. To examine flow and transport at Dryden, a local model of the subdomain was created. The local model allowed for a more detailed representation of the stratigraphy, faster convergence, and more detailed transport modeling.

C2.1.2 HYDRAULIC AND TRANSPORT PROPERTIES

Hydraulic properties important to the FEMWATER groundwater model include hydraulic conductivity (permeability), compressibility (storage) of the materials, dispersivity, and effective porosity. To apply the numerical model, the distribution of these parameters must be specified for each hydrogeological unit. Hydraulic properties have been estimated from aquifer pumping tests, long-term extraction, inverse modeling, and from laboratory permeability tests. The results of the aquifer testing at Dryden were limited in depth and may have yielded questionable results due to the relatively short durations. However, long-term time-drawdown data for the competent fractured bedrock aquifer are available from water level monitoring of a groundwater extraction system located at Site 25, approximately 500 to 1,000 feet west of the suspected source areas of the Dryden plumes. Analysis of the fractured bedrock time-drawdown data is presented in Attachment 1. Estimates of hydraulic conductivity can be obtained from the time-drawdown data. These estimates are generally more reliable than the short-duration aquifer tests conducted at Dryden, and they provide a good analog to the site. Hydraulic conductivities for the thinner alluvial and weathered bedrock materials are available from laboratory permeability tests. These units are most likely responding to the shorter duration aquifer tests. Table C2-1 provides a summary of initial hydraulic conductivity ranges and other parameters used for the numerical model of the site and those used for the final predictive modeling.

TABLE C2-1. HYDRAULIC PARAMETERS FOR GROUNDWATER FLOW AND TRANSPORT MODEL

Parameter	Layer	Range of Expected Values	Value used in Calibrated Models	Units
Hydraulic Conductivity	Alluvium and Extremely Weathered Bedrock	0.2 - 3.1	0.3	feet per day
	Competent Bedrock	0.1 - 0.21	0.11	
Porosity	Alluvium and Extremely Weathered Bedrock	0.19 - 0.45	0.40	Ratio or Volume
	Competent Bedrock	0.01 - 0.04	0.02	
Compressibility	Alluvium and Extremely Weathered Bedrock	2.5 to 3.0e-16	3.0e-16	feet x day^2/slug
	Competent Bedrock	4.0 to 6.5 e-18	4.0e-16	
Effective Porosity Ratio	Alluvium and Extremely Weathered Bedrock	0.1 - 1.0	1	Ratio of Effective Porosity to Total Porosity
	Competent Bedrock	0.2 - 1.0	0.75	

Note:

Values for compressibility are based on published values; hydraulic conductivity and porosity are derived from laboratory or field testing. Values ultimately used in the model are selected based on the results of calibration and inverse modeling.

C2.2 TRANSPORT FRAMEWORK

Contaminants at the various suspected release locations were likely released to the land surface or directly to the subsurface by leaking underground storage tanks or drums. The exact release dates are unknown and can only be bracketed by historical use data.

Dense non-aqueous phase liquid contaminants, such as TCE, released to the land surface and subsurface migrated to shallow groundwater in the permeable alluvium, colluvium, and weathered bedrock. The contamination likely migrated further vertically under the influence of gravity, becoming trapped in small pockets of free product in pore spaces. The contaminants dissolved in shallow groundwater were transported laterally under relatively slow groundwater flow conditions. The shallow aquifer materials and extremely weathered bedrock have a relatively high porosity resulting in slower average linear velocities. As contaminants reached the deeper, more competent fractured bedrock, they likely traveled at higher velocities due to the very low effective porosity of the fractured bedrock. The modeled plumes are relatively stable areas of high concentration near the release areas, with elongated plumes

caused by more rapid transport in the deeper fractured bedrock. A diagrammatic representation of the contaminant releases and the conceptual model are presented on Figure C-3.

C3.0 THREE-DIMENSIONAL FLOW MODEL

The 3-D flow model was developed and calibrated to be consistent with the conceptual model of groundwater flow at the site. Tasks included the development and calibration of a steady-state 3-D flow model to 1998 flow conditions, the calibration of a transient 3-D flow model to flow conditions between 1998 and 2002, and the application of the 3-D model to predict future transient-flow conditions from 2003 as a result of future actions at Dryden.

C3.1 STEADY-STATE FLOW MODEL DEVELOPMENT AND CALIBRATION

The steady-state 3-D groundwater flow model is a representation of conditions at a point in time when hydraulic conditions at the site were relatively well known and stresses on the hydrogeological system were relatively low. Historical groundwater level monitoring data at Dryden indicated that 1998 was an appropriate year to use for steady-state calibration due to relatively low stresses on the aquifer and high data density. Data from upgradient wells installed following 1998 are also used for calibration to provide additional resolution in creating a map of the steady-state potentiometric surface.

C3.1.1 HYDRAULIC GRADIENT

The steady-state model was calibrated to the potentiometric surface using a composite of data from groundwater monitoring wells in Operable Units 6 and 8, and monitoring wells on Rogers Dry Lake. It was necessary to use data from multiple time periods since many wells were installed following the installation of the Dryden wells. The composite data allow for a more complete picture of the potentiometric surface at, and around, Dryden. The composite data were compiled and contoured into computer-aided drafting for import into the modeling software (Figure C-4). The pre-remedial potentiometric map served as a basis for the flow boundaries.

C3.1.2 FLOW BOUNDARY CONDITIONS

The model area represents an area surrounding the contaminant plumes and approximately 9,000 feet downgradient (Figure C-5). The southern and northern boundaries are perpendicular to the observed groundwater elevation contours and hence represent flow lines, which are a type of no flow boundary simulated as the edge of the modeled region. The upgradient, or western boundary, and the

downgradient, or eastern boundary are specified head boundaries. The initial conditions for the specified head boundaries are based on the observed heads at the site for 1998.

C3.1.3 FINITE-ELEMENT MODEL MESH GENERATION

The finite-element mesh was constructed to be consistent with the stratigraphic units as interpreted in the conceptual site model of flow and transport. Specifically, as shown on Figure C-3, the conceptual stratigraphic sequence from top to bottom is alluvium/colluvium and extremely weathered bedrock, moderately weathered bedrock, and competent bedrock. The model mesh consists of two hydrogeological units. Each hydrological unit varies in thickness and mesh divisions as shown on Figure C-5. The upper two units were simplified into one combined unit representing the alluvium and extremely weathered bedrock. The saturated aquifer extends below the model domain; however, the model domain has been limited to a depth of 180 feet. The finite-element layers were created by building simplified triangulated irregular network (TIN) surfaces of contacts and filling the space between TINs with finite elements. The TINs were created using the contacts interpreted from exploratory boring logs. One advantage of finite-element modeling is that the mesh cells can be made denser in areas of interest without reducing the cell size everywhere in the model. This allows for smaller element sizes in the areas of interest, or where there is greatest change, and larger elements where concentrations, or gradients, change more slowly. The mesh generated for the Dryden model uses smaller elements in the areas of high concentration and the element sizes gradually increase with distance from the areas of high concentration.

C3.1.4 STEADY-STATE MODEL SIMULATION AND CALIBRATION RESULTS

Steady-state flow calibration was achieved within a tolerance of 5 feet from the observed head at most of the observation points. Figure C-6 presents the results of the steady-state flow simulation heads versus the observed potentiometric surface for 1998. A comparison of predicted heads to observed heads at reliable calibration points reveal a good agreement within the 5-foot tolerance interval (Figure C-7). The relatively high tolerance interval was selected based upon the irregular water level measurements at individual wells and questionable horizontal survey data reliability. Points that are known to have inaccurate survey locations were omitted from the calibration data. A 5-foot tolerance interval is below 10 percent of the total head drop over the model domain.

C3.2 TRANSIENT-FLOW SIMULATION/CALIBRATION

Further calibration of the flow model was performed under pumping stresses. These calibrations included the simulation of groundwater extraction at wells within the Site N3 and Site N7 areas of high TCE concentration. Additionally, changes in the upgradient specified head boundary as a result of groundwater extraction associated with the Site 25 interim removal action were simulated.

C3.2.1 SIMULATION OF PREVIOUS ONSITE EXTRACTION AND UPGRADIENT EXTRACTION

Groundwater was extracted at the Site N3 and Site N7 areas of high TCE concentration during remedial actions that took place between 1998 and 2001. Detailed time series water level data are not available for the extraction areas; however, sporadic measurements were taken at selected wells. Extraction rates for the extraction wells are also available (Table C3-1). Using data from extraction well N3-MW11, it was possible to conduct limited transient flow calibration of the model. Figure C-8 presents the results of transient calibration of the groundwater flow model with respect to the Site N3 extraction data. An adequate transient calibration was obtained by simulating pumping at well N3-MW11 at average rates for a period from October 1998 through October 2002, using N3-MW06 as an observation point. The calculated groundwater elevations at monitoring well N3-MW06, approximately 150 feet from extraction well N3-MW11, generally matched groundwater elevations observed during similar time periods. To achieve a closer calibration, bulk densities and hydraulic conductivities were adjusted by the same order of magnitude as the derived, or assumed, values.

A groundwater extraction and treatment system has been in operation upgradient of the model area from October 2001 to the present to hydraulically contain the Site 25 TCE plume, which originated in Operable Unit 8 (west of Operable Unit 6). The Site 25 extraction system has created a depression in the potentiometric surface on the upgradient edge of the model area. Rather than incorporating the whole extraction system and increase model convergence times, a section of the upgradient specified head boundary in the region of the Site 25 extraction well array was partitioned, and set independently of the rest of the boundary. Using this partition, it was possible to specify the head of the boundary near the Site 25 extraction well array. The heads were determined by extrapolating the predicted drawdown for observations wells near the model boundary.

TABLE C3-1. TRANSIENT CALIBRATION EXTRACTION AND OBSERVATION DATA

Date (month/day/year)	N3-MW11 Groundwater Extraction Data: Total (gallons)	This Period (gallons)	Period (Days)	Daily Total (gallons)	N3-MW06 Groundwater Elevation
4/06/1998	--	--	--	--	
10/02/1998	--	--	--	--	2278.484
12/04/1998	49,915	49,915	--	--	2278.214
12/16/1998	78,107	28,192	12	2,349.3	
1/20/1999	135,100	56,993	35	1,628.4	
2/11/1999	140,087	4,987	21	237.5	
3/04/1999	185,014	44,927	21	2,139.4	
4/02/1999	264,931	79,917	29	2,755.8	
4/20/1999	--	--	--	--	2273.834
4/30/1999	265,821	890	28	31.8	
11/29/1999	--	--	--	--	2276.154
2/10/2000	285,125	19,304	289	66.8	
2/20/2000	373,760	88,635	10	8,863.5	
3/21/2000	455,361	81,601	29	2,813.8	
4/07/2000	--	--	--	--	2273.144
4/20/2000	530,890	75,529	30	2,517.6	
5/18/2000	602,427	71,537	29	2,466.8	
6/23/2000	641,910	39,483	35	1,128.1	
7/06/2000	684,395	42,485	14	3,034.6	
7/21/2000	685,595	1,200	15	80.0	
8/28/2000	732,040	46,445	37	1,255.3	
9/12/2000	762,195	30,155	15	2,010.3	
9/18/2000	--	--	--	--	2271.944
9/22/2000	775,760	13,565	10	1,356.5	
9/28/2000	817,195	41,435	6	6,905.8	
10/13/2000	848,546	31,351	16	1,959.4	
10/26/2000	879,915	31,369	13	2,413.0	
11/06/2000	882,267	2,352	11	213.8	
1/04/2001	936,460	54,193	60	903.2	
1/25/2001	958,677	22,217	21	1,058.0	
2/06/2001	996,935	38,258	12	3,188.2	
2/20/2001	1,023,284	26,349	14	1,882.1	
3/05/2001	1,060,006	36,722	13	2,824.8	
3/19/2001	1,088,708	28,702	14	2,050.2	
4/04/2001	1,115,748	27,039	16	1,690.0	
4/16/2001	1,126,990	11,243	12	936.9	
5/14/2001	1,134,105	7,115	28	254.1	
5/30/2001	1,141,167	7,062	16	441.4	
6/11/2001	1,154,649	13,482	12	1,123.5	
			Daily Average	1,955.6	

To simulate the depression created by the Site 25 extraction wells, the heads at the specified head boundary were lowered to the calculated steady state based upon the current extraction rates at Site 25. A steady-state simulation was run using groundwater elevations from March 2003 as a calibration target (Figure C-9). The upgradient specified head boundary segment was used to depress the water table results in calibration to March 2003 conditions.

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C4.0 TRANSPORT MODELING

C4.1 TRANSPORT FROM SUSPECTED RELEASE DATES TO PRE-REMEDIAL STATES

The 3-D coupled flow and transport model was developed and calibrated to be consistent with the conceptual model of groundwater flow and transport at the site. The numerical model underwent a rough transport calibration by simulating the transport of contaminants from the suspected release dates to pre-remedial conditions. This inverse modeling was used to verify estimates of dispersivity for the aquifer materials. The model was run using the calibrated flow model and inserting pulse source terms to the areas of high TCE concentration at Sites N2, N3, and N7. The model was run in the coupled flow and transport mode, and the source loading was adjusted iteratively along with transport parameters until a reasonable approximation of the pre-remedial plumes were reached. Figure C-10 shows the results of the inverse transport modeling compared to the observed plume configuration in 1996. The model cannot duplicate the exact plume configuration; however, a rougher approximation was achieved. The discrepancies between the configurations are likely attributable to local variations in hydraulic parameters or discrete preferential pathways. It is also likely that the groundwater flow regime responsible for the current plume distribution underwent significant change as a result of groundwater extraction in the southern portion of the Lancaster subbasin. These changes were not modeled because they occurred prior to monitoring well installation.

C4.1.1 TRANSPORT PARAMETERS

Estimates of model parameters were developed to account for contaminant dispersion and diffusion. Specific model parameters were reviewed, including longitudinal and transverse dispersivity and diffusion coefficients. A longitudinal dispersivity of 10 feet was selected to be on the lower range of recommended values for acceptable solutions. The effective transverse dispersivity was assumed to be one-tenth of the longitudinal dispersivity. Therefore, 1 foot was used in all simulations. These values were confirmed during inverse modeling to roughly reproduce plume distributions using the provided transport and flow parameters. No adsorption was considered in simulating the transport of plumes. Adsorption is not likely to be active in the more permeable upper alluvial materials and no distribution coefficient data exist. Transport velocities in the upper materials are likely over estimated and, therefore, conservative.

The porosity of the shallow aquifer materials, including the extremely weathered bedrock, was estimated from laboratory measurements of porosity, which range from 0.19 to 0.45. Results were available for samples from multiple wells and depths across the site (Table C2-1). Based on the ranges of values considered, a best estimate of an effective porosity of the shallow aquifer materials for all simulations was assumed to be 0.40.

The fractured bedrock aquifer effective porosity was estimated from specific yields obtained from multiple observation wells and long-duration pumping observations. These values range from 0.01 to 0.04. An effective porosity of 0.02 was assumed for the fractured bedrock layers.

An additional parameter needed by the FEMWATER code for the simulation is compressibility of the materials. Compressibility values were assumed based on published values for the different aquifer materials because they were not available from laboratory testing (Table C2-1). The high porosity alluvial materials were assigned a compressibility of 1.45×10^{-16} slug per cubic foot (slug/ft^3), the bedrock materials were assigned a compressibility of 6.76×10^{-18} slug/ft^3.

C4.2 SIMULATION - PRESENT TO PRESENT PLUS MORE THAN 100 YEARS

The numerical model was run to simulate no remedial action for more than 100 years under current groundwater flow and transport conditions. The initial concentrations were based on a 3-D representation of the current groundwater commingled plume instead of from the inverse modeling to more accurately predict the future plume configuration. In addition, the plume has undergone significant remediation that could not be incorporated into the inverse modeling. The 3-D plume was interpolated onto the 3-D finite-element mesh nodes and served as the initial concentrations for the model simulation. It was assumed (from the current plume distribution) that no dense non-aqueous phase liquid exists in free product form within the aquifer. The model was run from the late year 2002 to 2125 (approximately 125 years). The model simulation results are presented in Attachment 2 as series of time sequence images.

C5.0 MODELING SUMMARY

The 3-D flow model provides good general agreement with 1998 conditions and acceptably reproduces the transient response of the aquifer, even with limited transient observation data. Model simulations of the groundwater depression induced by the Site 25 extraction well array agree with the observations made to date. The inverse modeling to reproduce the Dryden TCE groundwater plumes was not able to match the observed plumes exactly, but it acceptably represents the present flow and transport conditions.

Predictive transport modeling results suggest that the TCE groundwater plumes at Dryden are moving at a relatively slow rate. The modeling indicates that the leading edge is moving at an approximate average of 3 feet per year and the commingled plume leading edge establishes an equilibrium relatively early in the simulation period. It is likely that the leading edge reaches steady state with dilution at the leading edge, which limits the plume's advance. The plume is persistent at levels above regulatory limits to the end of the 125-year simulation. The slow movement of the leading edge is likely attributable to dilution of the lower concentrations through mechanical dispersion and diffusion. These results suggest that the plume is unlikely to naturally attenuate under the influence of these mechanisms. The transport modeling suggests that areas of high concentration are more persistent in the shallow, higher porosity materials than in the bulk of the plume.

Groundwater flow and contaminant transport models are based on a conceptual model of site conditions. This conceptual model is built over time using the results of remedial investigations. No investigation is limitless in scope and no conceptual model can reflect the exact nature of groundwater flow and contaminant transport. Although the model indicates a persistence of the contaminants in the areas with the highest concentrations, it still exhibits some downgradient movement. This is a divergence from what has been observed in monitoring data. The results of semiannual groundwater sampling since 1996 indicate that the areas with the highest contaminant concentrations are very stable and essentially immobile. The divergence between the computed plume configurations and the observed configuration may require additional investigation to resolve.

To accurately predict the future configuration of the contaminant plume, the model was calibrated to known data, and a transient calibration for flow and transport was included. However, the observation

data used for comparison was not comprehensive enough to yield an ideal calibration for flow. Several years worth of monthly water level observations, made during times when the aquifer was stressed, are required to effectively calibrate the transient flow model. Observation data was available for the aquifer during treatability study periods and a reasonable calibration to the limited data was achieved. The lack of a more robust flow calibration limits the certainty of the model predictions. Inverse contaminant transport simulations did not yield precise matches to the pre-remedial plume configuration. Past flow regimes appear to have a profoundly different affect on groundwater flow and contaminant transport. The groundwater basin to the east of Dryden has changed significantly as a result of water production in the southern end of the Lancaster subbasin and has resulted in dramatic groundwater declines from 1950 to the present. Groundwater gradients may also have been dramatically different. However, the predictive modeling from 2002 to 2125 accurately represents the current flow and transport regime, providing a good predictive tool.

This model is a continuous porous media representation of a complex fractured bedrock system. For this approach to work, the representative elementary volume of the aquifer materials must be very small compared to the scale of the model. It is possible that some flow and transport processes exceed the scale of the model.

Given the model's predictive uncertainties, modeling suggests that the contaminant plume at Dryden is persistent and will not naturally attenuate within a 125-year time frame. The model is also useful for interpreting the processes that control contaminant transport at the site.

The Dryden groundwater flow and transport model likely overestimates contaminant transport in the areas with the highest concentrations. The model assumes that all contaminants are in the dissolved phase and no fugitive dense non-aqueous phase liquid exists in pore spaces or fractures. While the predictive modeling results show the plume leading edge and areas with the highest contaminant concentrations advancing at a relatively low rate, it is difficult to confirm this given the resolution of monitoring wells in the leading edge area and the uncertainty regarding the depth stratification of the outer plume concentrations. Additional monitoring wells at the margins of the plume at varying depths may aid in the future modeling of contaminant transport at Dryden.

C6.0 REFERENCES

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FIGURES

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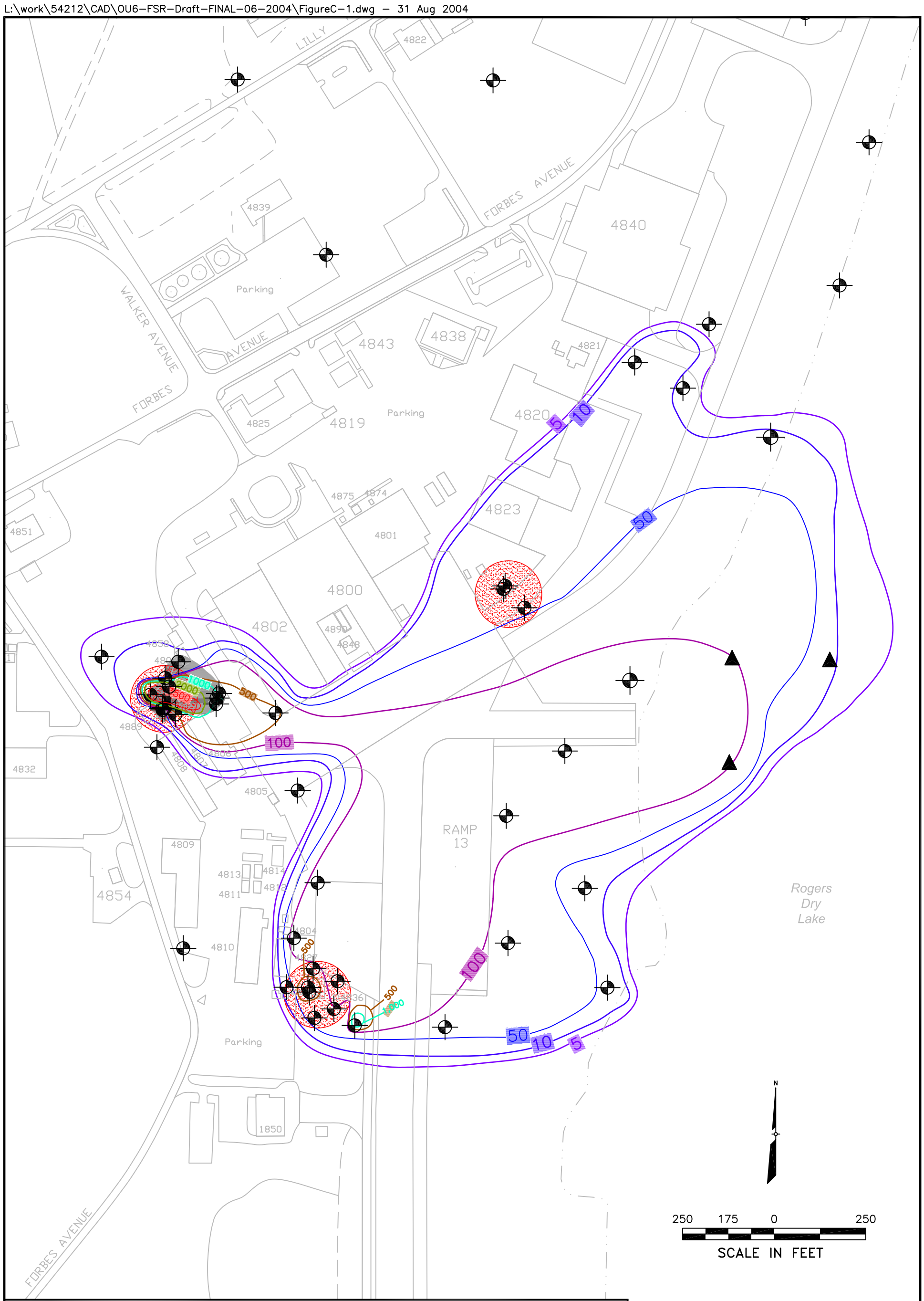


EXPLANATION

MONITORING WELL SAMPLED DURING VARIOUS EVENTS

BOREHOLE (GRAB GROUNDWATER SAMPLE)

SUSPECTED RELEASE AREAS

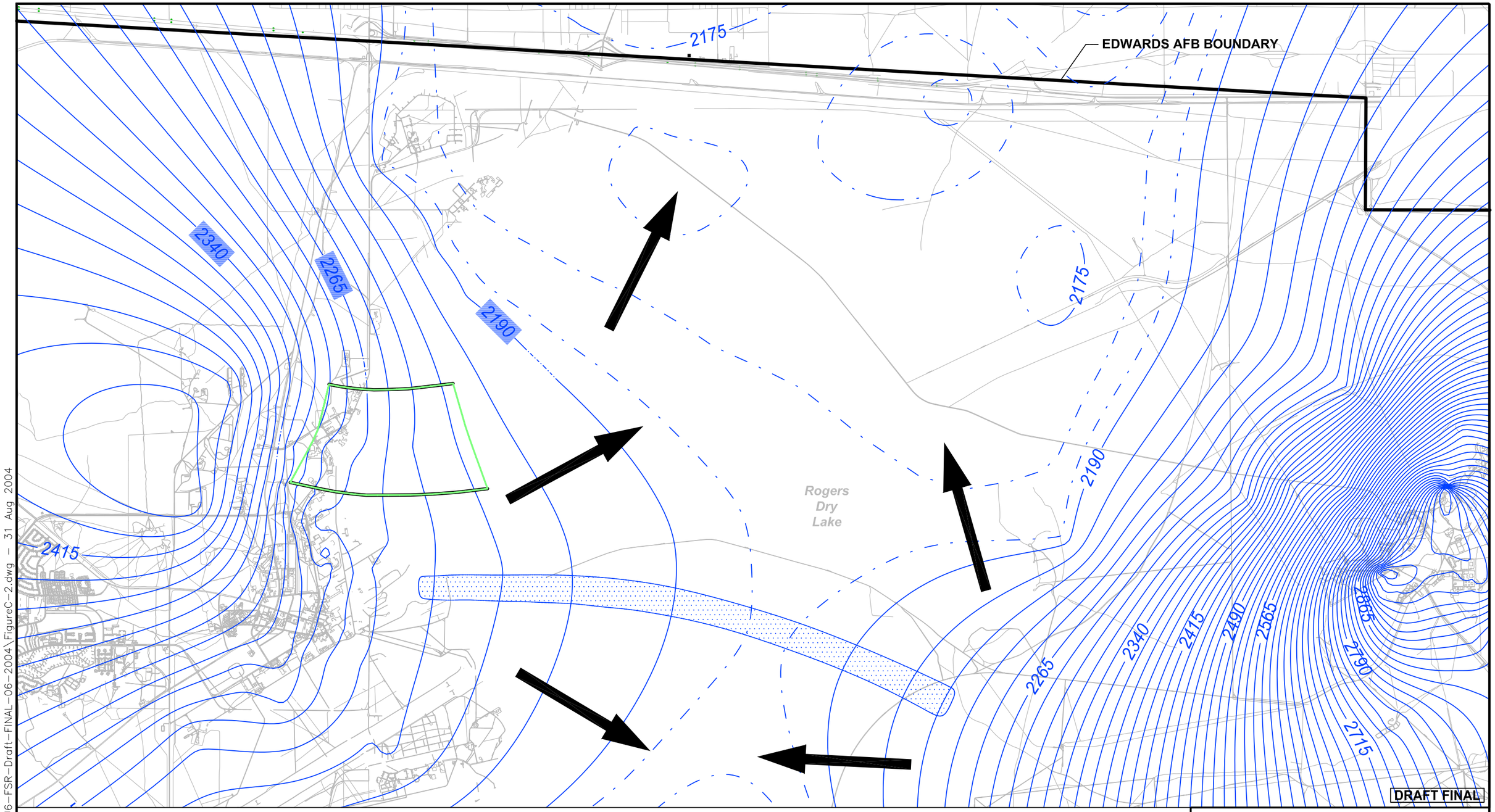
2000 — TCE CONCENTRATION CONTOUR (INTERVALS = 5, 10, 50, 100, 500, 1,000, 2,000, 3,500) ALL CONCENTRATIONS SHOWN AS MICROGRAMS PER LITER (μg/L)

FOOTPRINT OF SITE N3 BENZENE GROUNDWATER PLUME

DRAFT FINAL

Dryden Groundwater Contaminant Plumes

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure
Project No. 54212		C-1



EXPLANATION

- 5-FOOT INTERVAL
- 15-FOOT INTERVAL
- GROUNDWATER ELEVATION CONTOURS MARCH-APRIL 2001 WATER LEVELS
- INDUCED GROUNDWATER DIVIDE BOUNDARY BETWEEN NORTH MUROC AND LANCASTER SUBBASINS
- MODELED REGION
- GROUNDWATER FLOW DIRECTION

N

0 2500 5000
SCALE IN FEET

Dryden Model Area in the North Muroc Subbasin

Date 06–2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure
Project No. 54212		C-2

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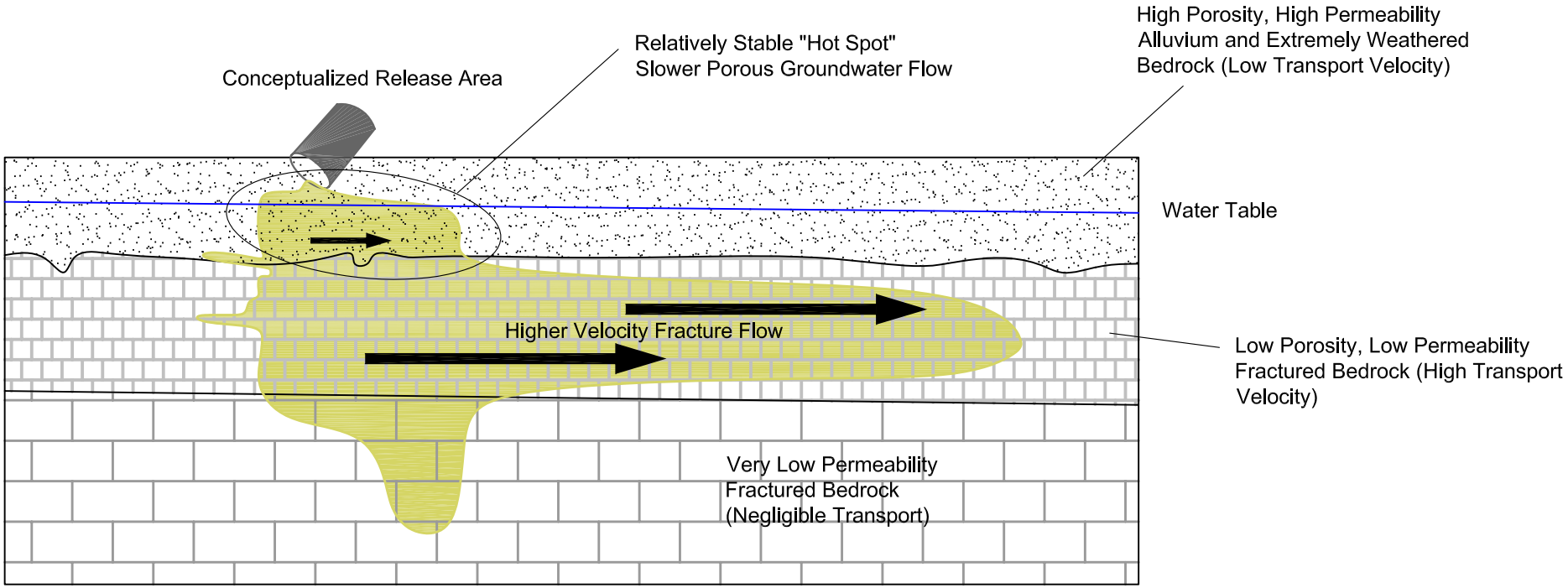
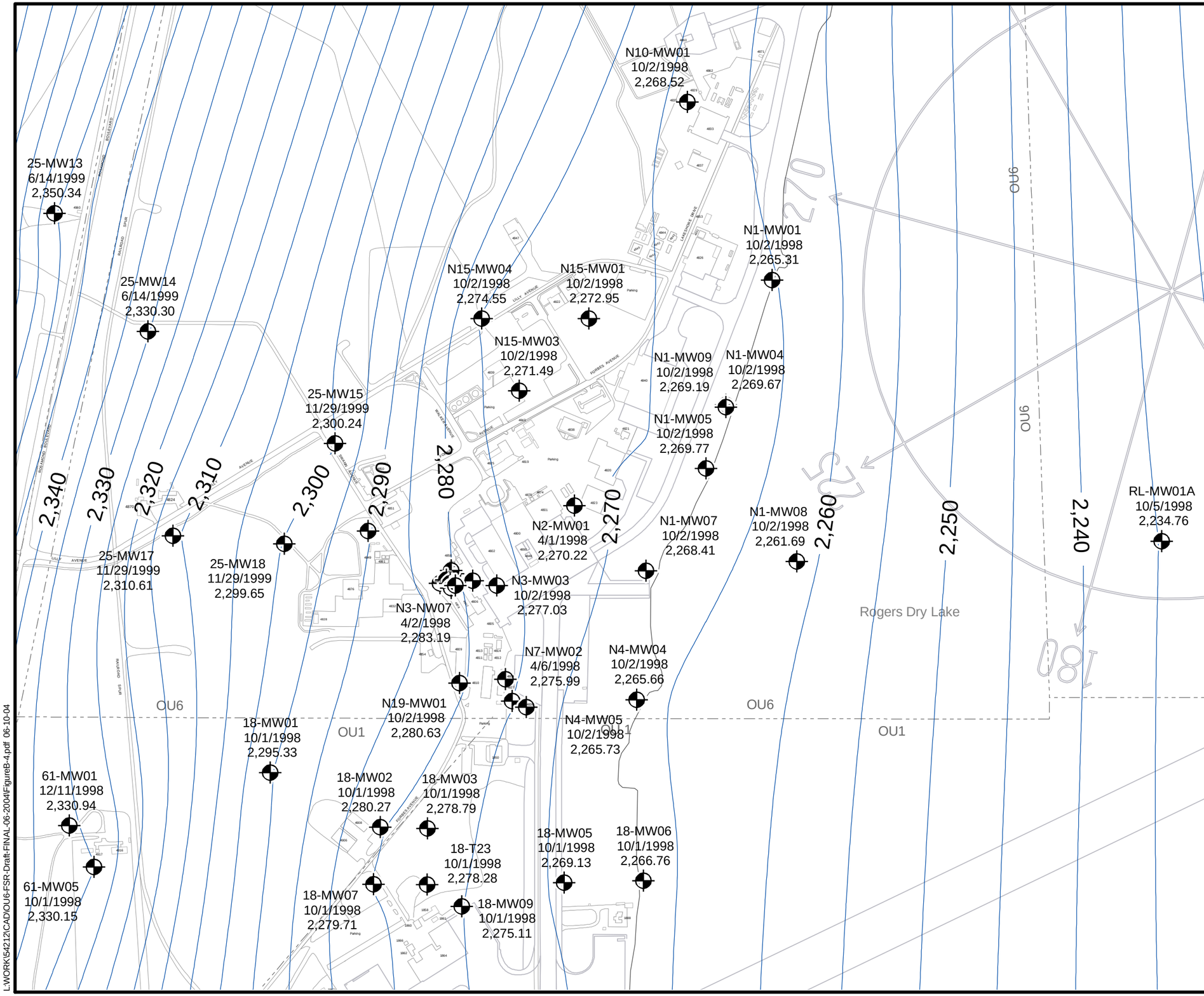


DRAFT FINAL

Conceptual Model of Contaminant Release and Transport

Date 06-2004	Operable Unit 6	Figure
Project No. 54212	Feasibility Study Edwards AFB	C-3



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Steady-State Groundwater Elevation Contour Map
Pre-Remedial Composite Data

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure
Project No. 54212		C-4

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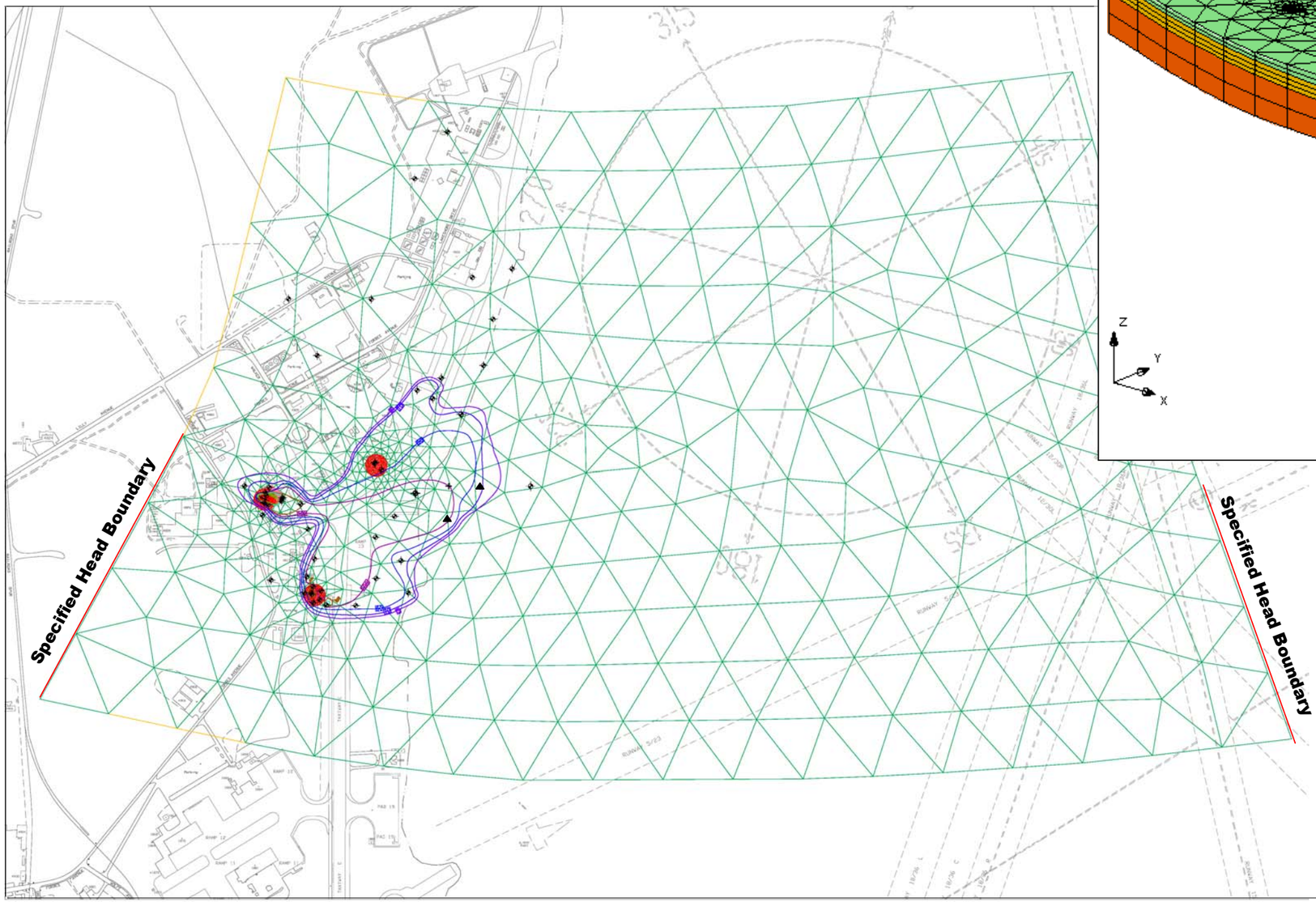
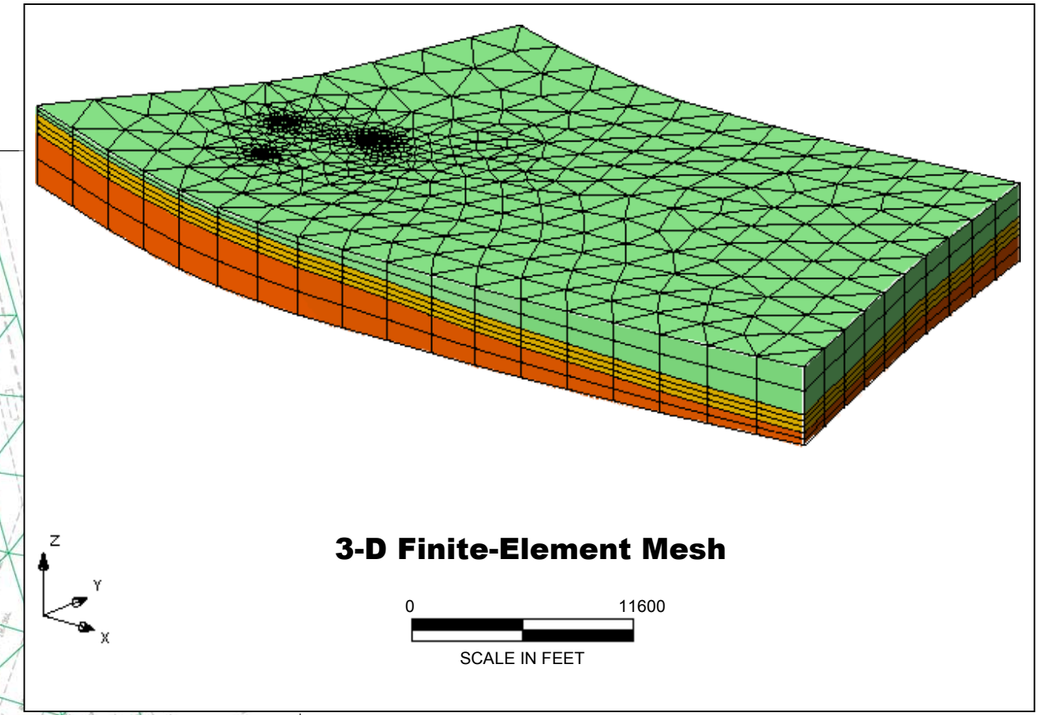
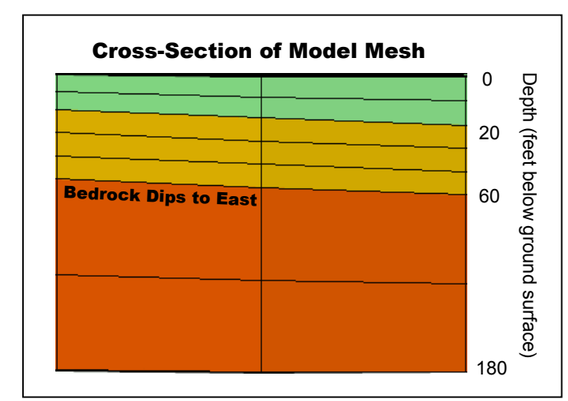
Map View Finite-Element Mesh





3-D Finite-Element Mesh



EXPLANATION

- MONITORING WELL SAMPLED DURING VARIOUS EVENTS
- BOREHOLE (GRAB GROUNDWATER SAMPLE)
- SUSPECTED RELEASE AREAS
- FINITE-ELEMENT MESH
- 2000 — TRICHLOROETHENE CONCENTRATION CONTOUR (INTERVALS = 5, 10, 50, 100, 500, 1,000, 2,000, 3,500)
- FOOTPRINT OF SITE N3 BENZENE GROUNDWATER PLUME

1000 500 0 1000
SCALE IN FEET

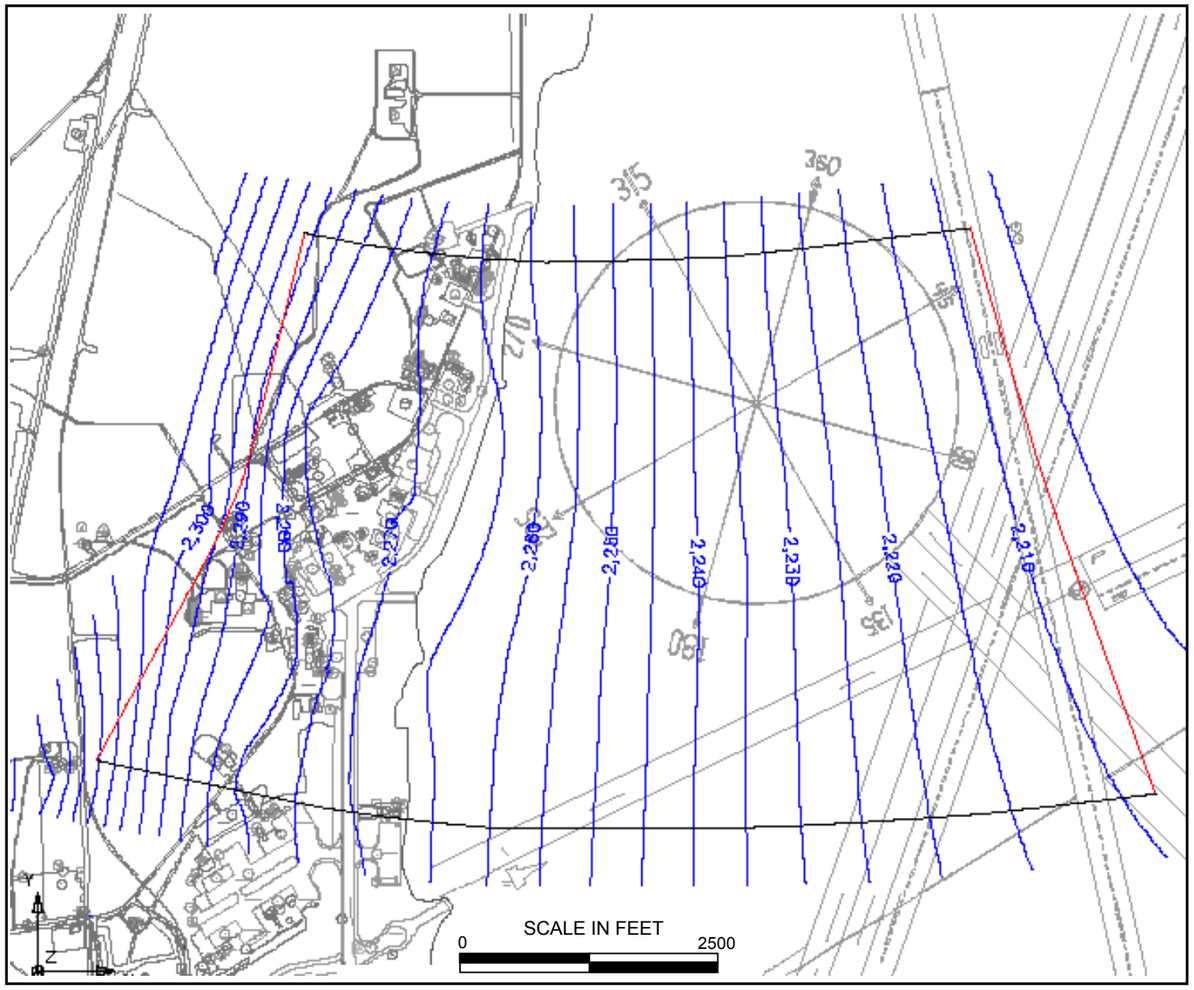
DRAFT FINAL

Finite-Element Mesh Construction

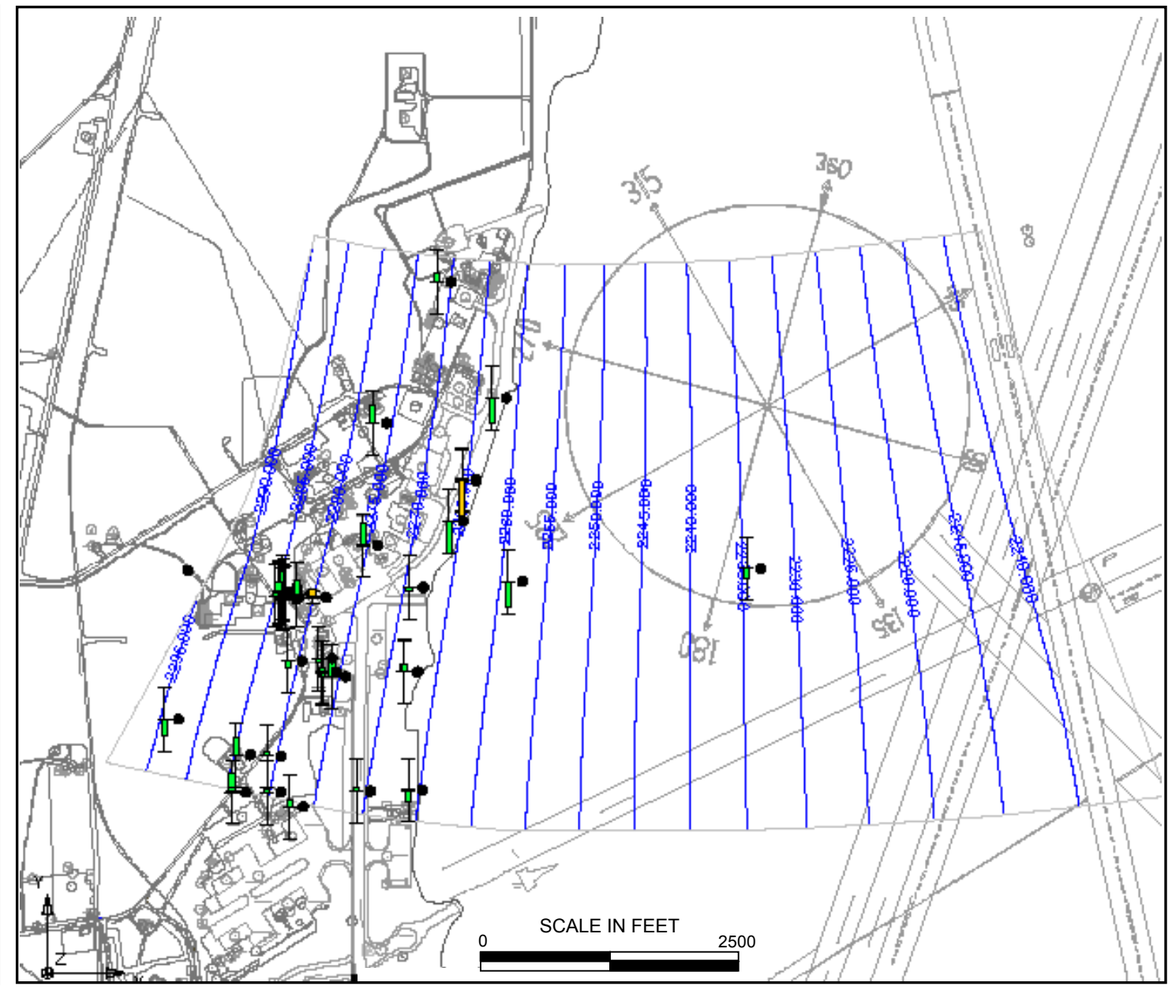
Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure
Project No. 54212		C-5

L:\WORK\54212\CAD\OU6-FSR-Draft-FINAL-06-04\Figure C-5.ppt 06/08/2004

Observed Heads 1998-1999 Pre-Remedial Composite Data



Steady-State Flow Solution Simulated Heads



EXPLANATION

ERROR BARS INDICATE AGREEMENT BETWEEN OBSERVED HEAD AND PREDICTED HEAD AT SPECIFIED WELLS

GREEN = WITHIN TOLERANCE

YELLOW = OUTSIDE TOLERANCE WITHIN ONE STANDARD DEVIATION

RED = OUTSIDE TOLERANCE

GROUNDWATER ELEVATION CONTOUR

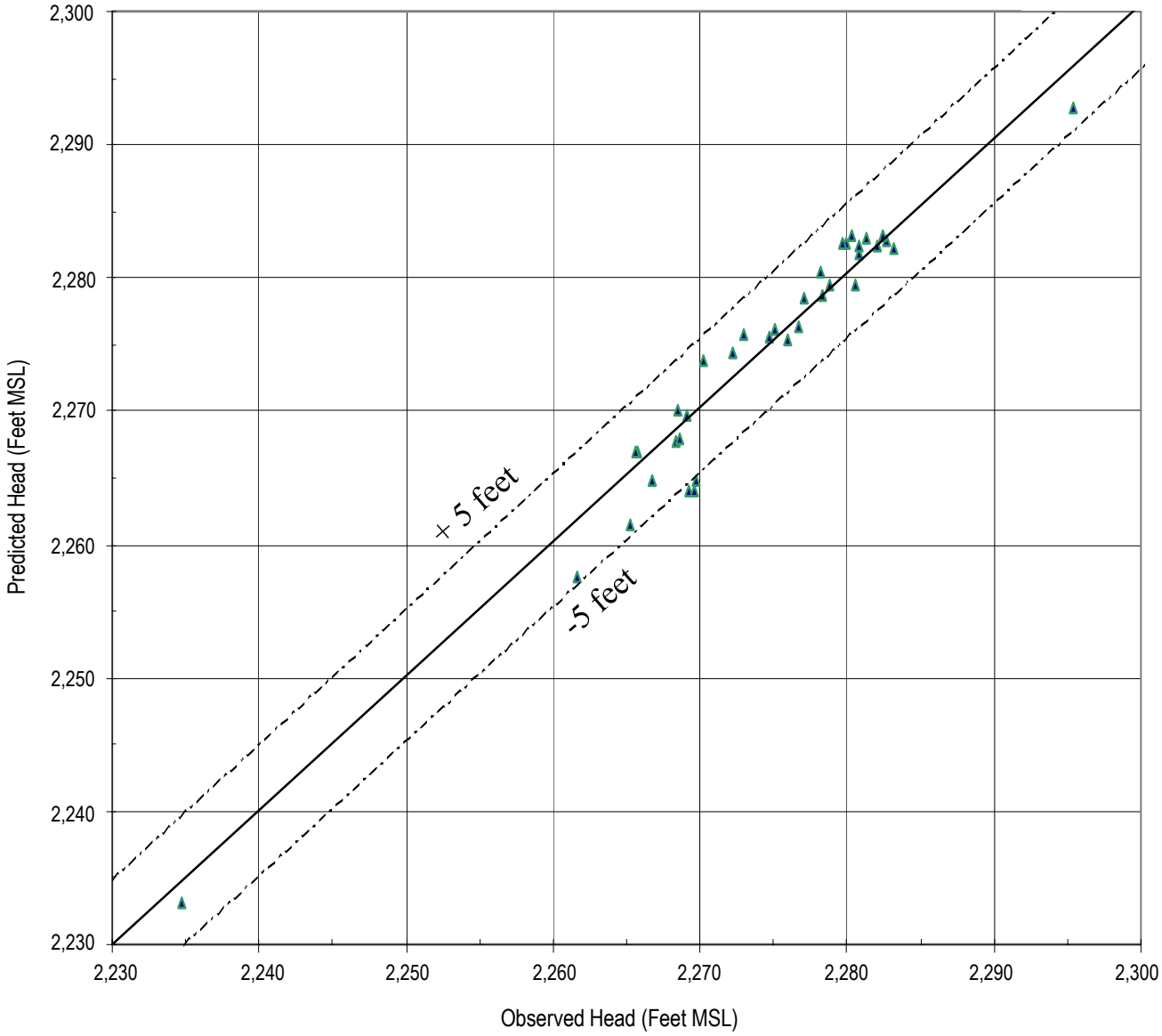
DRAFT FINAL

Dryden Groundwater Modeling
1998 Steady-State Flow Solution Results

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure
Project No. 54212		C-6

L:\WORK\54212\CAD\OU6-FSR-Draft-FINAL-06-04\Figure C-6.ppt 06/08/2004

Predicted Versus Observed Head
Steady-State 1998



EXPLANATION

KNOWN OBSERVATION POINT (GROUNDWATER MONITORING WELL)

IDEAL

CONFIDENCE INTERVAL

MSL MEAN SEA LEVEL

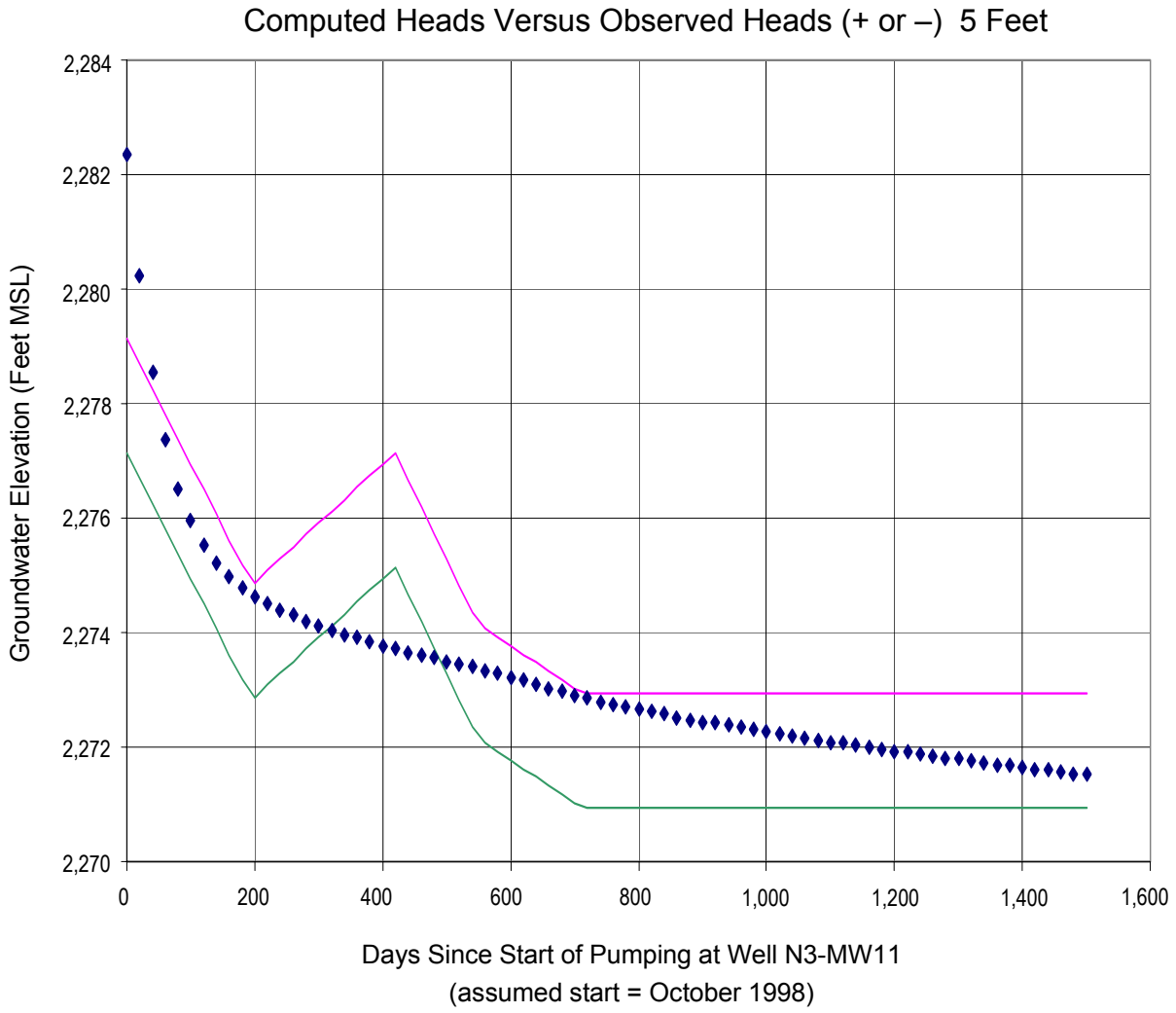
DRAFT FINAL

Calibration Plot
Dryden Steady-State 1998 Predicted Heads Compared to Observed Heads

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure
Project No. 54212		C-7

L:\WORK\54212\CAD\OU6-FSR-Draft-FINAL-06-2004\Figure C-7.ppt 06/10/2004

Transient Calibration Plot for Observation Well N3-MW06



EXPLANATION

UPPER BOUNDS OBSERVED

COMPUTED

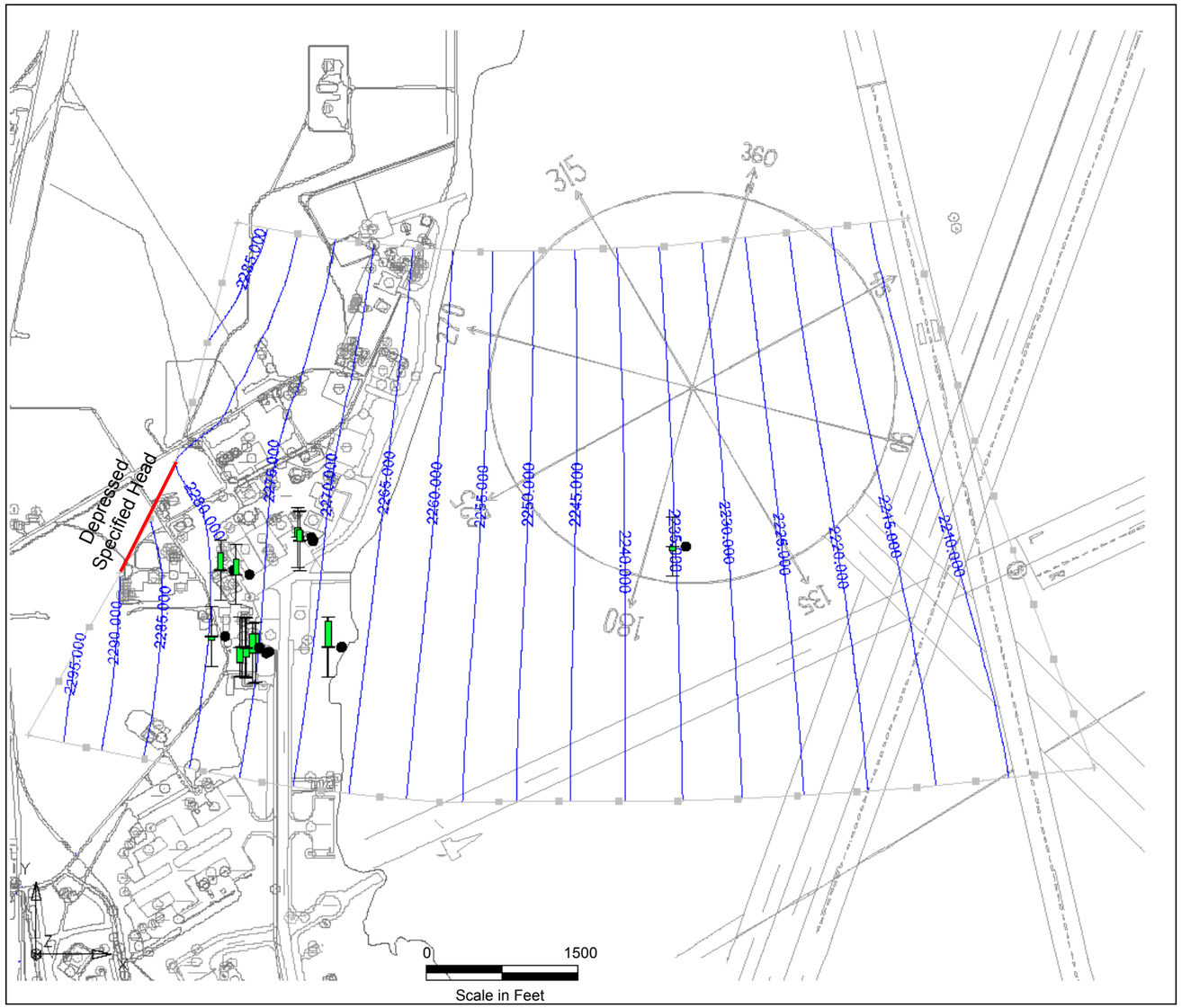
LOWER BOUNDS OBSERVED

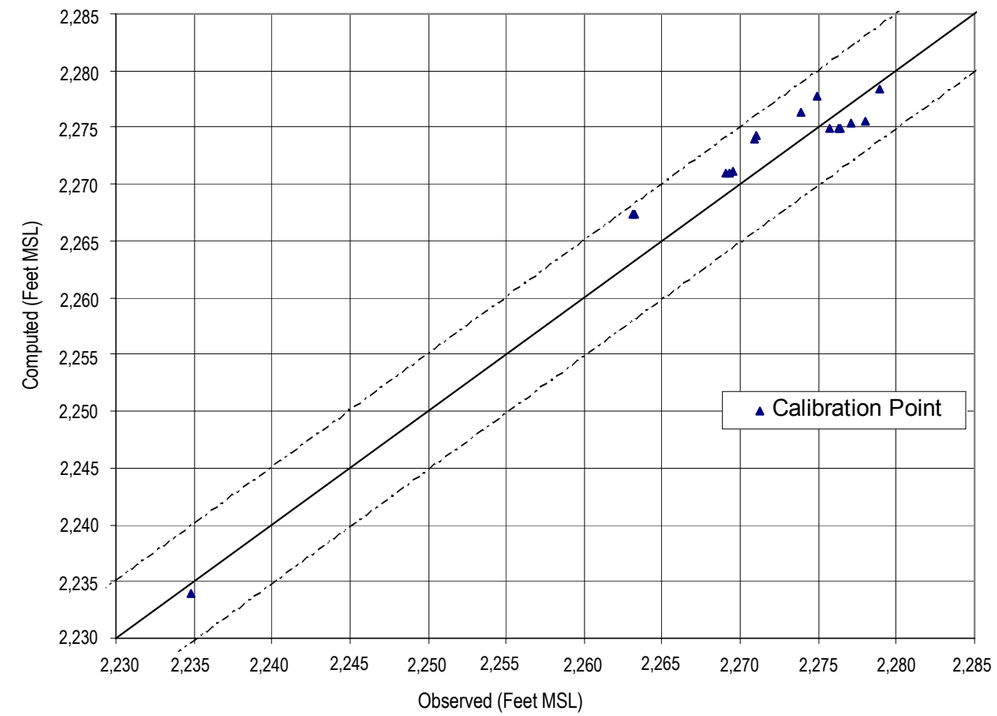
MSL MEAN SEA LEVEL

DRAFT FINAL

Transient Calibration Plot Dryden Transient Predicted Heads Compared to Observed Heads at Well N3-MW06		
Date 06-2004 Project No. 54212	Operable Unit 6 Feasibility Study Edwards AFB	Figure C-8

L:\WORK\54212\CAD\OU6-FSR-Draft-FINAL-06-04T\Figure C-8.ppt 06/08/2004





EXPLANATION

ERROR BARS INDICATE AGREEMENT BETWEEN OBSERVED HEAD AND PREDICTED HEAD AT SPECIFIED WELLS

GREEN = WITHIN TOLERANCE

YELLOW = OUTSIDE TOLERANCE WITHIN ONE STANDARD DEVIATION

RED = OUTSIDE TOLERANCE

GROUNDWATER ELEVATION CONTOUR

EXPLANATION

KNOWN OBSERVATION POINT (GROUNDWATER MONITORING WELL)

IDEAL

CONFIDENCE INTERVAL

MSL MEAN SEA LEVEL

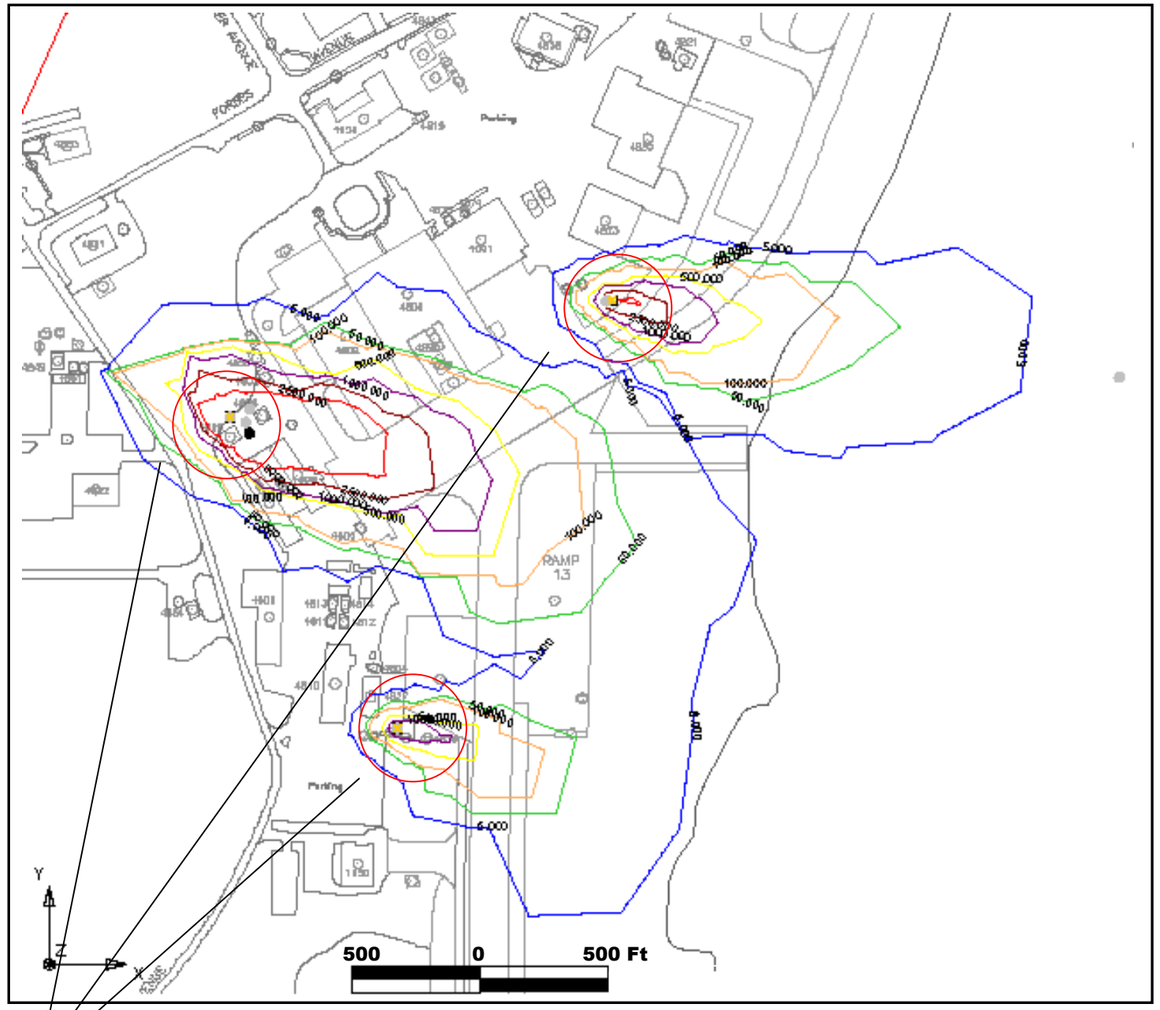
DRAFT FINAL

Dryden Groundwater Modeling
2003 Steady-State Flow Solution Results

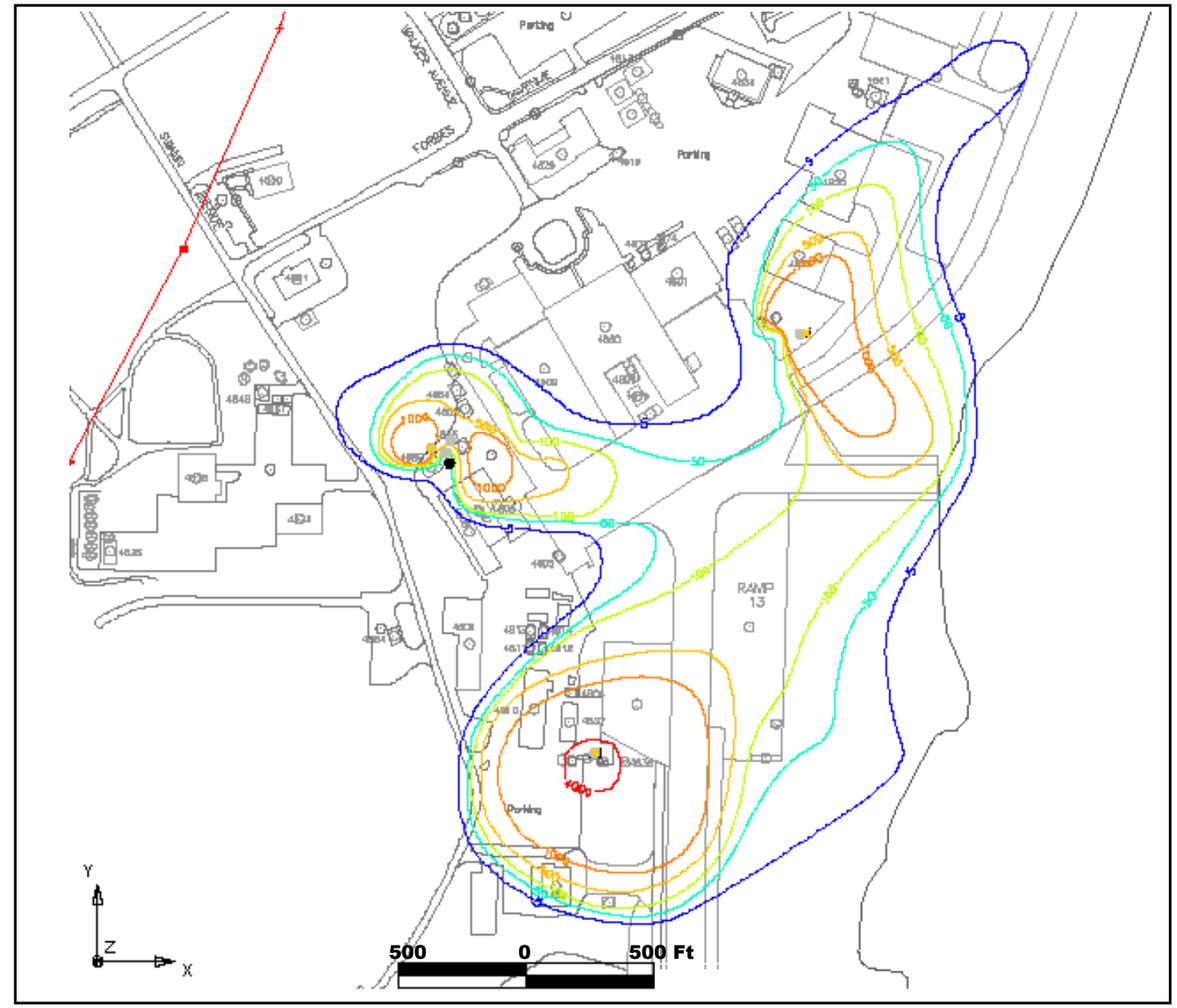
Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure
Project No. 54212		C-9

L:\WORK\54212\CAD\OU6-FSR-Draft-FINAL-06-04\Figure C-9.ppt 06/08/2004

Computed Plume Configuration from Inverse Modeling 1970-1996



Observed Plume Configuration 1996



Hot Spot Areas Release Times in Model

Site N3: 1970

Site N2: 1975

Site N7: 1975

EXPLANATION

Ft = FEET

DRAFT FINAL

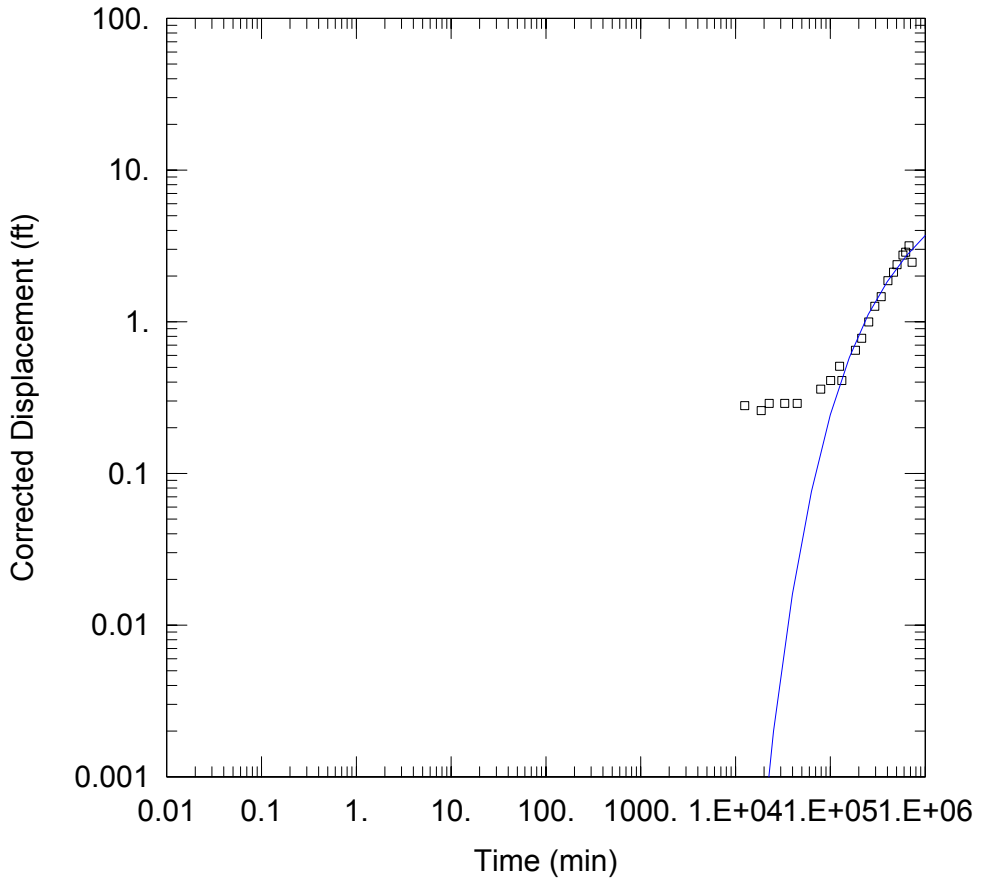
Dryden Groundwater Modeling
1996 Inverse Transport Modeling Results

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Figure
Project No. 54212		C-10

L:\WORK\54212\CAD\OU6-FSR-Draft-FINAL-06-2004\Figure C-10.ppt 06/08/2004

ATTACHMENT 1

SITE 25 FRACTURED BEDROCK TIME-DRAWDOWN DATA



WELL TEST ANALYSIS

Data Set: C:\DOCUME~1\NATHAN~1.TOL\DESKTOP\NASAMO~1\25-I
Date: 08/31/03 Time: 13:16:19

PROJECT INFORMATION

Company: Earth Tech
Client: Air Force
Project: 40380
Test Location: Site 25
Test Well: Multi 25-EW*
Test Date: Oct 2001 to present

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis
T = 86.43 ft^2/day
S = 0.01846

AQUIFER DATA

Saturated Thickness: 125. ft Anisotropy Ratio (Kz/Kr): 1.

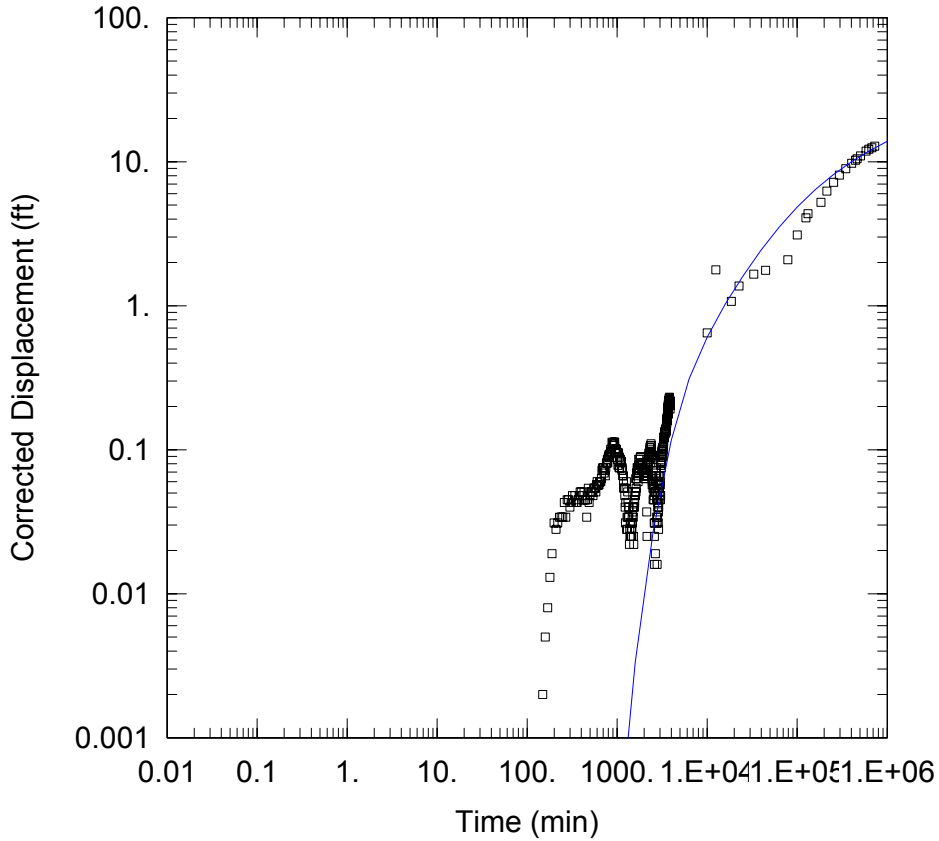
WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
25-EW01	9.303E+004	6.774E+004
25-EW02	9.314E+004	6.782E+004
25-EW03	9.328E+004	6.791E+004
25-EW04	9.345E+004	6.802E+004
25-EW05	9.364E+004	6.815E+004
25-EW06	9.383E+004	6.826E+004
25-EW07	9.398E+004	6.839E+004
25-EW08	9.402E+004	6.86E+004
25-MW09	9.405E+004	6.881E+004
25-EW10	9.409E+004	6.906E+004

Observation Wells

Well Name	X (ft)	Y (ft)
▫ 25-MW14	9.298E+004	6.937E+004



WELL TEST ANALYSIS

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PROJECT INFORMATION

Company: Earth Tech
Client: Air Force
Project: 40380
Test Location: Site 25
Test Well: Multi 25-EW*
Test Date: Oct 2001 to present

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis
T = 50.3 ft^2/day
S = 0.01376

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

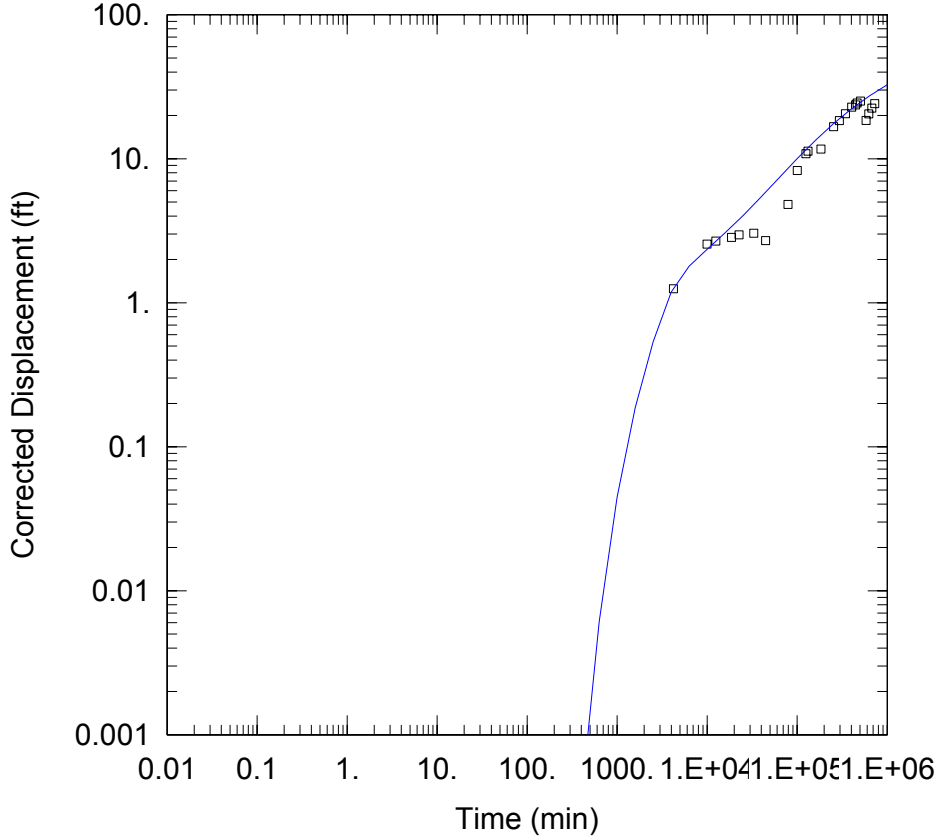
WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
25-EW01	9.303E+004	6.774E+004
25-EW02	9.314E+004	6.782E+004
25-EW03	9.328E+004	6.791E+004
25-EW04	9.345E+004	6.802E+004
25-EW05	9.364E+004	6.815E+004
25-EW06	9.383E+004	6.826E+004
25-EW07	9.398E+004	6.839E+004
25-EW08	9.402E+004	6.86E+004
25-MW09	9.405E+004	6.881E+004
25-EW10	9.409E+004	6.906E+004

Observation Wells

Well Name	X (ft)	Y (ft)
▫ 25-MW18	9.386E+004	6.799E+004



WELL TEST ANALYSIS

Data Set: C:\DOCUME~1\NATHAN~1.TOL\DESKTOP\NASAMO~1\25-I
Date: 08/31/03 Time: 13:16:33

PROJECT INFORMATION

Company: Earth Tech
Client: Air Force
Project: 40380
Test Location: Site 25
Test Well: Multi 25-EW*
Test Date: Oct 2001 to present

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis
T = 17.38 ft^2/day
S = 0.003887

AQUIFER DATA

Saturated Thickness: 125. ft
Anisotropy Ratio (Kz/Kr): 1.

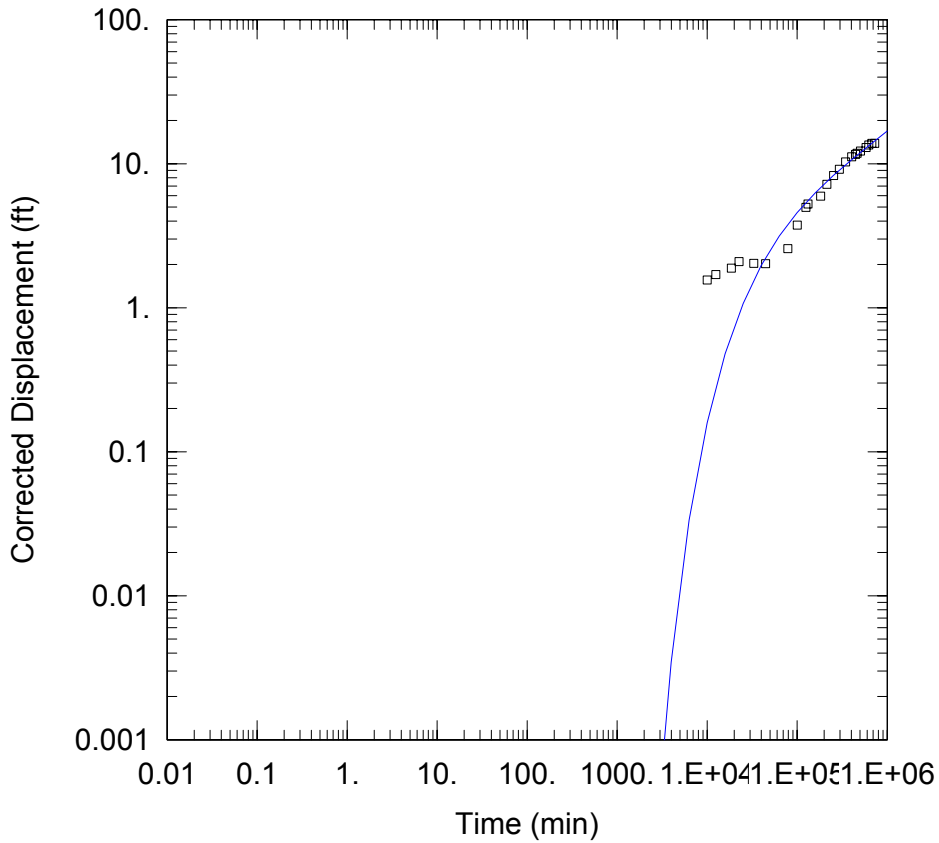
WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
25-EW01	9.303E+004	6.774E+004
25-EW02	9.314E+004	6.782E+004
25-EW03	9.328E+004	6.791E+004
25-EW04	9.345E+004	6.802E+004
25-EW05	9.364E+004	6.815E+004
25-EW06	9.383E+004	6.826E+004
25-EW07	9.398E+004	6.839E+004
25-EW08	9.402E+004	6.86E+004
25-MW09	9.405E+004	6.881E+004
25-EW10	9.409E+004	6.906E+004

Observation Wells

Well Name	X (ft)	Y (ft)
▫ 25-MW15	9.419E+004	6.864E+004



WELL TEST ANALYSIS

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Date: 08/31/03 Time: 13:17:09

PROJECT INFORMATION

Company: Earth Tech
Client: Air Force
Project: 40380
Test Location: Site 25
Test Well: Multi 25-EW*
Test Date: Oct 2001 to present

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis
T = 13.59 ft^2/day
S = 0.1225

AQUIFER DATA

Saturated Thickness: 125. ft
Anisotropy Ratio (Kz/Kr): 1.

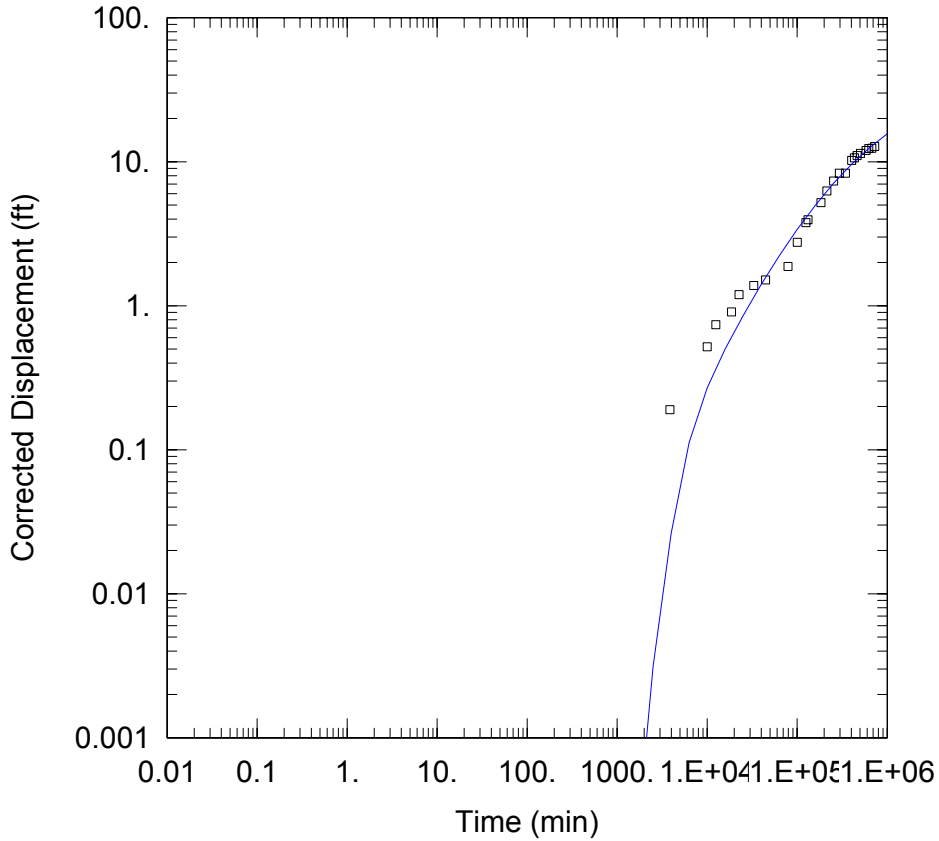
WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
25-EW01	9.303E+004	6.774E+004
25-EW02	9.314E+004	6.782E+004
25-EW03	9.328E+004	6.791E+004
25-EW04	9.345E+004	6.802E+004
25-EW05	9.364E+004	6.815E+004
25-EW06	9.383E+004	6.826E+004
25-EW07	9.398E+004	6.839E+004
25-EW08	9.402E+004	6.86E+004
25-MW09	9.405E+004	6.881E+004
25-EW10	9.409E+004	6.906E+004

Observation Wells

Well Name	X (ft)	Y (ft)
▫ 25-MW21A	9.369E+004	6.822E+004



WELL TEST ANALYSIS

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PROJECT INFORMATION

Company: Earth Tech
Client: Air Force
Project: 40380
Test Location: Site 25
Test Well: Multi 25-EW*
Test Date: Oct 2001 to present

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis
T = 27.42 ft^2/day
S = 0.01277

AQUIFER DATA

Saturated Thickness: 125. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

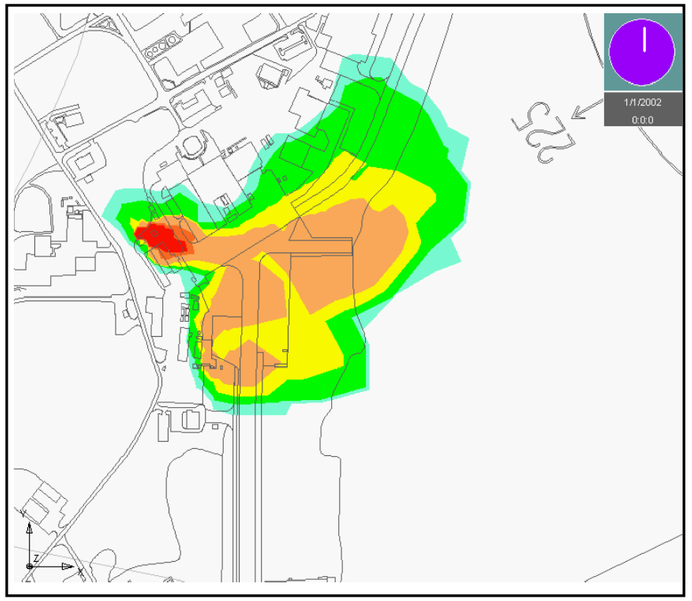
Well Name	X (ft)	Y (ft)
25-EW01	9.303E+004	6.774E+004
25-EW02	9.314E+004	6.782E+004
25-EW03	9.328E+004	6.791E+004
25-EW04	9.345E+004	6.802E+004
25-EW05	9.364E+004	6.815E+004
25-EW06	9.383E+004	6.826E+004
25-EW07	9.398E+004	6.839E+004
25-EW08	9.402E+004	6.86E+004
25-MW09	9.405E+004	6.881E+004
25-EW10	9.409E+004	6.906E+004

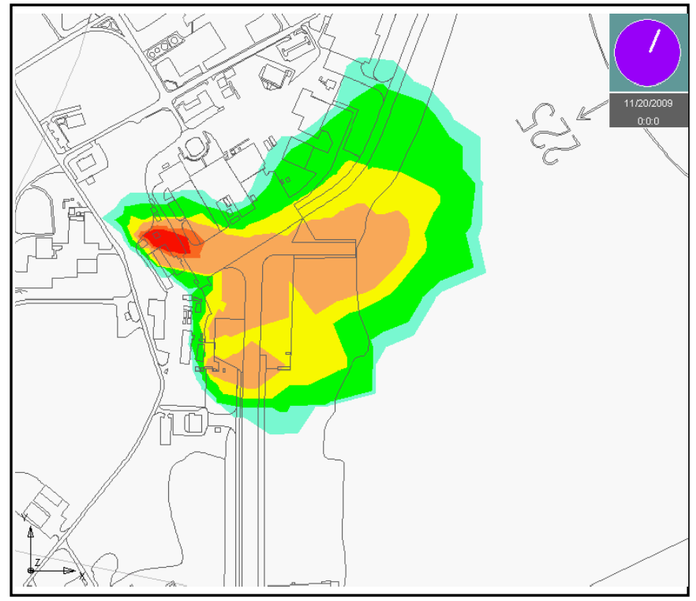
Observation Wells

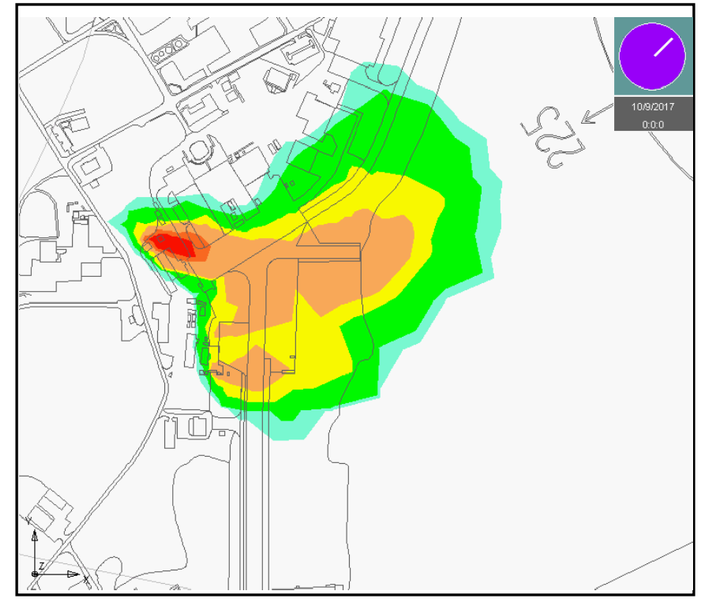
Well Name	X (ft)	Y (ft)
▫ 25-MW39	9.424E+004	6.834E+004

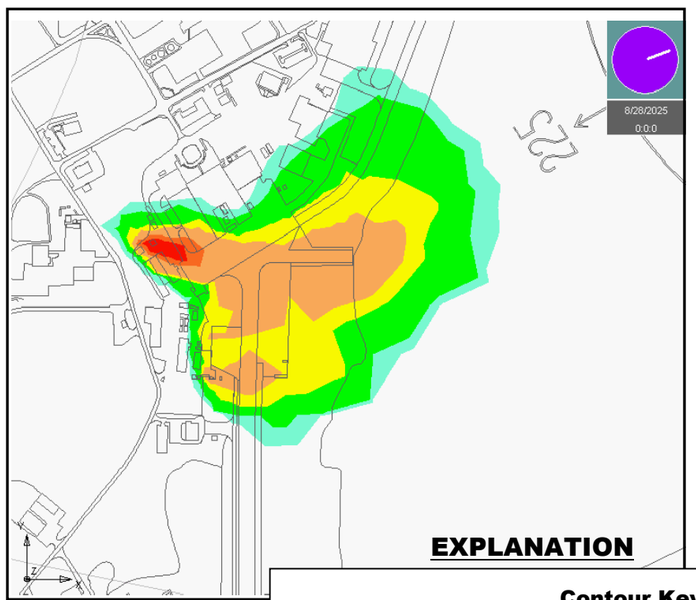
ATTACHMENT 2

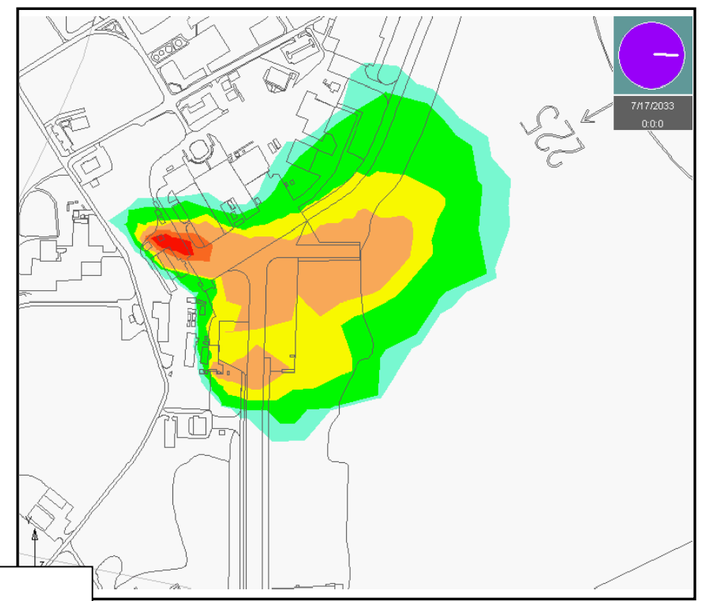
PREDICTIVE MODEL RESULTS
2002 TO 2125

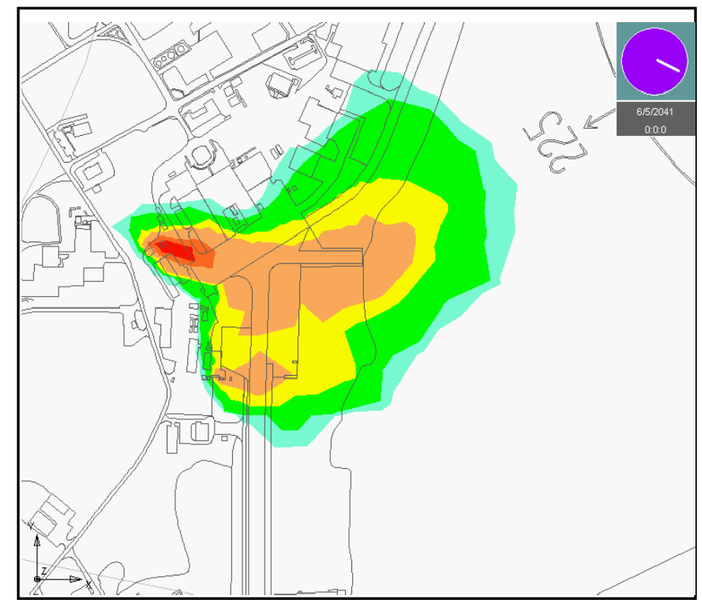












EXPLANATION

Contour Key

TCE = TRICHLOROETHENE

ppb = PARTS PER BILLION

0 600

Scale in Feet

TCE CONCENTRATION (ppb)

- 5-10
- 10-50
- 50-100
- 100-500
- 500-1000
- 1000-10000

DRAFT FINAL

Dryden Groundwater Modeling
2002 to 2041 Transport Modeling Results

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Attachment
Project No. 54212		2-1

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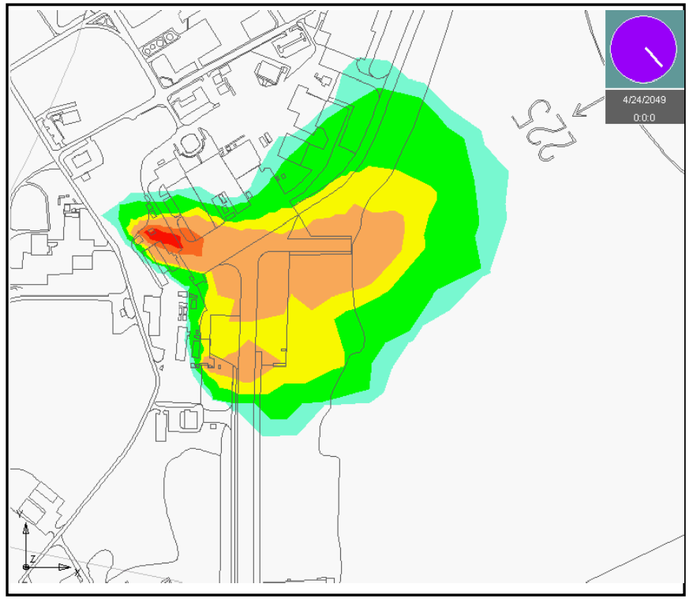

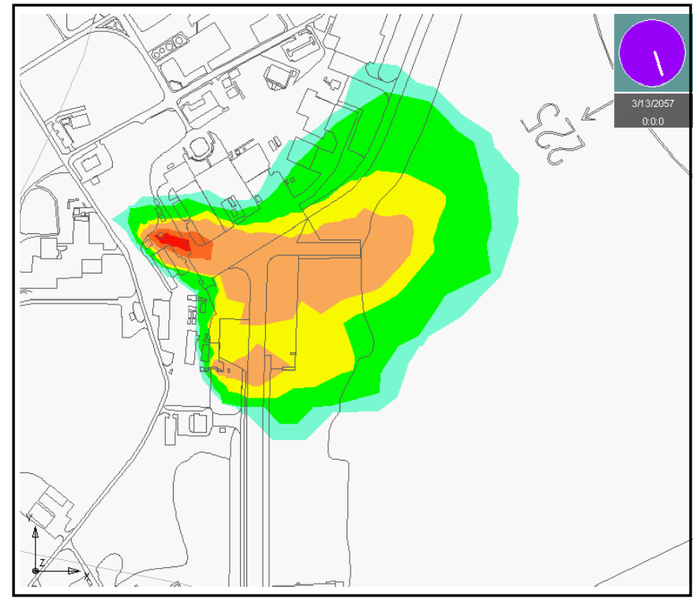

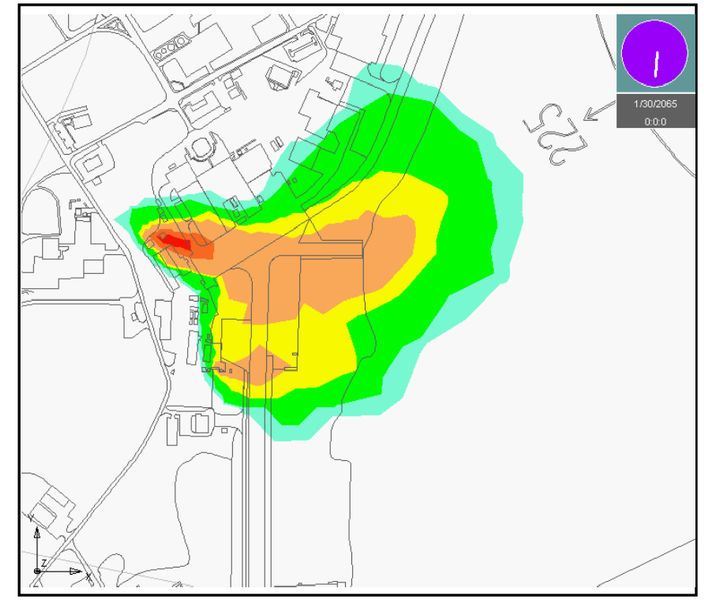

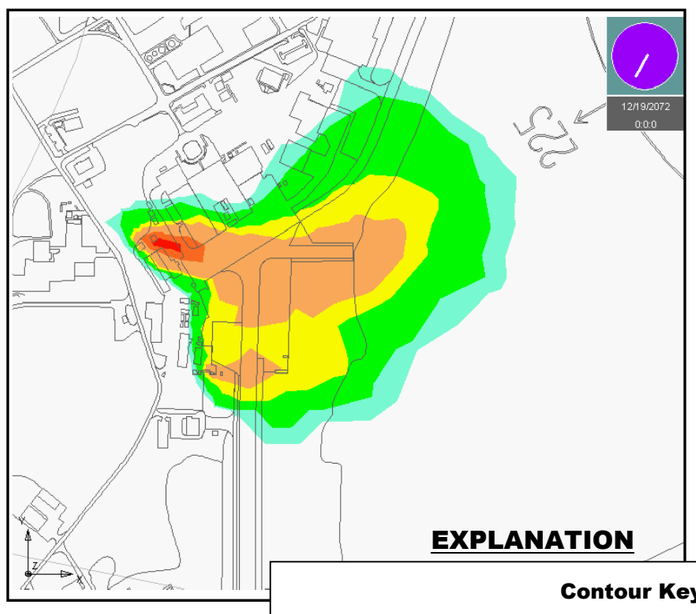

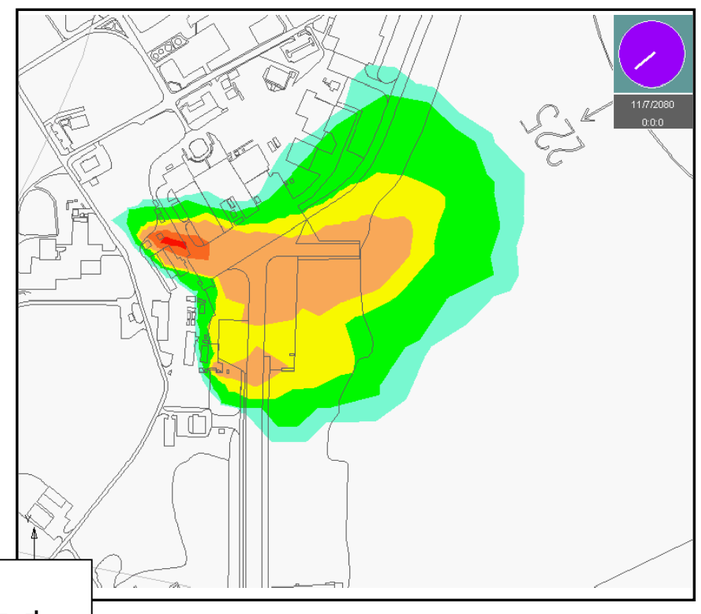

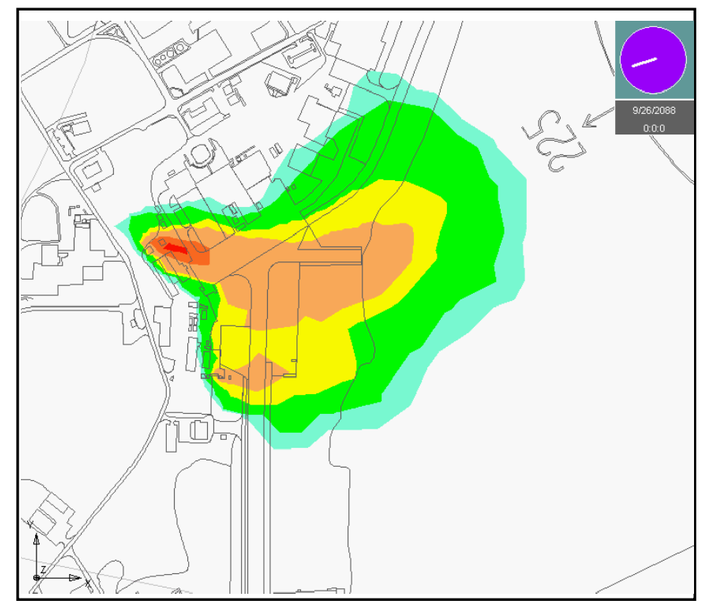

EXPLANATION

TCE = TRICHLOROETHENE

ppb = PARTS PER BILLION

0 600

Scale in Feet

Contour Key

TCE CONCENTRATION (ppb)

- 5-10
- 10-50
- 50-100
- 100-500
- 500-1000
- 1000-10000

DRAFT FINAL

Dryden Groundwater Modeling
2049 to 2088 Transport Modeling Results

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Attachment
Project No. 54212		2-2

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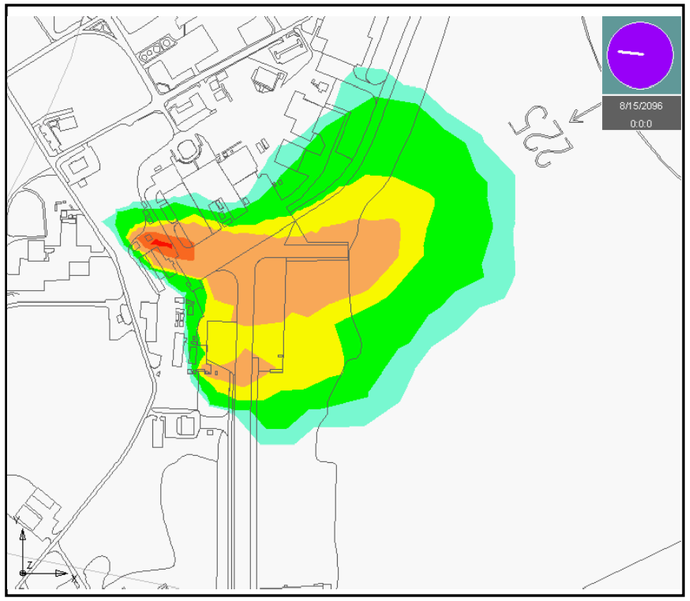

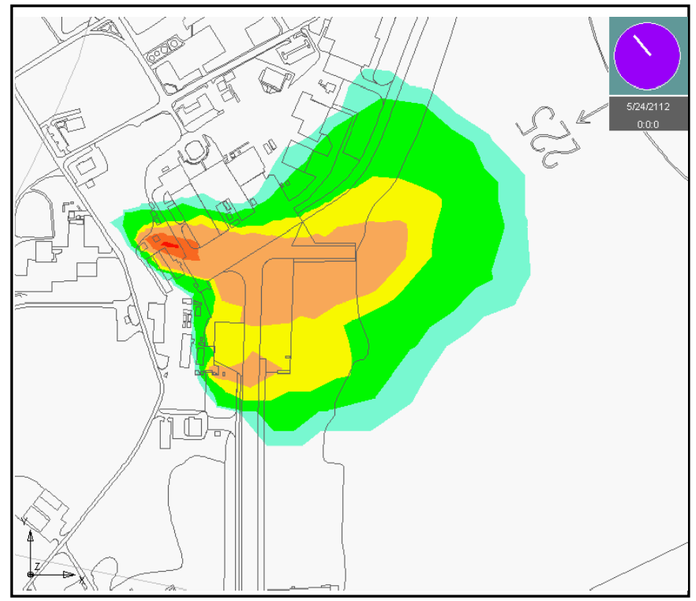

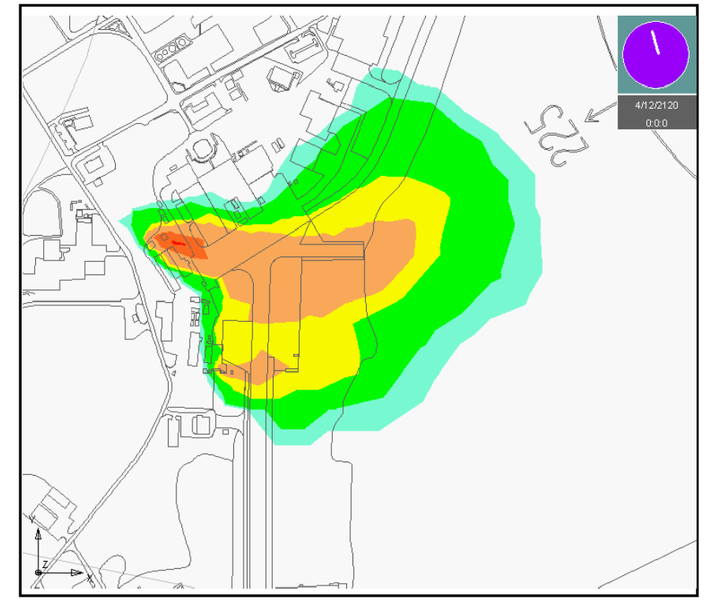

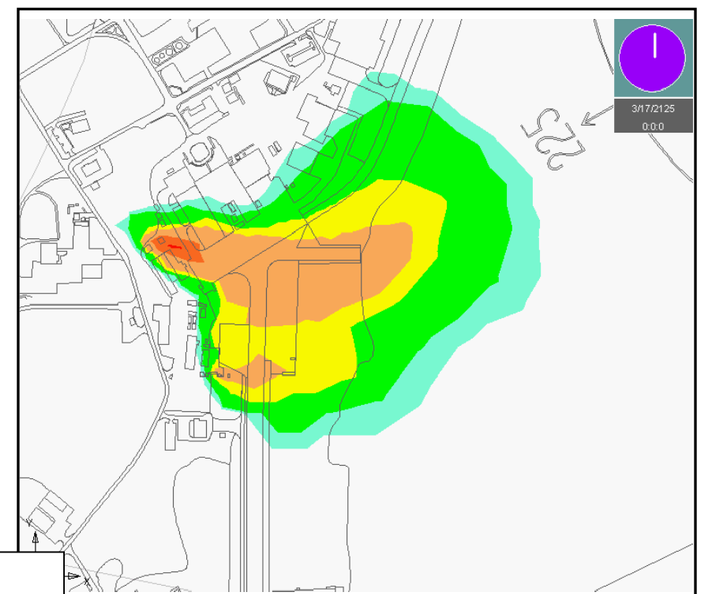

EXPLANATION

TCE = TRICHLOROETHENE

ppb = PARTS PER BILLION

0 600

Scale in Feet

Contour Key

TCE CONCENTRATION (ppb)

- 5-10
- 10-50
- 50-100
- 100-500
- 500-1000
- 1000-10000

DRAFT FINAL

Dryden Groundwater Modeling
2096 to 2125 Transport Modeling Results

Date 06-2004	Operable Unit 6 Feasibility Study Edwards AFB	Attachment
Project No. 54212		2-3

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APPENDIX D

TCE AND BENZENE MASS CALCULATIONS – SITES N2, N3, AND N7

TABLE D-1. CALCULATION OF MASS AND VOLUME OF TCE DISSOLVED IN THE SITE N2 GROUNDWATER PLUME

TCE (µg/L)	Average (µg/L)	Average (lbs/ft^3)[a]	Surface Area of Concentration Contour (ft^2)[b]	Aquifer Thickness (ft)[c]	Aquifer Porosity (%)[d]	Water Volume (ft^3)[e]	Mass of TCE (lbs)[f]	Volume of TCE (gal)[g]	Approximate Percent of Total Mass
100 – 500	300	1.87E-05	82,041	90	30	2,215,107	41.45	3.41	41.3
50 – 100	75	4.68E-06	306,241	90	30	8,268,507	38.68	3.18	38.5
10 – 50	30	1.87E-06	367,974	90	30	9,935,298	18.59	1.53	18.5
5 – 10	7.5	4.68E-07	135,541	90	30	3,659,607	1.71	0.14	1.7
Total			891,797			24,078,519	100.43	8.26	100

Notes:

% = percent
> = greater than
µg/L = micrograms per liter
cm^3 = cubic centimeters
ft = feet
ft^2 = square feet
ft^3 = cubic feet
g = grams
gal = gallons
lbs = pounds
L = liters
TCE = trichloroethene

(a) Calculated as: $\mu g / L \times \frac{g}{10^6 \mu g} \times \frac{lb}{454 g} \times 28.32 \frac{L}{ft^3}$

(b) Estimated from concentration contours generated from the latest groundwater monitoring data
(c) Assumed based on past sampling events
(d) Assumed
(e) Calculated as: Surface area of concentration contour (square feet) x Aquifer thickness x Porosity (unitless)
(f) Calculated as: Average TCE concentration (lbs/ft^3) x Water volume (ft^3)

(g) Calculated as: $\textit{Mass of TCE (pounds)} \times \frac{454 g}{lb} \times \textit{(density of TCE)} \frac{cm^3}{1.46 g} \times \frac{L}{10^3 cm^3} \times \frac{gal}{3.785 L}$

TABLE D-2. CALCULATION OF MASS AND VOLUME OF TCE DISSOLVED IN THE SITE N3 GROUNDWATER PLUME

TCE (µg/L)	Average (µg/L)	Average (lbs/ft^3)[a]	Surface Area of Concentration Contour (ft^2)[b]	Aquifer Thickness (ft)[c]	Aquifer Porosity (%)[d]	Water Volume (ft^3)[e]	Mass of TCE (lbs)[f]	Volume of TCE (gal)[g]	Approximate Percent of Total Mass
> 3,500	6,750	4.21E-04	2,709	90	30	73,143	30.80	2.53	11.0
2,000 – 3,500	2,750	1.72E-04	1,194	90	30	32,238	5.53	0.45	2.0
1,000 - 2,000	1,500	9.36E-05	3,155	90	30	85,185	7.97	0.65	2.8
500 – 1,000	750	4.68E-05	15,846	90	30	427,842	20.02	1.64	7.1
100 – 500	300	1.87E-05	395,232	90	30	10,671,264	199.70	16.41	71.2
50 – 100	75	4.68E-06	100,311	90	30	2,708,397	12.67	1.04	4.5
10 – 50	30	1.87E-06	56,943	90	30	1,537,461	2.88	0.24	1.0
5 – 10	7.5	4.68E-07	72,863	90	30	1,967,301	0.92	0.08	0.3
Total			648,253			17,502,831	280.49	23.04	100

Notes:

(a) Calculated as: $\mu g / L \times \frac{g}{10^6 \mu g} \times \frac{lb}{454 g} \times 28.32 \frac{L}{ft^3}$

(b) Estimated from concentration contours generated from the latest groundwater monitoring data
(c) Assumed based on past sampling events
(d) Assumed
(e) Calculated as: Surface area of concentration contour (square feet) x Aquifer thickness x Porosity (unitless)
(f) Calculated as: Average TCE concentration (lbs/ft^3) x Water volume (ft^3)

(g) Calculated as: $\textit{Mass of TCE (pounds)} \times \frac{454 g}{lb} \times \textit{(density of TCE)} \frac{cm^3}{1.46 g} \times \frac{L}{10^3 cm^3} \times \frac{gal}{3.785 L}$

% = percent
> = greater than
µg/L = micrograms per liter
cm^3 = cubic centimeters
ft = feet
ft^2 = square feet
ft^3 = cubic feet
g = grams
gal = gallons
lbs = pounds
L = liters
TCE = trichloroethene

TABLE D-3. CALCULATION OF MASS AND VOLUME OF BENZENE DISSOLVED IN THE SITE N3 GROUNDWATER PLUME

Benzene (µg/L)	Average (µg/L)	Average (lbs/ft³)[a]	Surface Area of Concentration Contour (ft²)[b]	Aquifer Thickness (ft)[c]	Aquifer Porosity (%)[d]	Water Volume (ft³)[e]	Mass of Benzene (lbs)[f]	Volume of Benzene (gal)[g]	Approximate Percent of Total Mass
> 1,000	3,600	2.25E-04	107	90	30	2,889	0.65	0.09	37.5
500 – 1,000	750	4.68E-05	120	90	30	3,240	0.15	0.02	8.8
100 – 500	300	1.87E-05	236	90	30	6,372	0.12	0.02	6.9
50 – 100	75	4.68E-06	932	90	30	25,164	0.12	0.02	6.8
10 – 50	30	1.87E-06	12,929	90	30	349,083	0.65	0.09	37.7
5 –10	7.5	4.68E-07	1,971	90	30	53,217	0.02	0.003	1.4
1 – 5	3	1.87E-07	3,187	90	30	86,049	0.02	0.002	0.9
Total			19,482			526,014	1.73	0.245	100

Notes:

(a) Calculated as: $\mu g / L \times \frac{g}{10^6 \mu g} \times \frac{lb}{454 g} \times 28.32 \frac{L}{ft^3}$

(b) Estimated from concentration contours generated from the latest groundwater monitoring data

(c) Assumed based on past sampling events

(d) Assumed

(e) Calculated as: Surface area of concentration contour (square feet) x Aquifer thickness x Porosity (unitless)

(f) Calculated as: Average Benzene concentration (lbs/ft³) x Water volume (ft³)

(g) Calculated as: $Mass\ of\ Benzene\ (pounds) \times \frac{454 g}{lb} \times (density\ of\ Benzene)\ \frac{cm^3}{0.884 g} \times \frac{L}{10^3 cm^3} \times \frac{gal}{3.785 L}$

% = percent
> = greater than
µg/L = micrograms per liter
cm³ = cubic centimeters
ft = feet
ft² = square feet
ft³ = cubic feet
g = grams
gal = gallons
lbs = pounds
L = liters

TABLE D-4. CALCULATION OF MASS AND VOLUME OF TCE DISSOLVED IN THE SITE N7 GROUNDWATER PLUME

TCE (µg/L)	Average (µg/L)	Average (lbs/ft^3)[a]	Surface Area of Concentration Contour (ft^2)[b]	Aquifer Thickness (ft)[c]	Aquifer Porosity (%)[d]	Water Volume (ft^3)[e]	Mass of TCE (lbs)[f]	Volume of TCE (gal)[g]	Approximate Percent of Total Mass
> 1,000	1,100	6.86E-05	1,021	90	30	27,567	1.89	0.16	0.9
500 – 1,000	750	4.68E-05	5,862	90	30	158,274	7.40	0.61	3.4
100 – 500	300	1.87E-05	367,788	90	30	9,930,276	185.83	15.27	86.2
50 – 100	75	4.68E-06	122,807	90	30	3,315,789	15.51	1.27	7.2
10 – 50	30	1.87E-06	83,387	90	30	2,251,449	4.21	0.35	2.0
5 – 10	7.5	4.68E-07	47,946	90	30	1,294,542	0.61	0.05	0.3
Total			628,811			16,977,897	215.45	17.71	100

Notes:

(a) Calculated as: $\mu g / L \times \frac{g}{10^6 \mu g} \times \frac{lb}{454 g} \times 28.32 \frac{L}{ft^3}$

(b) Estimated from concentration contours generated from the latest groundwater monitoring data
(c) Assumed based on past sampling events
(d) Assumed
(e) Calculated as: Surface area of concentration contour (square feet) x Aquifer thickness x Porosity (unitless)
(f) Calculated as: Average TCE concentration (lbs/ft^3) x Water volume (ft^3)

(g) Calculated as: $\textit{Mass of TCE (pounds)} \times \frac{454 g}{lb} \times \textit{(density of TCE)} \frac{cm^3}{1.46 g} \times \frac{L}{10^3 cm^3} \times \frac{gal}{3.785 L}$

% = percent
> = greater than
µg/L = micrograms per liter
cm^3 = cubic centimeters
ft = feet
ft^2 = square feet
ft^3 = cubic feet
g = grams
gal = gallons
lbs = pounds
L = liters
TCE = trichloroethene

APPENDIX E

SUMMARY OF POTENTIAL ARARs AND TBCs IDENTIFIED FOR DRYDEN

TABLE E-1. POTENTIAL FEDERAL ARARs AND TBCs – DRYDEN
(Page 1 of 7)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
Non-zero MCLGs	40 CFR Part 141	Chemical	Establishes a non-enforceable concentration of a drinking water contaminant that is protective of adverse human health effects and allows an adequate margin of safety.	Relevant and Appropriate	MCLGs are not applicable to the remedial action because they were developed as concentration thresholds for contaminants in drinking water systems and not groundwater aquifers. The NCP states that MCLGs are relevant and appropriate (based upon the circumstances of the release) as groundwater cleanup standards for groundwater and surface water that have been determined to be current or future drinking water sources.
National Drinking Water Regulations – Primary - MCLs	40 CFR Part 141	Chemical	Maximum permissible level of a contaminant, derived from health-based considerations, in water, which is delivered to any user of a public water system.	Relevant and Appropriate	MCLs are not applicable to the remedial action because they were developed as concentration thresholds for contaminants in drinking water systems and not groundwater aquifers. The NCP states that MCLs are relevant and appropriate (based upon the circumstances of the release) as groundwater cleanup standards for groundwater and surface water that have been determined to be potential drinking water sources if MCLGs are a) deemed not to be Relevant or Appropriate or b) set at a level of zero. Federal MCLs are superceded by the California MCLs, if the California standards are more stringent.

TABLE E-1. POTENTIAL FEDERAL ARARs AND TBCs – DRYDEN
(Page 2 of 7)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
National Drinking Water Regulations – Secondary MCLs	40 CFR Part 143	Chemical	Maximum permissible level of a contaminant, based upon human welfare considerations, in water that is delivered to any user of a public water system.	Relevant and Appropriate	MCLs are not applicable to the remedial action because they were developed as concentration thresholds for contaminants in drinking water systems and not groundwater aquifers. The NCP states that MCLs are relevant and appropriate (based upon the circumstances of the release) as groundwater cleanup standards for groundwater and surface water that have been determined to be potential drinking water sources if MCLGs are a) deemed not to be Relevant or Appropriate or b) set at a level of zero. Federal MCLs are superceded by the California MCLs, if the California standards are more stringent.
Federal Ambient Water Quality Criteria	Clean Water Act Section 304	Chemical	Sets criteria for water quality based on toxicity to aquatic organisms and human health.	Relevant and Appropriate	The criteria may be relevant and appropriate if discharges to naturally occurring surface water bodies are proposed and those water bodies have designated uses that include the protection of aquatic life and human health.
Environmental Protection Agency, Region IX PRGs	Not promulgated – Circulated by EPA	Chemical	Chemical concentrations in soil, air and water that can be used as screening levels or triggers for further investigation.	TBC	PRGs are not cleanup levels but levels above which further risk characterization is recommended.

TABLE E-1. POTENTIAL FEDERAL ARARs AND TBCs – DRYDEN
(Page 3 of 7)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
Toxic Substances Control Act	40 CFR 761	Chemical	Regulates polychlorinated biphenyl-contaminated material.	Not Applicable nor Relevant or Appropriate	No PCB-contaminated materials have been detected at the site.
Endangered Species Act	50 CFR 200 and 402	Location	Requires formal consultation with the Department of Interior if activities have the potential to alter the critical habitats upon which listed endangered and threatened species depend.	Applicable	Endangered or threatened species and/or critical habitat are found in the vicinity of Dryden. Any proposed remedial actions would need to consider provisions of this act.
National Historic Preservation Act	16 USC Section 470 et seq.	Location	Requires federal agencies to consider the effect of any federally assisted undertaking or licensing on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places.	Applicable	Several archeological resources near Dryden are considered potentially eligible for inclusion in the National Register.
Archeological and Historic Preservation Act	16 USC Section 470 et seq.	Location	Requires federal agencies to notify the Secretary of the Interior when undertakings will impact significant archeological processes.	Applicable	No significant sites are in close proximity to Dryden.
Archeological Resources Protection Act	16 USC Section 469 et seq.	Location	Establishes penalties for unauthorized destruction of archeological resources on federal lands.	Not Applicable nor Relevant or Appropriate	No archeological resources exist within Dryden.

TABLE E-1. POTENTIAL FEDERAL ARARs AND TBCs – DRYDEN
(Page 4 of 7)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
Migratory Bird Treaty Act	50 CFR Parts 10 and 20 (16 USC Section 703 et seq.)	Location	Prevents taking of migratory birds' nests or eggs without special permits.	Applicable	Migratory birds may exist at Dryden. Any proposed remedial actions in this area would need to consider provisions of this act.
Executive Order on Floodplain Management	Executive Order No. 11988	Location	Requires federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid adverse impacts associated with direct and indirect development of a floodplain.	Not Applicable nor Relevant or Appropriate	Dryden is not within a floodplain.
American Indian Religious Freedom Act	16 USC Section 470 et seq.	Location	Preserves and protects sacred or traditional sites, and ensures the rights of Native Americans access to these locations on federal properties.	Relevant and Appropriate	The close proximity of potentially sacred sites near Dryden requires consideration of this law.
Clean Water Act, (Wetland Protection) and Executive Order 11990	40 CFR Part 230.10 and Executive Order 11990	Location	Requires permit from the U.S. Army Corps of Engineers for construction activities in wetlands and alternatives analysis to ensure selection of the least damaging practicable alternative. Action must be taken to minimize adverse impacts on wetlands.	Not Applicable nor Relevant or Appropriate	No jurisdictional wetland types are associated with Dryden.
Clean Water Act (Disposal of Dredged or Fill Material)	40 CFR Parts 230.71 through 230.76	Location/ Action	Places limitations/requirements on the management, disposal, and treatment of the dredged or fill material discharged. Applies to sites that contain wetland areas or vernal pools.	Not Applicable nor Relevant or Appropriate	No jurisdictional wetland types are associated with Dryden.

TABLE E-1. POTENTIAL FEDERAL ARARs AND TBCs – DRYDEN
(Page 5 of 7)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
Statement of Policy on Control of Air Stripper Emissions	OSWER Directive 9355.028	Action	Limits VOC emissions from air stripper towers to less than 3 pounds per hour or 10 tons per year total VOCs.	TBC	KCAPCD New Source Review of air contaminants requirements are more stringent than this U.S. EPA directive.
Hazardous Air Pollutant Control Requirements	Clean Air Act Amendments, Section III	Action	Establishes thresholds and content of air emissions.	Applicable	Air emissions may result from any proposed treatment systems at Dryden.
Federal Discharge Water Quality Standards and National Pollutant Discharge Elimination System	40 CFR Parts 122 through 129	Action	Requires permits for the discharge of pollutants from any point source into the waters of the United States and presents discharge requirements.	Relevant and Appropriate	May be relevant and appropriate if remedial action includes the construction of treatment systems that may act as stormwater catchments. Includes measures to minimize and/or eliminate pollutants in stormwater discharges and monitoring to demonstrate compliance under NPDES. Discharge standards for NPDES permits and WDRs may be applicable if discharge to surface water or reinjection of treated groundwater are proposed.
RCRA - Standards for Interim Status Facilities	40 CFR Part 265	Action	Addresses closure and post-closure care of a treatment unit.	TBC	The California hazardous waste program has been authorized by the U.S. Environmental Protection Agency. Any treatment systems must meet substantive requirements of a RCRA unit.

TABLE E-1. POTENTIAL FEDERAL ARARs AND TBCs – DRYDEN
(Page 6 of 7)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
National Pretreatment Standards	40 CFR Part 403	Action	Sets standards to control pollutants that pass through or interfere with treatment processes in POTW or which may contaminate sewage sludge.	Applicable	May be applicable if remedial action includes the construction of treatment systems that discharge wastewater to a federally-owned treatment works.
RCRA - Identification and Listing of a Hazardous Waste	40 CFR Part 261	Action	Establishes criteria for the identification and listing of a hazardous waste.	Not Applicable nor Relevant or Appropriate	The State of California regulations governing hazardous waste are more stringent than federal RCRA regulations.
Institutional Controls	Institutional Controls: A Reference Manual (USEPA Workgroup on Institutional Controls (March, 1998)	Action	Identifies different types of institutional controls, including legal controls.	TBC	Considered for implementation if remedial action includes institutional controls.
Institutional Control Fact Sheet	OSWER Directive 9355.0-74FS-P	Action	*Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups*. This fact sheet provides an overview of the types of institutional controls that are commonly used or implemented, and outlines the factors that should be considered when evaluating them.	TBC	May be considered in the development of alternatives that include institutional controls.

TABLE E-1. POTENTIAL FEDERAL ARARs AND TBCs – DRYDEN
(Page 7 of 7)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
Remedy Guidance Selection Process Guidance	OSWER Directive 9200.1-23P	Action	*A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*. Guidance regarding formats and content for Superfund remedial action decision documents.	TBC	Appendix B of the document may be considered to address components of the Feasibility Study.
Monitored Natural Attenuation Implementation	OSWER Directive 9200.4-17P	Action	*Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and UST Sites*. Guidance regarding the use of monitored natural attenuation for the cleanup of contaminated soil and groundwater in the Superfund, RCRA Corrective Action, and Underground Storage Tank programs.	TBC	May be considered in the development of alternatives that include monitored natural attenuation.
Underground Injection Control Program	40 CFR Parts 144-147	Action	Protects groundwater from contamination by subsurface emplacement of fluids.	Not Applicable nor Relevant or Appropriate	No injection of RCRA waste will be considered. If any RCRA hazardous waste is generated at the site, underground injection will not be a disposal method.

Notes:

ARAR = applicable or relevant and appropriate requirement
CFR = Code of Federal Regulations
EPA = Environmental Protection Agency
MCL = maximum contaminant level
MCLG = maximum contaminant level goal
NCP = National Oil and Hazardous Substance Contingency Plan
No. = number
NPDES = National Pollutant Discharge Elimination System
OSWER = Office of Solid Waste and Emergency Response
POTW = publicly-owned treatment works
PRG = preliminary remediation goal
RCRA = Resource Conservation and Recovery Act
TBC = to be considered
U.S. = United States
USC = United States Code
USEPA = United States Environmental Protection Agency
UST = underground storage tank
WDR = waste discharge requirement

TABLE E-2. POTENTIAL STATE AND COUNTY ARARs AND TBCs – DRYDEN
(Page 1 of 12)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
California Environmental Protection Standard	CCR Title 22, Section 66264.702 et. seq.	Chemical	Sets concentration limits for discharges of contaminants to soil and air from permitted treatment, storage, or disposal units.	Applicable	Only applicable if soils are stored or disposed of on site.
Drinking Water Primary Standards Organic and Inorganic Chemicals	CCR, Title 22, Section 64431 et. seq., 64444, and 64449	Chemical	MCLs for public water systems.	Relevant and Appropriate	These requirements are not directly applicable to the remedial action because they were developed as concentration thresholds for contaminants in drinking water systems and not groundwater aquifers. They are considered relevant and appropriate where the aquifer is a potential drinking water source and the state MCLs are more stringent than federal MCLs.
State Action Levels	DHS/Office of Drinking Water Criteria	Chemical	Numeric limits (concentration levels) that are designed to protect human health from contaminants in drinking water.	TBC	DHS action levels are used as triggers to implement corrective actions for public water systems and are not enforceable. State and federal MCLs exist for groundwater contaminants that are protective of human health.
California EPA DTSC Values	DTSC Preliminary Endangerment Assessment Manual (January 1994)	Chemical	California EPA has developed residential health-based screening calculations for selected chemicals, which are lower than EPA Region IX PRGs.	TBC	These values are not cleanup levels but levels above which further risk characterization is recommended. They will be used in cases where they are more stringent than EPA Region IX PRGs.

TABLE E-2. POTENTIAL STATE AND COUNTY ARARs AND TBCs – DRYDEN
(Page 2 of 12)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
Policies and Procedures for Investigation and Cleanup and Abatement of Discharges.	SWRCB Resolution 92-49 (as amended)	Chemical/ Action	Requires cleanups to promote attainment of background levels or the best water quality that is reasonable considering certain factors.	TBC	If final cleanup levels above background are proposed, justification acceptable to the SWRCB must be provided.
Waste Discharge Requirements	Porter/Cologne Water Quality Act – California Water Code, Ch. 4, Article 4 SWRCB Order #97-03- DWQ.	Chemical/ Action	Requires notification and transmittal of technical reports to the RWQCB of proposed discharges to the water of the state. Requires cleanup and abatement of actual or threatened pollution or new source conditions, and establishes WDRs, among other requirements.	Relevant and Appropriate	May be relevant and appropriate if remedial action includes the construction of treatment systems that may act as stormwater catchments. Includes measures to minimize and/or eliminate pollutants in stormwater discharges and monitoring to demonstrate compliance under NPDES. Discharge standards for NPDES permits and WDRs may be applicable if discharge to surface water or reinjection of treated groundwater are proposed.

TABLE E-2. POTENTIAL STATE AND COUNTY ARARs AND TBCs – DRYDEN
(Page 3 of 12)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
Statement of Policy with Respect to Maintaining High Quality of Waters (Non-degradation Policy) in California	SWRCB Resolution Number 68-16	Chemical/ Location/ Action	Establishes the state's policy for maintaining the quality of water in California higher than that stated in established policies when existing quality is higher. Requires the use for best practical treatment or control of groundwater contaminant plume. May require levels of contaminants lower than state or federal MCLs. Also applies to *in-situ* discharge of polluted water into undegraded waters of the state.	TBC	If final cleanup levels above background are proposed, justification acceptable to the SWRCB must be provided. Discharge of treated groundwater to surface water or reinjection into the aquifer may be proposed.
Discharge Prohibitions and Stormwater Pollution Prevention	SWRCB Order 99-08-DWQ	Action	Requires control of stormwater runoff at construction sites that are greater than 5 acres in size.	Not Applicable nor Relevant or Appropriate	No construction projects, related to the removal action, will exceed an area of 5 acres at Dryden.
LUFT Field Manual	May 24, 1988 Revised October 1989	Chemical/ Action	Specifies the requirements for the removal of USTs and assessment of potential releases of petroleum fuel-related contaminants.	TBC	Considered for cleanup goals for petroleum fuel-related contaminants.

TABLE E-2. POTENTIAL STATE AND COUNTY ARARs AND TBCs – DRYDEN
(Page 4 of 12)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
Sources of Drinking Water Policy	SWRCB Resolution No. 88-63	Action	Defines all ground and surface water as existing or potential sources of drinking water unless TDS are greater than 3,000 ppm, the well yield is less than 200 gpd from a single well, or groundwater is unreasonable to treat using best management practices or best economically achievable treatment practices.	Applicable	The identification of the underlying groundwater as potential drinking water sources provides information to determine concentration limits, cleanup levels, or treatment levels.
Water Quality Monitoring	CCR, Title 23 Sections 2550.7 - 2550.10	Action	Requires remedial action monitoring.	Applicable	Groundwater monitoring will be performed.
Water Well Standards State of California Dept. of Water Resources	Water Well Standards Bulletin 74-81 Supplemental Bulletin 74-90 adopted pursuant to California Water Code Section 13800	Action	Sets standards to be applied to the construction or abandonment of water wells.	Applicable	Applicable if actions involve construction or abandonment of water wells.

TABLE E-2. POTENTIAL STATE AND COUNTY ARARs AND TBCs – DRYDEN
(Page 5 of 12)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
Location Standards for Owners & Operators of Hazardous Waste Transfer, Treatment, Storage, and Disposal Facilities	CCR, Title 22, Section 66264.18	Action	Establishes siting criteria for waste treatment, storage, or disposal units. Provides location standards including seismic considerations and floodplain restrictions.	Applicable	Units for the treatment of used GAC or recovered fuels may be considered at Dryden.
Criteria for Identifying Hazardous Waste and Persistent and Bioaccumulative Toxic Substances	CCR, Title 22, Section 66261.24	Action	Presents criteria for testing and identifying RCRA hazardous wastes: sets levels for TTLC and STLC.	Applicable	The criteria and TTLC and STLC levels are applicable for the characterization of excavated soils or other wastes generated by remedial actions at Dryden.
Standards Applicable to Generators of Hazardous Waste	CCR, Title 22, Sections 66262.10 and 66262.11	Action	Establishes standards for generators of hazardous wastes in California, including those for hazardous waste determination, manifesting, transportation record keeping, and reporting.	Applicable	Substantive requirements are applicable if excavated soils or treatment residuals exceed RCRA hazardous waste thresholds.
Management of Extremely Hazardous Wastes	CCR Title 22, Section 67430.3	Action	Requires the removal of improperly disposed extremely hazardous wastes.	Relevant and Appropriate	Although no extremely hazardous wastes have been identified at Dryden, if such wastes are encountered during the remedial action, they must be

TABLE E-2. POTENTIAL STATE AND COUNTY ARARs AND TBCs – DRYDEN
(Page 6 of 12)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
					appropriately managed.
Land Disposal Restrictions	CCR Title 22, Sections 66268.1 through 66268.9, Section 66268.124, Corrective Management Rule, Section 66264.91; 66262.100, 66264.708; 66270.30; and 66272.1	Action	Identifies hazardous wastes that are restricted from land disposal.	Applicable	Applicable if excavated soil or treatment residuals exceed limits before treatment. Soil and residuals would be tested using TTLC/STLC to determine if they exceed disposal limits, if necessary. On site disposal actions may be exempt from treatment standards through the CAMU Rule.
California Integrated Waste Management Requirements	Title 27 CCR, Sections 20510 through 21600	Action	Requirements for waste management units and landfills.	Relevant or Appropriate	May be relevant requirements for facilities to which the remedial action-related non-hazardous wastes may be sent.
Standards Applicable of Transporters of Hazardous Waste	CCR Title 22, Sections 66263.10 through 66263.18	Action	Establishes standards that apply to persons transporting hazardous waste in California.	Not Applicable nor Relevant or Appropriate	These standards apply to off-site activities, and are therefore, by definition, not an ARAR. However, these requirements must be fully complied with when transporting hazardous waste off-site.

TABLE E-2. POTENTIAL STATE AND COUNTY ARARs AND TBCs – DRYDEN
(Page 7 of 12)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
Air Resources Act, KCAPCD	Rule 402 and 419	Action	Fugitive dust and nuisance dust. Limits on-site activities so the concentration of fugitive dust at the property line shall not be visible and nuisance dust is abated.	Applicable	Applicable to soil excavation, if proposed. The rule also requires taking every reasonable precaution to minimize fugitive dust or nuisance dust and the prevention and cleanup of material accidentally deposited on paved streets.
Air Resources Act, Kern County Air Pollution Control District	Rule 210.1 New Source review of Air Contaminants	Action	Requires that emissions from an air stripper be within acceptable levels.	Applicable	Applicable to potential control of emissions from air stripping tower, if proposed. Allowable concentrations are determined on a site-by-site basis by KCAPCD.
Discharges of Waste to Land	CCR, Title 23, Chapter 15, Section 2520	Action	Regulates the siting, design, construction, operation, closure, and monitoring of waste discharges to land for treatment. Storage and disposal wastes regulated include "hazardous wastes," "non-hazardous wastes," and "inert waste." Includes criteria for diversion and drainage of storm water. Also establishes water quality protection standard for landfills, surface impoundments, waste piles, and land treatment sites.	Relevant and Appropriate (soil disposal) Applicable (landfill closure and post-closure)	Relevant to the on-site disposal of soils following treatment, if proposed. On-site landfill disposal may be considered. Directly applicable to closure of landfills, if necessary.

TABLE E-2. POTENTIAL STATE AND COUNTY ARARs AND TBCs – DRYDEN
(Page 8 of 12)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
Standards for Operators of Hazardous Waste TSDFs - Waste Piles	CCR, Title 22, Div. 4.5, Chapter 14, Sections 66264.250-.259	Action	Regulates the storage and treatment of hazardous waste in piles.	Relevant and Appropriate	Although not applicable to CERCLA remedial actions, substantive requirements are relevant and appropriate if *ex-situ* treatment or storage of hazardous waste is planned.
Standards for Operators of Hazardous Waste TSDFs - Miscellaneous Units	CCR, Title 22, Sections 66264.171 through 66264.178, 66264.192 through 66264.199, 66264.552, and Sections 66264.600 through 66264.603.	Action	Applies to owners and operators of facilities that treat, store, or dispose of hazardous wastes in miscellaneous units. Covers environmental performance standards, design, construction, monitoring, inspections, and post-closure care for miscellaneous units, containers, and tank systems.	Relevant and Appropriate	Although not applicable to CERCLA remedial actions, air strippers and carbon vessels may be considered for use at Dryden. No other corrective action management units will be established during the remedial action at Dryden.
California Designated Level Methodology for Waste Characterization and Cleanup Level Determination	Staff Report, California RWQCB	Action	Proposes a methodology for determining cleanup levels in soil based upon impact on groundwater. Designated waste is defined as non-hazardous waste, which consists of pollutants, which, under ambient environmental conditions, could cause degradation of water of the state.	TBC	Can be used in determining cleanup levels in soil that are protective of groundwater quality.

TABLE E-2. POTENTIAL STATE AND COUNTY ARARs AND TBCs – DRYDEN
(Page 9 of 12)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
Endangered Species	CDFG Code Section 2080	Action	This section prohibits the taking, importation, or sale of any species, or any part thereof, of an endangered species or a threatened species. The desert tortoise is on the California and Federal and Threatened Animals Species Lists, and the CDFG has the authority to protect these species and their habitat.	Applicable	Action must be taken to conserve endangered species. There can be no releases and/or actions that would have a deleterious effect on species or habitat.
California Listing of Species of Special Concern	CCR Title 14, Section 640	Action	Requires planning avoidance of adverse impacts on species of special concern and their habitat.	TBC	Remedial action may include soil excavation or treatment plant construction, potentially impacting endemic species. Will be considered during CERCLA planning document preparation.
Endangered Species	CCR Title 14, Sections 670.2 and 670.5	Action	Establishes species, subspecies, and varieties of native California plants as endangered, threatened, or rare and species and subspecies of animals as endangered or threatened.	Applicable	Remedial action may include soil excavation or treatment plant construction, potentially impacting endemic species. Will be considered during CERCLA planning document preparation.
Wildlife Species/ Habitats	CDFG Code Section 1600	Action	Declares the protection and conservation of fish and wildlife to be an important public interest. This section is a general statement of policy that does not impose a substantive requirement.	TBC	Action must be taken for the general protection and conservation of fish and wildlife resources.

TABLE E-2. POTENTIAL STATE AND COUNTY ARARs AND TBCs – DRYDEN
(Page 10 of 12)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
Endangered Species	CDFG Code Sections 2090 through 2096	Action	Present provisions concerning CDFG coordination and consultation with state and federal agencies and with project applicants. These sections do not impose substantive requirements.	Relevant and Appropriate	Action must be taken to conserve endangered species. There can be no releases and/or actions that would have a deleterious effect on species or habitat.
Rare Native Plants	CDFG Code Sections 1900 et. Seq. and 2080	Action	Present provisions concerning native plant protection including: criteria for determining endangered plant species, designation of endangered plants, and other prohibitions.	Applicable	Action must be taken to conserve endangered species. There can be no releases and/or actions that would have a deleterious effect on species or habitat.
Wildlife Species	CDFG Code Sections 3005, 3511, and 3513.	Action	These code sections prohibit the taking of birds and mammals.	Applicable	Action must be taken to prohibit the taking of birds and mammals, including taking by poison. The Mojave ground squirrel is a species of special concern and is known to inhabit portions of Edwards AFB.

TABLE E-2. POTENTIAL STATE AND COUNTY ARARs AND TBCs – DRYDEN
(Page 11 of 12)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
Wildlife Species/ Habitats	CDFG Code Sections 4700, 5050,	Action	Prohibits the possession of mammals, reptiles, and fish that are identified as "fully protected."	Applicable	Applicable where the state law has a listing that is more stringent than the federal Endangered Species Act or Migratory Bird Treaty Act.
Land Use Covenants	CCR Title 22, Section 67391.1 a, b, and d.	Action	States that if a remedy at property owned by the federal government will result in levels of hazardous substances remaining on property at levels not suitable for unrestricted use, and it is not feasible to record a land use covenant, then the Record of Decision is to clearly define and include limitations on land use and hazardous substances remaining on the property.	Relevant and Appropriate	If the Air Force transfers any portion of Edwards AFB that is not suitable for unrestricted use to a nonfederal entity, it will comply with these provisions in Title 22.

TABLE E-2. POTENTIAL STATE AND COUNTY ARARs AND TBCs – DRYDEN
(Page 12 of 12)

Requirement	Citation	ARAR Type	Description	Applicable, or Relevant and Appropriate, or TBC	Comments
Land Use Covenants	Civil Code Section 1471, a and b.	Action	Allows the state (as non-owners) to enter into restrictive land use covenants with land owners and their successors after determining that protection of present or future human health or safety or the environment is necessary.	Relevant and Appropriate	If hazardous materials are allowed to remain at a site and institutional controls are initiated, a covenant may be required by the State to enable the enforcement and monitoring of such controls to assure protectiveness.

Notes:

AFB = Air Force Base
ARAR = applicable or relevant and appropriate requirement
CAMU = Corrective Action Management Unit
CCR = California Code of California Regulations
CDFG = California Department of Fish and Game
CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
DHS = Department of Health Services
DTSC = Department of Toxic Substances Control
EPA = Environmental Protection Agency
GAC = granular activated carbon
gpd = gallons per day
KCAPCD = Kern County Air Pollution Control District
LUFT = leaking underground fuel tank
MCL = maximum contaminant level
NPDES = National Pollutant Discharge Elimination System
ppm = parts per million
PRG = preliminary remediation goal
RCRA = Resource Conservation and Recovery Act
RWQCB = Regional Water Quality Control Board
STLC = soluble threshold limit concentration
SWRCB = State Water Resources Control Board
TBC = to be considered
TDS = total dissolved solids
TSDF = transfer, storage, and disposal facility
TTLC = total soluble threshold limit concentration
UST = underground storage tank
VOC = volatile organic compound

TABLE E-3. POTENTIAL WORKER PROTECTION REGULATIONS – DRYDEN
(Page 1 of 2)

Requirement	Citation	ARAR Type	Description	Applicable, Relevant and Appropriate, or TBC	Comments
NIOSH or ACGIH	29 CFR Part 190.120	Chemical	Non-promulgated published exposure limits (recommended exposure limits or threshold limit values) for chemicals not regulated by OSHA.	Relevant and Appropriate	These standards will be applicable during remedial actions.
OSHA Hazardous Waste Operations	29 CFR Part 190.1000	Chemical	Promulgated standards for worker exposure to specific chemical compounds; establishes permissible exposure levels.	TBC	These standards will be applicable during remedial actions.
Ambient Air Quality Standards	40 CFR 50.6 and 50.12	Chemical	Chemical concentrations in soil, air and water that can be used as screening levels or triggers for further investigation.	TBC	Construction and excavation actions must comply with ambient air quality standards during excavation activities. Ambient air standards are: PM_{10} concentration of 50 $\mu g/m^3$ (12-month average), 150 $\mu g/m^3$ (24-hour average), and lead concentrations of 1.5 $\mu g/m^3$ (calendar-quarter average).
OSHA standards	OSHA 29 CFR	Action	Establishes and regulates worker health and safety.	TBC	All remedial action activities will be conducted in accordance with applicable worker health and safety requirements.

TABLE E-3. POTENTIAL WORKER PROTECTION REGULATIONS – DRYDEN
(Page 2 of 2)

Requirement	Citation	ARAR Type	Description	Applicable, Relevant and Appropriate, or TBC	Comments
Process Safety	29 CFR 1910.119	Action	Establishes a non-enforceable concentration of a drinking water contaminant that is protective of adverse human health effects and allows an adequate margin of safety.	TBC	Any of the treatment options considered as part of the remedial action must comply with process safety requirements.

Notes:

$\mu g/m^3$ = micrograms per cubic meter
ACGIH = American Conference of Governmental Industrial Hygienists
ARAR = applicable or relevant and appropriate requirement
CFR = Code of Federal Regulations
NIOSH = National Institute for Occupational Safety and Health
OSHA = Occupational Safety and Health Administration
PM_{10} = particulate matter less than 10 microns in diameter
TBC = to be considered

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APPENDIX F

OPERABLE UNIT 6 NATURAL ATTENUATION SCREENING

APPENDIX F

OPERABLE UNIT 6 NATURAL ATTENUATION SCREENING

F.1 INTRODUCTION

Natural attenuation is defined by the United States Environmental Protection Agency Office of Research and Development and Office of Solid Waste and Emergency Response as:

> "…the biodegradation, dispersion, dilution, sorption, volatilization, and/or chemical and biochemical stabilization of contaminants to effectively reduce contaminant toxicity, mobility, or volume to levels that are protective of public health and the ecosystem."

Groundwater Monitoring/Hydrologic Control differs from the *No Action* alternative because it requires that supporting documentation, including groundwater monitoring results and modeling predictions, be supplied to demonstrate that contaminant concentrations can be reduced to cleanup levels in a "reasonable timeframe." Biodegradation, also known as intrinsic bioremediation, may be the most important destructive natural attenuation mechanism. While intrinsic bioremediation of petroleum hydrocarbons has been well documented to occur under a variety of hydrogeological settings, the intrinsic (unaided) bioremediation of chlorinated aliphatic hydrocarbons occurs only under a specific set of environmental conditions.

F.2 BEHAVIOR

The behavior of chlorinated solvent plumes has been categorized into three types based on the amount of solvent, the amount of biologically available organic carbon in the aquifer, the distribution and concentration of natural electron acceptors, and the types of electron acceptors being used (Wiedemeier et al., 1998).

- Type 1 behavior - occurs where the primary substrate is anthropogenic carbon (e.g. total petroleum hydrocarbons), which drives reductive dechlorination. Type 1 behavior results in the rapid and extensive degradation of the highly chlorinated solvents such as tetrachloroethene (PCE), trichloroethene (TCE), and dichloroethene (DCE).
- Type 2 behavior - dominates in areas that are characterized by relatively high concentrations (greater than 20 milligrams per liter [mg/L] of dissolved organic carbon [DOC]) of biologically

available native organic carbon, which drives reductive dechlorination. Type 2 behavior generally results in slower biodegradation of the highly chlorinated solvents than Type 1 behavior.

- Type 3 behavior - dominates in areas that are characterized by low concentrations (less than 20 mg/L DOC) of native and/or anthropogenic carbon and by dissolved oxygen (DO) concentrations greater than 1 mg/L. Under these aerobic conditions, reductive dechlorination will not occur; thus, there is no removal of PCE, TCE, and DCE. Instead, the most significant natural attenuation mechanisms for these compounds under these conditions are advection, dispersion, and sorption.

The potential for intrinsic bioremediation of TCE within the Dryden groundwater plume was evaluated using data collected during groundwater monitoring events and the technical protocol developed by Wiedemeier et al. (1998). Based upon the results of this screening, the groundwater plume was characterized as having Type 3 behavior, meaning that only limited intrinsic bioremediation of TCE is occurring.

Field parameters measured during well purging and laboratory analytical results from the groundwater samples were used to evaluate intrinsic biodegradation within the Site N2 groundwater plume. Screening data used to assess the biodegradation potential of chlorinated compounds are shown in the table in Attachment 1 (Wiedemeier et al., 1998). The scores are shown in the right hand column of the table in Attachment 2. An overall score of 8 was obtained, indicating that a very limited potential for non-enhanced natural attenuation exists at Site N2.

Source:

Wiedemeier, T.H., M.A Swanson, D.E. Moutoux, J.T. Wilson, D.H. Kampbell, J.E. Hansen, and P. Hass. 1998. *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water*, U.S. Environmental Protection Agency, Office of Research and Development, Washington D.C., 20460, EPA/600/R-98/128. September.

ATTACHMENT 1

TABLE 2.3 FROM WIEDEMEIER ET AL., 1998

Table 2.3 Analytical Parameters and Weighting for Preliminary Screening for Anaerobic Biodegradation Processes[a/]

Analysis	Concentration in Most Contaminated Zone	Interpretation	Value
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at higher concentrations	3
Oxygen*	>5 mg/L	Not tolerated; however, VC may be oxidized aerobically	-3
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2
Iron II*	>1 mg/L	Reductive pathway possible; VC may be oxidized under Fe(III)-reducing conditions	3
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2
Sulfide*	>1 mg/L	Reductive pathway possible	3
Methane*	<0.5 mg/L >0.5 mg/L	VC oxidizes Ultimate reductive daughter product, VC Accumulates	0 3
Oxidation Reduction Potential* (ORP) against Ag/AgCl electrode	<50 millivolts (mV) <-100mV	Reductive pathway possible Reductive pathway likely	1 2
pH*	5 < pH < 9 5 > pH >9	Optimal range for reductive pathway Outside optimal range for reductive pathway	0 -2
TOC	> 20 mg/L	Carbon and energy source; drives dechlorination; can be natural or anthropogenic	2
Temperature*	> 20°C	At T >20°C biochemical process is accelerated	1
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1
Alkalinity	>2x background	Results from interaction between CO_2 and aquifer minerals	1
Chloride*	>2x background	Daughter product of organic chlorine	2
Hydrogen	>1 nM	Reductive pathway possible, VC may accumulate	3
Hydrogen	<1 nM	VC oxidized	0
Volatile Fatty Acids	> 0.1 mg/L	Intermediates resulting from biodegradation of more complex compounds; carbon and energy source	2
BTEX*	> 0.1 mg/L	Carbon and energy source; drives dechlorination	2
Tetrachloroethene		Material released	0
Trichloroethene*		Material released Daughter product of PCE	0 2[a/]
DCE*		Material released Daughter product of TCE If cis is > 80% of total DCE it is likely a daughter product 1,1-DCE can be chemical reaction product of TCA	0 2[a/]
VC*		Material released Daughter product of DCE	0 2[a/]
1,1,1-Trichloroethane*		Material released	0
DCA		Daughter product of TCA under reducing conditions	2
Carbon Tetrachloride		Material released	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2
Ethene/Ethane	>0.01mg/L >0.1 mg/L	Daughter product of VC/ethene	2 3
Chloroform		Material released Daughter product of Carbon Tetrachloride	0 2
Dichloromethane		Material released Daughter product of Chloroform	0 2

* Required analysis. a/ Points awarded only if it can be shown that the compound is a daughter product (i.e., not a constituent of the source NAPL).

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ATTACHMENT 2

TABLE 3 FROM WIEDEMEIER ET AL., 1998

TABLE 3. NATURAL ATTENUATION SCREENING

Parameter	Concentration in Most Contaminated Zone	Interpretation	Score
Oxygen	> 1 mg/L	Dissolved oxygen concentration of 6.77 mg/L at N2-OW02. Higher concentrations suppress the reductive dechlorination pathway and promote the aerobic oxidation of VC.	-3
Nitrate	> 1 mg/L	Nitrate concentration of 141 mg/L at N2-OW02. Higher concentrations may compete with reductive pathway.	0
Iron II	< 1 mg/L	Ferrous iron (II) < 1 mg/L (not detected) at N2-OW02. Reductive pathway unlikely. VC may be oxidized.	0
Sulfate	> 20 mg/L	Sulfate > 20 mg/L at N2 and throughout Dryden. These high concentrations may compete with reductive pathway.	0
Sulfide	< 1 mg/L	Sulfide concentration < 1 mg/L at Site N2 and throughout Dryden. Reductive pathway unlikely.	0
Methane	> 1 mg/L	Methane concentration of 0.502 mg/L at N2-OW02. Methane is the ultimate daughter product of reductive pathway. Low methane concentrations indicate that reductive dechlorination is not proceeding to completion. VC may accumulate.	3
Oxidation Reduction Potential (ORP)	-100 millivolts (mV) < ORP < 50 mV	ORP measurement of -30.90 mV at N2-OW02. Values less than 50 mV indicate that a reductive pathway is possible and values less than -100 mV, indicate that a reductive pathway is likely.	1
pH	5 < pH < 9	pH at well N2-OW02 measured at 7.62, which is within the optimal range for reductive pathway.	0
TOC	< 20 mg/L	TOC concentration of 4.0 mg/L at N2-OW02. Carbon and energy source; drives dechlorination; can be natural or anthropogenic.	0
Temperature	> 20 degrees C	The groundwater temperature at N2-OW02 was measured at 22.13 degrees C, which should accelerate biochemical degradation.	1
Carbon Dioxide	NA	Carbon dioxide was not measured.	0
Alkalinity	< 2x background	Results from interaction between CO_2 and aquifer minerals. Total alkalinity was 401 mg/L at N2-OW02, located within the TCE hot spot. Upgradient at N15-MW03, alkalinity was 360 mg/L.	0
Chloride	> 2x background	Chloride concentration of 1,880 mg/L at hot spot well N2-OW02 and 190 mg/L at upgradient well N15-MW3. Daughter product of organic chlorine.	2
Hydrogen	NA	Hydrogen was not measured.	0
BTEX	< 0.1 mg/L	Carbon and energy source; drives dechlorination. BTEX at N2-OW02 appears to be less than 0.1 mg/L, but evaluation is limited by elevated detection limits related to high TCE concentrations.	0
PCE	NA	Material released.	0
TCE	340 µg/L	Daughter product of PCE, but release appears to have been TCE. Maximum TCE concentration of 340 µg/L detected at well N1-MW07.	0
DCE	28 µg/L	Daughter product of TCE. c*is*-DCE was detected at Site N2, indicating that this is likely to be a daughter product. Maximum *cis*-DCE concentration of 28 µg/L detected at well N1-MW06.	2
VC	<10 µg/L	Elevated detection limits related to high TCE concentrations prevented evaluation.	0
1,1,1-TCA	NA	Material released.	0
DCA	NA	Daughter product of TCA under reducing conditions.	0
Carbon Tetrachloride	NA	Material released.	0
Chloroethane	1.8 µg/L	Daughter product of DCA or VC under reducing conditions.	0
Ethene/Ethane	Not Tested	Daughter product of VC/ethene.	0
Chloroform	2,300 µg/L	Daughter product of carbon tetrachloride	2
Dichloromethane	Not Tested	Potential daughter product of chloroform.	0
		TOTAL:	8

Notes:

< = less than
> = greater than
µg/L = micrograms per liter
C = Celsius
CO_2 = carbon dioxide
DCA = dichloroethane
DCE = dichloroethene
BTEX = benzene, toluene, ethylbenzene, and total xylenes
mg/L = milligrams per liter
mV = millivolts
NA = not applicable
PCE = tetrachloroethene
TCA = trichloroethane
TCE = trichloroethene
TOC = total organic carbon
VC = vinyl chloride
x = times

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APPENDIX G

DRYDEN FEASIBILITY STUDY COST ESTIMATES

G.1 COST PRESENTATION

Costs presented in the feasibility study include:

- Period of Analysis
- Capital Costs
- Annual Operation and Maintenance Costs
- Periodic Costs
- Total Costs
- Total Escalated Costs
- Present Values
- Discount Rates

These costs and factors, as well as the estimating process and assumptions, are explained in the following sections.

G.2 RACER™ ESTIMATING SOFTWARE

The cost estimates presented in this study were developed using Remedial Action Cost Engineering and Requirements (RACER™) cost estimating software. RACER™ is a parametric cost modeling system that uses cost technologies based on generic engineering solutions for environmental projects, technologies, and processes. The generic engineering solutions were derived from historical project information, industry data, government laboratories, construction management agencies, vendors, contractors, and engineering analysis. The cost database is a duplicate of the ECHOS (Environmental Cost Handling Options and Solutions) cost database, which was published by the R.S. Means company.

G.3 COST TYPES

Cost estimates prepared for the feasibility study present three cost types: capital costs, operation and maintenance (O&M) costs, and periodic costs.

Capital costs are associated with the construction and initial implementation of a remedial action and do not include costs associated with long-term operation. The costs include labor, equipment, material costs, contractor markups, mobilization/demobilization, site work, installation, disposal, and expenditures for supporting professional/technical services associated with construction of the remedial action.

O&M costs are those post-construction costs, which are incurred to verify the effectiveness of a remedial action and were estimated on an annual basis. These costs include labor, equipment, material costs, and contractor markups associated with monitoring, operating and maintaining systems, containment, disposal and professional/technical services associated with O&M activities.

Periodic costs occur either 1) once every few years or 2) once during the remedial timeframe. Periodic costs included in these estimates are associated with 5-year reviews and site closeout activities.

G.4 ESCALATION

Escalation is a cost adjustment utilized to account for the change of labor rates, productivity, and material prices that occur between the cost estimate date and the date on which work will be performed. An escalation factor is applied to each year's total expenditures for the duration of the project.

G.5 DISCOUNT RATE

The discount rate is used in present value analysis to adjust for the potential productivity and increasing value of money, assuming positive-return investments. The discount rate was selected based upon the rates published in Appendix C to *Circular A-94 - Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs* (United States Office of Management and Budget, 2003).

G.6 PRESENT VALUE ANALYSIS

Present value analysis is a method to evaluate expenditures, which occur over varying project durations. This methodology allows for cost comparisons of different remedial alternatives on the basis of a single cost figure for each alternative. This "present value" is the amount needed to be set aside at the project outset to assure that funds will be available for the entire project.

Present Value is the sum of all non-escalated costs after applying the discount rate to each year's costs. This was calculated using the following formula:

$$\sum_{i=1}^{N} \frac{P_i}{(1+rate)^t}$$

Where:

- N is the total number of years being evaluated
- *i* is current year starting from year "1"
- P_i is equal to the most recent expenditure
- *rate* is the discount rate
- the denominator exponent "t" is the time (in years) that has elapsed since the initial cost

G.7 COST ASSUMPTIONS

G.7.1 ACCESS RESTRICTIONS

2 hours/month for geographical information system operator for development and maintenance

G.7.2 GROUNDWATER MONITORING/HYDROLOGIC CONTROL

2 hours/month for geographical information system operator for development and maintenance

16 samples/event, 1 event/year for the first 5 years, 1 event every 2 years until calendar year 11, 1 event every 5 years until calendar year 26, and a final event in calendar year 30
On-site carbon treatment of purge water and transport to publicly-owned treatment works (POTW) for discharge

5-year reviews in calendar years 6, 11, 16, 21, and 26

Installation of one monitoring well screened 60 to 70 feet below ground surface (bgs) and a total depth of 80 feet bgs with 80 feet of tubing for low-flow pump

G.7.3 CHEMICAL REACTION

2 hours/month for geographical information system operator for development and maintenance

G.7.3.1 Fenton-Based Reagent

Fenton's radius of influence (ROI) = 10 feet
314 sq feet per well
3 wells/day; 4 days per event; 3 events per remedial action; 100-foot injection wells
Mob/Demob – $10,108 per event x 3 events = $30,324/remedial action
On-site and off-site support – $2,147/day = $716/well x 3 events = $2,148/well/remedial action
Site equipment and materials – $3,045/day = $1,015/well x 3 events = $3,045/well/remedial action
Reagent - $2.62/gallon x 600 gallons/well = $1,572/well x 3 events = $4,716/well/remedial action
Earth Tech Staff Engineer – 4 hours per well
Reference – ISOTEC quote 12/5/01

Site N3

MCL - within the 5 μg/L concentration contour – 648,253 sq feet
Fenton's - Install 2,027 wells, inject at 2,039 wells – 3 events

G.7.3.2 Permanganate Reagent

Permanganate ROI = 30 feet
2,827 sq feet per well
3 wells/day; 5 days per event; 3 events per remedial action; 100-foot injection wells
Mob/Demob – $16,181 per event x 3 events = $48,543/remedial action
On-site and off-site support – $2,750/day = $917/well x 3 events = $2,751/well/remedial action
Site equipment and materials – $3,900/day = $1,300/well x 3 events = $3,900/well/remedial action
Reagent - $0.19/gallon x 333 gallons/well = $62.71/well x 3 events = $188/well/remedial action
Earth Tech Staff Engineer – 4 hours per well
Reference - Geo-Cleanse quote 11/2/00

Site N2

MCL - within the 5 μg/L concentration contour – 891,798 sq feet
Permanganate – Install 305 wells, inject at 315 wells – 3 events

Site N7

MCL - within the 5 μg/L concentration contour – 628,810 sq feet
Permanganate – Install 215 wells, inject at 222 wells – 3 events

Total for Sites N2 and N7

MCL - within the 5 μg/L concentration contour – 1,520,608 sq feet
Permanganate – Install 520 wells, inject at 537 wells – 3 events

G.7.3.3 Chemical Reaction Monitoring

30 samples/event, 4 events in the first year, 2 events per year for 3 years, 1 event per calendar year 6, 1 event per calendar year 8 and 1 event per calendar year 10
On-site carbon treatment of purge water and transport to POTW for discharge
Installation of one monitoring well screened 60 to 70 feet bgs and a total depth of 80 feet bgs with 80 feet of tubing for low-flow pump.

5-year review in calendar year 5.

G.7.4 SOURCE CONTROL AND HYDROLOGIC CONTROL WITH GROUNDWATER MONITORING

2 hours/month for geographical information system operator for development and maintenance

G.7.4.1 Permanganate Reagent

Permanganate ROI = 30 feet
2,827 sq feet per well
3 wells/day; 5 days per event; 3 events per remedial action; 100-foot injection wells
Mob/Demob – $16,181 per event x 3 events = $48,543/remedial action
On-site and off-site support – $2,750/day = $917/well x 3 events = $2,751/well/remedial action
Site equipment and materials – $3,900/day = $1,300/well x 3 events = $3,900/well/remedial action
Reagent - $0.19/gallon x 333 gallons/well = $62.71/well x 3 events = $188/well/remedial action
Earth Tech Staff Engineer – 4 hours per well
Reference - Geo-Cleanse quote 11/2/00

Site N3

Inject at 13 wells – N3-DEW2, N3-MW03, N3-MW06, N3-MW07, N3-MW11, N3-MW13, N3-MW15, N3-MW16, N3-MW17, N3-MW18, N3-NW03, N3-NW05, and N3-NW06.

Site N7

Inject at 9 wells – N7-ASW1b, N7-MW01, N7-MW03, N7-MW04, N7-MW08, N7-MW09b, N7-MW10, N7-MW11, and N7-MW12.

G.7.4.2 Chemical Reaction Monitoring

41 samples/event, 1 event/year for the first 5 years, 1 event every 2 years until calendar year 11, 1 event every 5 years until calendar year 26, and a final event in calendar year 30
On-site carbon treatment of purge water and transport to publicly-owned treatment works (POTW) for discharge

5-year reviews in calendar years 6, 11, 16, 21, and 26

Installation of one monitoring well screened 60 to70 feet bgs and a total depth of 80 feet bgs with 80 feet of tubing for low-flow pump.

G.8 REFERENCES

Earth Tech, Inc. 2003. *RACER™ Quick Reference Guide*. January.

United States Environmental Protection Agency/United States Army Corp of Engineers. 2000. A *Guide to Developing and Documenting Cost Estimates During the Feasibility Study*, OSWER Directive EPA 540-R-00-002, OSWER 9355.0-75.

United States Office of Management and Budget. 2003. *Appendix C to Circular A-94 - Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*. January.

Site Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Access Restrictions
ID: OU6 TCE Plume
Type: None
Description: Access Restrictions to OU6 TCE plume through GIS

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Calendar Year 01 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 02 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:09:33 AM

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Calendar Year 03 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 04 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 05 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 06 - 5-year Review	$7,119								$14,042	$21,161
(System Defaults)		$1,581	$9,966	$0	$0	$1,523	$0	$972		
Calendar Year 06 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 07 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 08 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 09 - Access Restrictions	$1,610								$1,233	$2,843

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 10 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 11 - 5-year Review	$7,346								$14,553	$21,899
(System Defaults)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Calendar Year 11 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 12 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 13 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 14 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 15 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Calendar Year 16 - 5-year Review	$7,446								$14,553	$21,999
(System Defaults)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Calendar Year 16 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 17 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 18 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 19 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 20 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 21 - 5-year Review	$7,496								$14,553	$22,049
(System Defaults)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Calendar Year 21 - Access Restrictions	$1,610								$1,233	$2,843

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:09:33 AM

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 22 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 23 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 24 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 25 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 26 - 5-year Review	$7,546								$14,553	$22,099
(System Defaults)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Calendar Year 26 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 27 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Calendar Year 28 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 29 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 30 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Total Site Cost	$85,247	$20,205	$65,772	$0	$0	$14,198	$0	$9,062	$109,238	$194,485
							Escalation			$89,528
							Escalated Site Cost			$284,013

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:09:33 AM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Access Restrictions
ID: OU6 TCE Plume
Type: None
Description: Access Restrictions to OU6 TCE plume through GIS

Phase Element

Name: Calendar Year 01 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2006
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 9:12:01 AM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$222
								Escalated Phase Element Cost		$3,065

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:12:01 AM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Access Restrictions
ID: OU6 TCE Plume
Type: None
Description: Access Restrictions to OU6 TCE plume through GIS

Phase Element

Name: Calendar Year 01 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2006

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 9:12:44 AM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:12:44 AM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Access Restrictions
ID: OU6 TCE Plume
Type: None
Description: Access Restrictions to OU6 TCE plume through GIS

Phase Element

Name: Calendar Year 06 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2011
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 9:14:41 AM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Five-Year Review	$7,119								$14,042	$21,161
(100% Prime)		$1,581	$9,966	$0	$0	$1,523	$0	$972		
Total Phase Element Cost	$7,119	$1,581	$9,966	$0	$0	$1,523	$0	$972	$14,042	$21,161
							Escalation			$4,281
							Escalated Phase Element Cost			$25,442

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:14:41 AM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Access Restrictions
ID: OU6 TCE Plume
Type: None
Description: Access Restrictions to OU6 TCE plume through GIS

Phase Element

Name: Calendar Year 06 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2011
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 9:15:17 AM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Five-Year Review

Element: Document Review

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	8.00	HR	0.00	70.31	0.00	$562.47	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐
33220108	Project Scientist	6.00	HR	0.00	42.32	0.00	$253.92	☐
33220109	Staff Scientist	11.00	HR	0.00	40.40	0.00	$444.36	☐
				Total Element Cost			**$1,625.12**	

Element: Interviews

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	10.00	HR	0.00	70.31	0.00	$703.08	☐
				Total Element Cost			**$703.08**	

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐

Phase Element Technology Cost Detail Report (without Markups)

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	8.00	HR	0.00	40.40	0.00	$323.17	☐
				Total Element Cost			**$1,335.33**	

Element: Report

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	14.00	HR	0.00	52.05	0.00	$728.74	☐
33220108	Project Scientist	12.00	HR	0.00	42.32	0.00	$507.85	☐
33220109	Staff Scientist	24.00	HR	0.00	40.40	0.00	$969.51	☐
				Total Element Cost			**$2,557.64**	

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	3.00	DAY	50.33	0.00	0.00	$151.00	☐
33010202	Per Diem (per person)	3.00	DAY	149.00	0.00	0.00	$447.00	☑
33041101	Airfare	1.00	LS	300.00	0.00	0.00	$300.00	☑

Phase Element Technology Cost Detail Report
(without Markups)

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
				Total Element Cost			**$898.00**	
			Total 1st Year Technology Cost				**$7,119.17**	
				Total Phase Element Cost			**$7,119.17**	

Cost Database Date: 2003

Cost Type: User-Defined

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Markups Template Preferences Report

Template: System Defaults

Description	Professional Labor	Craft Labor	Materials	Equipment
Prime General Conditions < 10,000	25.00	25.00	17.00	40.00
Prime General Conditions 10,000 to 25,000	15.00	20.00	12.00	30.00
Prime General Conditions 25,001 to 50,000	10.00	17.50	10.00	20.00
Prime General Conditions 50,001 to 100,000	7.50	15.00	8.00	15.00
Prime General Conditions 100,001 to 250,000	5.00	12.00	6.50	10.00
Prime General Conditions 250,001 to 500,000	5.00	10.00	5.00	8.00
Prime General Conditions > 500,000	5.00	8.00	5.00	6.00
Prime Overhead	160.00	30.00	8.00	8.00
Sub General Conditions < 10,000	25.00	25.00	17.00	40.00
Sub General Conditions 10,000 to 25,000	15.00	20.00	12.00	30.00
Sub General Conditions 25,001 to 50,000	10.00	17.50	10.00	20.00
Sub General Conditions 50,001 to 100,000	7.50	15.00	8.00	15.00
Sub General Conditions 100,001 to 250,000	5.00	12.00	6.50	10.00
Sub General Conditions 250,001 to 500,000	5.00	10.00	5.00	8.00
Sub General Conditions > 500,000	5.00	8.00	5.00	6.00
Sub Overhead	160.00	30.00	8.00	8.00

Prime Markup on Sub	3.5
Prime Profit	8.5
Risk (Contingency)	0
Owner Cost	5
Sub Profit	8.5

This report for official U.S. Government use only.

Site Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrolog
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Calendar Year 01 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 01 through 05 - Well Inst.	$253,110								$430,440	$683,550
(System Defaults)		$19,839	$327,051	$0	$0	$51,000	$0	$32,550		

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/25/2004 6:38:49 PM

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Calendar Year 02 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 03 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 04 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 05 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 06 - 5-year Review	$7,119								$14,042	$21,161
(System Defaults)		$1,581	$9,966	$0	$0	$1,523	$0	$972		
Calendar Year 06 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 07 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 07 - Long-Term Monitoring	$47,170								$85,839	$133,009

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/25/2004 6:38:49 PM

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
(System Defaults)		$4,717	$64,864	$0	$0	$9,924	$0	$6,334		
Calendar Year 08 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 09 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 09 - Long-Term Monitoring	$47,170								$85,839	$133,009
(System Defaults)		$4,717	$64,864	$0	$0	$9,924	$0	$6,334		
Calendar Year 10 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 11 - 5-year Review	$7,346								$14,553	$21,899
(System Defaults)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Calendar Year 11 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 11 - Long-Term Monitoring	$47,170								$85,839	$133,009
(System Defaults)		$4,717	$64,864	$0	$0	$9,924	$0	$6,334		

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Calendar Year 12 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 13 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 14 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 15 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 16 - 5-year Review	$7,446								$14,553	$21,999
(System Defaults)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Calendar Year 16 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 16 - Long-Term Monitoring	$47,170								$85,839	$133,009
(System Defaults)		$4,717	$64,864	$0	$0	$9,924	$0	$6,334		
Calendar Year 17 - Access Restrictions	$1,610								$1,233	$2,843

Cost Database Date: 2003

Cost Type: User-Defined

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Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 18 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 19 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 20 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 21 - 5-year Review	$7,496								$14,553	$22,049
(System Defaults)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Calendar Year 21 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 21 - Long-Term Monitoring	$47,170								$85,839	$133,009
(System Defaults)		$4,717	$64,864	$0	$0	$9,924	$0	$6,334		
Calendar Year 22 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Calendar Year 23 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 24 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 25 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 26 - 5-year Review	$7,546								$14,553	$22,099
(System Defaults)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Calendar Year 26 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 26 - Long-Term Monitoring	$47,170								$85,839	$133,009
(System Defaults)		$4,717	$64,864	$0	$0	$9,924	$0	$6,334		
Calendar Year 27 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 28 - Access Restrictions	$1,610								$1,233	$2,843

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 29 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 30 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 30 - Long-Term Monitoring	$47,170								$85,839	$133,009
(System Defaults)		$4,717	$64,864	$0	$0	$9,924	$0	$6,334		
Total Site Cost	$668,545	$73,063	$846,874	$0	$0	$134,665	$0	$85,948	$1,140,550	$1,809,095
							Escalation			$642,283
							Escalated Site Cost			$2,451,378

Cost Database Date: 2003

Cost Type: User-Defined

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Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 01 through 05 - Well Inst. LTM
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2006
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/25/2004 6:27:18 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Groundwater Monitoring Well	$9,537								$5,161	$14,698
(100% Prime)		$1,333	$2,032	$0	$0	$1,097	$0	$700		
Off-site Transportation and Waste Disposal	$3,934								$1,266	$5,200
(100% Prime)		$315	$315	$0	$0	$388	$0	$248		
Discharge to POTW	$3,791								$1,337	$5,128
(100% Prime)		$328	$381	$0	$0	$383	$0	$244		
Monitoring	$235,848								$422,676	$658,524
(100% Prime)		$17,863	$324,322	$0	$0	$49,133	$0	$31,358		
Total Phase Element Cost	$253,110	$19,839	$327,051	$0	$0	$51,000	$0	$32,550	$430,440	$683,550
								Escalation		$85,403
								Escalated Phase Element Cost		$768,953

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/25/2004 6:27:18 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 01 through 05 - Well Inst. LTM
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2006
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/25/2004 6:27:56 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Groundwater Monitoring Well

Element: Aquifer 1

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020303	Organic Vapor Analyzer Rental, per Day	2.00	DAY	118.98	0.00	0.00	$237.97	☐
33170808	Decontaminate Rig, Augers, Screen (Rental Equipment)	2.00	DAY	112.50	0.00	0.00	$225.00	☐
33220112	Field Technician	14.00	HR	0.00	28.24	0.00	$395.42	☐
33230101	2" PVC, Schedule 40, Well Casing	70.00	LF	1.18	3.98	7.01	$852.26	☐
33230201	2" PVC, Schedule 40, Well Screen	10.00	LF	2.73	5.14	9.04	$169.12	☐
33230301	2" PVC, Well Plug	1.00	EA	5.76	5.98	10.51	$22.25	☐
33231126	Air Rotary, 6" Dia Borehole (Consolidated), Depth <= 100 ft	81.00	LF	0.00	16.39	28.82	$3,662.03	☐
33231182	Furnish 55 Gallon Drum for Drill Cuttings & Development Water	3.00	EA	78.35	0.00	0.00	$235.05	☐
33231401	2" Screen, Filter Pack	12.00	LF	3.07	3.39	5.96	$148.98	☐
33231811	2" Well, Portland Cement Grout	67.00	LF	1.14	0.00	0.00	$76.66	☐
33232101	2" Well, Bentonite Seal	1.00	EA	9.13	13.45	23.65	$46.23	☐
				Total Element Cost			**$6,070.97**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/25/2004 6:27:56 PM

Phase Element Technology Cost Detail Report
(without Markups)

Element: General Aquifers

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010101	Mobilize/DeMobilize Drilling Rig & Crew	1.00	LS	0.00	1,195.31	2,102.02	$3,297.33	☐
33231504	Surface Pad, Concrete, 2' x 2' x 4"	1.00	EA	40.00	124.58	3.97	$168.54	☐
				Total Element Cost			**$3,465.88**	
				Total 1st Year Technology Cost			**$9,536.84**	

Cost Database Date: 2003

Cost Type: User-Defined

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Phase Element Technology Cost Detail Report (without Markups)

Technology: Off-site Transportation and Waste Disposal

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33190102	Bulk Solid Hazardous Waste Loading Into Truck	3.00	CY	0.00	1.10	1.27	$7.11	☐
33190211	Dump Truck Transportation Hazardous Waste 300 - 399 Miles	340.00	MI	2.41	0.00	0.00	$819.40	☐
33190308	Minimum Charges for Bulk Shipments Requiring Treatment or Stabilization	1.00	EA	2,525.45	0.00	0.00	$2,525.45	☐
33190311	Truck Washout/Decontamination	1.00	EA	162.11	0.00	0.00	$162.11	☐
33197283	Landfill hazardous solid bulk waste, Requiring stabilization	3.00	CY	140.00	0.00	0.00	$420.00	☑
				Total Element Cost			**$3,934.07**	
				Total 1st Year Technology Cost			**$3,934.07**	

Cost Database Date: 2003

Cost Type: User-Defined

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Phase Element Technology Cost Detail Report (without Markups)

Technology: Discharge to POTW

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
19040621	550 Gallon Horizontal Plastic Sump with 4" NPT Connection	1.00	EA	1,404.91	354.64	0.00	$1,759.55	☐
33130274	Coconut-based, High Capacity, 12 x 30 Sieve, 1100 Iodine, 2,000 - 10,000 Lb	2,000.00	LB	1.02	0.00	0.00	$2,031.80	☐
				Total Element Cost			**$3,791.35**	
				Total 1st Year Technology Cost			**$3,791.35**	

Cost Database Date: 2003

Cost Type: User-Defined

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Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	18.00	EA	8.29	0.00	0.00	$149.21	☐
33020402	Decontamination Materials per Sample	18.00	EA	7.46	0.00	0.00	$134.22	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	825.00	LF	0.43	0.00	0.00	$356.65	☐
33021509	Water Quality Parameter Testing Device	1.00	WK	236.67	0.00	0.00	$236.67	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	18.00	EA	176.55	0.00	0.00	$3,177.84	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	18.00	EA	140.27	0.00	0.00	$2,524.88	☐
33230509	4" Submersible Pump Rental, Day	2.00	DAY	79.58	0.00	0.00	$159.16	☐
33231186	Well Development Equipment Rental (weekly)	1.00	WK	236.67	0.00	0.00	$236.67	☐
				Total Element Cost			**$6,975.32**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/25/2004 6:27:56 PM

Phase Element Technology Cost Detail Report (without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	8.00	MI	0.37	0.00	0.00	$2.97	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	303.00	HR	0.00	42.32	0.00	$12,823.14	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	32.00	HR	0.00	28.24	0.00	$903.82	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐

Total Element Cost	**$40,194.30**
Total 1st Year Technology Cost	**$47,169.62**
Total Phase Element Cost	**$64,431.88**

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 01 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2006
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:45:16 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$222
								Escalated Phase Element Cost		$3,065

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:45:16 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 01 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2006
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:45:33 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:45:33 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 02 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2007
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:45:52 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$289
							Escalated Phase Element Cost			$3,132

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:45:52 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 02 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2007
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:46:07 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:46:07 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 03 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2008
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:46:47 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$358
								Escalated Phase Element Cost		$3,201

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:46:47 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 03 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2008
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:47:19 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:47:19 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 04 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2009
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:47:42 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$429
								Escalated Phase Element Cost		$3,272

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:47:42 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 04 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2009

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:47:58 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:47:58 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 05 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2010
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:48:28 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$501
							Escalated Phase Element Cost			$3,344

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:48:28 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 05 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2010

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:48:42 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:48:42 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 06 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2011
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:49:01 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$575
							Escalated Phase Element Cost			$3,418

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:49:01 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 06 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2011
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:49:17 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:49:17 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 06 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2011
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:49:39 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Five-Year Review	$7,119								$14,042	$21,161
(100% Prime)		$1,581	$9,966	$0	$0	$1,523	$0	$972		
Total Phase Element Cost	$7,119	$1,581	$9,966	$0	$0	$1,523	$0	$972	$14,042	$21,161
								Escalation		$4,281
								Escalated Phase Element Cost		$25,442

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:49:39 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 06 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2011

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:49:54 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Five-Year Review

Element: Document Review

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	8.00	HR	0.00	70.31	0.00	$562.47	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐
33220108	Project Scientist	6.00	HR	0.00	42.32	0.00	$253.92	☐
33220109	Staff Scientist	11.00	HR	0.00	40.40	0.00	$444.36	☐
				Total Element Cost			**$1,625.12**	

Element: Interviews

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	10.00	HR	0.00	70.31	0.00	$703.08	☐
				Total Element Cost			**$703.08**	

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐

Phase Element Technology Cost Detail Report (without Markups)

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	8.00	HR	0.00	40.40	0.00	$323.17	☐
				Total Element Cost			**$1,335.33**	

Element: Report

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	14.00	HR	0.00	52.05	0.00	$728.74	☐
33220108	Project Scientist	12.00	HR	0.00	42.32	0.00	$507.85	☐
33220109	Staff Scientist	24.00	HR	0.00	40.40	0.00	$969.51	☐
				Total Element Cost			**$2,557.64**	

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	3.00	DAY	50.33	0.00	0.00	$151.00	☐
33010202	Per Diem (per person)	3.00	DAY	149.00	0.00	0.00	$447.00	☑
33041101	Airfare	1.00	LS	300.00	0.00	0.00	$300.00	☑

Phase Element Technology Cost Detail Report
(without Markups)

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
				Total Element Cost			**$898.00**	
			Total 1st Year Technology Cost				**$7,119.17**	
				Total Phase Element Cost			**$7,119.17**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:49:54 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 07 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2012
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:50:17 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$47,170								$85,839	$133,009
(100% Prime)		$4,717	$64,864	$0	$0	$9,924	$0	$6,334		
Total Phase Element Cost	$47,170	$4,717	$64,864	$0	$0	$9,924	$0	$6,334	$85,839	$133,009
								Escalation		$30,405
								Escalated Phase Element Cost		$163,414

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:50:17 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 07 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2012

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:50:31 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	18.00	EA	8.29	0.00	0.00	$149.21	☐
33020402	Decontamination Materials per Sample	18.00	EA	7.46	0.00	0.00	$134.22	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	825.00	LF	0.43	0.00	0.00	$356.65	☐
33021509	Water Quality Parameter Testing Device	1.00	WK	236.67	0.00	0.00	$236.67	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	18.00	EA	176.55	0.00	0.00	$3,177.84	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	18.00	EA	140.27	0.00	0.00	$2,524.88	☐
33230509	4" Submersible Pump Rental, Day	2.00	DAY	79.58	0.00	0.00	$159.16	☐
33231186	Well Development Equipment Rental (weekly)	1.00	WK	236.67	0.00	0.00	$236.67	☐
				Total Element Cost			**$6,975.32**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:50:31 PM

Phase Element Technology Cost Detail Report (without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	8.00	MI	0.37	0.00	0.00	$2.97	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	303.00	HR	0.00	42.32	0.00	$12,823.14	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	32.00	HR	0.00	28.24	0.00	$903.82	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐
				Total Element Cost			**$40,194.30**	
				Total 1st Year Technology Cost			**$47,169.62**	
				Total Phase Element Cost			**$47,169.62**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:50:31 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 07 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2012
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:50:51 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$649
								Escalated Phase Element Cost		$3,492

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:50:51 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 07 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2012

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:51:06 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:51:06 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 08 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2013
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:51:27 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$724
								Escalated Phase Element Cost		$3,567

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:51:27 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 08 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2013

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:52:04 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:52:04 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 09 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2014
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:52:28 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$47,170								$85,839	$133,009
(100% Prime)		$4,717	$64,864	$0	$0	$9,924	$0	$6,334		
Total Phase Element Cost	$47,170	$4,717	$64,864	$0	$0	$9,924	$0	$6,334	$85,839	$133,009
							Escalation			$37,375
						Escalated Phase Element Cost				$170,384

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:52:28 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name:	OU6 FS
ID:	OU6
Location:	EDWARDS AFB, CALIFORNIA
Modifiers:	**Material** 1.0807 (Modified)
	Labor 1.4603 (Modified)
	Equipment 1.0248 (Modified)
Category:	None
Report Option:	Calendar Year
Description:	ou6 fs cal

Site

Name:	Dryden - Groundwater Monitoring/Hydrologic Control
ID:	Dryden
Type:	None
Description:	Long-Term Monitoring of OU6 TCE plume

Phase Element

Name:	Calendar Year 09 - Long-Term Monitoring	**Media/Waste Type:**	Groundwater
Type:	Long Term Monitoring	**Secondary Media/Waste Type:**	N/A
Labor Rate Group:	System Labor Rate	**Contaminant:**	Volatile Organic Compounds (VOCs)
Analysis Rate Group:	System Analysis Rate	**Secondary Contaminant:**	None
Approach:	None	**Markup Template:**	System Defaults
Start Date:	01/01/2014	**O&M Markup Template:**	N/A

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:52:41 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	18.00	EA	8.29	0.00	0.00	$149.21	☐
33020402	Decontamination Materials per Sample	18.00	EA	7.46	0.00	0.00	$134.22	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	825.00	LF	0.43	0.00	0.00	$356.65	☐
33021509	Water Quality Parameter Testing Device	1.00	WK	236.67	0.00	0.00	$236.67	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	18.00	EA	176.55	0.00	0.00	$3,177.84	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	18.00	EA	140.27	0.00	0.00	$2,524.88	☐
33230509	4" Submersible Pump Rental, Day	2.00	DAY	79.58	0.00	0.00	$159.16	☐
33231186	Well Development Equipment Rental (weekly)	1.00	WK	236.67	0.00	0.00	$236.67	☐
				Total Element Cost			**$6,975.32**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:52:41 PM

Phase Element Technology Cost Detail Report (without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	8.00	MI	0.37	0.00	0.00	$2.97	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	303.00	HR	0.00	42.32	0.00	$12,823.14	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	32.00	HR	0.00	28.24	0.00	$903.82	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐
				Total Element Cost			**$40,194.30**	
				Total 1st Year Technology Cost			**$47,169.62**	
				Total Phase Element Cost			**$47,169.62**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:52:41 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 09 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2014
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:52:59 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$798
							Escalated Phase Element Cost			$3,641

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:52:59 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 09 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2014
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:53:12 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:53:12 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 10 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2015
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:53:29 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$873
							Escalated Phase Element Cost			$3,716

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:53:29 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 10 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2015

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:53:45 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:53:45 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 11 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2016
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 3:59:46 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Five-Year Review	$7,346								$14,553	$21,899
(100% Prime)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Total Phase Element Cost	$7,346	$1,638	$10,329	$0	$0	$1,578	$0	$1,007	$14,553	$21,899
							Escalation			$7,301
						Escalated Phase Element Cost				$29,200

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 3:59:46 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 11 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2016
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:00:07 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Five-Year Review

Element: Document Review

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	8.00	HR	0.00	70.31	0.00	$562.47	☐
33220105	Project Engineer	9.00	HR	0.00	52.05	0.00	$468.48	☐
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	13.00	HR	0.00	40.40	0.00	$525.15	☐
				Total Element Cost			**$1,852.34**	

Element: Interviews

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	10.00	HR	0.00	70.31	0.00	$703.08	☐
				Total Element Cost			**$703.08**	

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐

Phase Element Technology Cost Detail Report (without Markups)

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	8.00	HR	0.00	40.40	0.00	$323.17	☐
				Total Element Cost			**$1,335.33**	

Element: Report

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	14.00	HR	0.00	52.05	0.00	$728.74	☐
33220108	Project Scientist	12.00	HR	0.00	42.32	0.00	$507.85	☐
33220109	Staff Scientist	24.00	HR	0.00	40.40	0.00	$969.51	☐
				Total Element Cost			**$2,557.64**	

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	3.00	DAY	50.33	0.00	0.00	$151.00	☐
33010202	Per Diem (per person)	3.00	DAY	149.00	0.00	0.00	$447.00	☑
33041101	Airfare	1.00	LS	300.00	0.00	0.00	$300.00	☑

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:00:07 PM

Phase Element Technology Cost Detail Report
(without Markups)

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
				Total Element Cost			**$898.00**	
			Total 1st Year Technology Cost				**$7,346.39**	
				Total Phase Element Cost			**$7,346.39**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:00:07 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 11 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2016
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:00:26 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$47,170								$85,839	$133,009
(100% Prime)		$4,717	$64,864	$0	$0	$9,924	$0	$6,334		
Total Phase Element Cost	$47,170	$4,717	$64,864	$0	$0	$9,924	$0	$6,334	$85,839	$133,009
								Escalation		$44,345
								Escalated Phase Element Cost		$177,354

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:00:26 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 11 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2016

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:00:54 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	18.00	EA	8.29	0.00	0.00	$149.21	☐
33020402	Decontamination Materials per Sample	18.00	EA	7.46	0.00	0.00	$134.22	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	825.00	LF	0.43	0.00	0.00	$356.65	☐
33021509	Water Quality Parameter Testing Device	1.00	WK	236.67	0.00	0.00	$236.67	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	18.00	EA	176.55	0.00	0.00	$3,177.84	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	18.00	EA	140.27	0.00	0.00	$2,524.88	☐
33230509	4" Submersible Pump Rental, Day	2.00	DAY	79.58	0.00	0.00	$159.16	☐
33231186	Well Development Equipment Rental (weekly)	1.00	WK	236.67	0.00	0.00	$236.67	☐
				Total Element Cost			**$6,975.32**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:00:54 PM

Phase Element Technology Cost Detail Report (without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	8.00	MI	0.37	0.00	0.00	$2.97	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	303.00	HR	0.00	42.32	0.00	$12,823.14	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	32.00	HR	0.00	28.24	0.00	$903.82	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐
				Total Element Cost			**$40,194.30**	
				Total 1st Year Technology Cost			**$47,169.62**	
				Total Phase Element Cost			**$47,169.62**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:00:54 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 11 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2016
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:01:11 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$947
							Escalated Phase Element Cost			$3,790

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:01:11 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 11 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2016

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:01:25 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:01:25 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 12 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2017
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:01:43 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,022
							Escalated Phase Element Cost			$3,865

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:01:43 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 12 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2017
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:01:57 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:01:57 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 13 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2018
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:02:15 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,097
							Escalated Phase Element Cost			$3,940

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:02:15 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 13 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2018
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:02:31 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:02:31 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 14 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2019
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:02:52 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,171
							Escalated Phase Element Cost			$4,014

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:02:52 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 14 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2019

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:03:09 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:03:09 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 15 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2020
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:04:09 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,245
							Escalated Phase Element Cost			$4,088

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:04:09 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 15 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2020
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:04:21 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:04:21 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 16 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2021
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:04:41 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,320
							Escalated Phase Element Cost			$4,163

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:04:41 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 16 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2021

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:04:54 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:04:54 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 16 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2021
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:05:08 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Five-Year Review	$7,446								$14,553	$21,999
(100% Prime)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Total Phase Element Cost	$7,446	$1,638	$10,329	$0	$0	$1,578	$0	$1,007	$14,553	$21,999
							Escalation			$10,219
						Escalated Phase Element Cost				$32,218

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:05:08 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 16 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2021

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:05:21 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Five-Year Review

Element: Document Review

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	8.00	HR	0.00	70.31	0.00	$562.47	☐
33220105	Project Engineer	9.00	HR	0.00	52.05	0.00	$468.48	☐
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	13.00	HR	0.00	40.40	0.00	$525.15	☐
				Total Element Cost			**$1,852.34**	

Element: Interviews

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	10.00	HR	0.00	70.31	0.00	$703.08	☐
				Total Element Cost			**$703.08**	

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐

Phase Element Technology Cost Detail Report (without Markups)

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	8.00	HR	0.00	40.40	0.00	$323.17	☐
				Total Element Cost			**$1,335.33**	

Element: Report

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	14.00	HR	0.00	52.05	0.00	$728.74	☐
33220108	Project Scientist	12.00	HR	0.00	42.32	0.00	$507.85	☐
33220109	Staff Scientist	24.00	HR	0.00	40.40	0.00	$969.51	☐
				Total Element Cost			**$2,557.64**	

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	3.00	DAY	50.33	0.00	0.00	$151.00	☐
33010202	Per Diem (per person)	3.00	DAY	149.00	0.00	0.00	$447.00	☑
33041101	Airfare	1.00	LS	400.00	0.00	0.00	$400.00	☑

Phase Element Technology Cost Detail Report
(without Markups)

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
				Total Element Cost			**$998.00**	
			Total 1st Year Technology Cost				**$7,446.39**	
				Total Phase Element Cost			**$7,446.39**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:05:21 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 16 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2021
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:05:42 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$47,170								$85,839	$133,009
(100% Prime)		$4,717	$64,864	$0	$0	$9,924	$0	$6,334		
Total Phase Element Cost	$47,170	$4,717	$64,864	$0	$0	$9,924	$0	$6,334	$85,839	$133,009
							Escalation			$68,752
						Escalated Phase Element Cost				$201,761

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:05:42 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 16 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2021

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:05:56 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	18.00	EA	8.29	0.00	0.00	$149.21	☐
33020402	Decontamination Materials per Sample	18.00	EA	7.46	0.00	0.00	$134.22	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	825.00	LF	0.43	0.00	0.00	$356.65	☐
33021509	Water Quality Parameter Testing Device	1.00	WK	236.67	0.00	0.00	$236.67	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	18.00	EA	176.55	0.00	0.00	$3,177.84	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	18.00	EA	140.27	0.00	0.00	$2,524.88	☐
33230509	4" Submersible Pump Rental, Day	2.00	DAY	79.58	0.00	0.00	$159.16	☐
33231186	Well Development Equipment Rental (weekly)	1.00	WK	236.67	0.00	0.00	$236.67	☐
				Total Element Cost			**$6,975.32**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:05:56 PM

Phase Element Technology Cost Detail Report (without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	8.00	MI	0.37	0.00	0.00	$2.97	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	303.00	HR	0.00	42.32	0.00	$12,823.14	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	32.00	HR	0.00	28.24	0.00	$903.82	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐
				Total Element Cost			**$40,194.30**	
				Total 1st Year Technology Cost			**$47,169.62**	
				Total Phase Element Cost			**$47,169.62**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:05:56 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 17 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2022
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:06:17 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,394
							Escalated Phase Element Cost			$4,237

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:06:17 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 17 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2022
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:06:33 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:06:33 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 18 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2023
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:06:55 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,469
							Escalated Phase Element Cost			$4,312

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:06:55 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 18 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2023

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:07:08 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:07:08 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 19 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2024
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:07:28 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,543
							Escalated Phase Element Cost			$4,386

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:07:28 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 19 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2024
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:07:42 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:07:42 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 20 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2025
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:08:00 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,618
							Escalated Phase Element Cost			$4,461

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:08:00 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 20 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2025

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:08:12 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:08:12 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 21 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2026
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:32:27 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Five-Year Review	$7,496								$14,553	$22,049
(100% Prime)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Total Phase Element Cost	$7,496	$1,638	$10,329	$0	$0	$1,578	$0	$1,007	$14,553	$22,049
							Escalation			$13,132
						Escalated Phase Element Cost				$35,181

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:32:27 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 21 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2026

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:33:01 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Five-Year Review

Element: Document Review

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	8.00	HR	0.00	70.31	0.00	$562.47	☐
33220105	Project Engineer	9.00	HR	0.00	52.05	0.00	$468.48	☐
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	13.00	HR	0.00	40.40	0.00	$525.15	☐
				Total Element Cost			**$1,852.34**	

Element: Interviews

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	10.00	HR	0.00	70.31	0.00	$703.08	☐
				Total Element Cost			**$703.08**	

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐

Phase Element Technology Cost Detail Report (without Markups)

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	8.00	HR	0.00	40.40	0.00	$323.17	☐
				Total Element Cost			**$1,335.33**	

Element: Report

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	14.00	HR	0.00	52.05	0.00	$728.74	☐
33220108	Project Scientist	12.00	HR	0.00	42.32	0.00	$507.85	☐
33220109	Staff Scientist	24.00	HR	0.00	40.40	0.00	$969.51	☐
				Total Element Cost			**$2,557.64**	

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	3.00	DAY	50.33	0.00	0.00	$151.00	☐
33010202	Per Diem (per person)	3.00	DAY	149.00	0.00	0.00	$447.00	☑
33041101	Airfare	1.00	LS	450.00	0.00	0.00	$450.00	☑

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:33:01 PM

Phase Element Technology Cost Detail Report
(without Markups)

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
				Total Element Cost			**$1,048.00**	
			Total 1st Year Technology Cost				**$7,496.39**	
				Total Phase Element Cost			**$7,496.39**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:33:01 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 21 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2026
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:33:24 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,693
							Escalated Phase Element Cost			$4,536

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:33:24 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 21 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2026
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:33:40 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:33:40 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 21 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2026
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:34:07 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$47,170								$85,839	$133,009
(100% Prime)		$4,717	$64,864	$0	$0	$9,924	$0	$6,334		
Total Phase Element Cost	$47,170	$4,717	$64,864	$0	$0	$9,924	$0	$6,334	$85,839	$133,009
							Escalation			$79,219
						Escalated Phase Element Cost				$212,228

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:34:07 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 21 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2026

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:34:20 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	18.00	EA	8.29	0.00	0.00	$149.21	☐
33020402	Decontamination Materials per Sample	18.00	EA	7.46	0.00	0.00	$134.22	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	825.00	LF	0.43	0.00	0.00	$356.65	☐
33021509	Water Quality Parameter Testing Device	1.00	WK	236.67	0.00	0.00	$236.67	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	18.00	EA	176.55	0.00	0.00	$3,177.84	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	18.00	EA	140.27	0.00	0.00	$2,524.88	☐
33230509	4" Submersible Pump Rental, Day	2.00	DAY	79.58	0.00	0.00	$159.16	☐
33231186	Well Development Equipment Rental (weekly)	1.00	WK	236.67	0.00	0.00	$236.67	☐
				Total Element Cost			**$6,975.32**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:34:20 PM

Phase Element Technology Cost Detail Report
(without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	8.00	MI	0.37	0.00	0.00	$2.97	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	303.00	HR	0.00	42.32	0.00	$12,823.14	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	32.00	HR	0.00	28.24	0.00	$903.82	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐
				Total Element Cost			**$40,194.30**	
				Total 1st Year Technology Cost			**$47,169.62**	
				Total Phase Element Cost			**$47,169.62**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:34:20 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 22 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2027
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:34:36 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$1,767
								Escalated Phase Element Cost		$4,610

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:34:36 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 22 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2027

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:34:48 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:34:48 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 23 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2028
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:35:04 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,842
							Escalated Phase Element Cost			$4,685

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:35:04 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 23 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2028

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:35:19 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:35:19 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 24 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2029
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:35:37 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,916
							Escalated Phase Element Cost			$4,759

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:35:37 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 24 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2029

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:35:49 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:35:49 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 25 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2030
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:36:06 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,991
							Escalated Phase Element Cost			$4,834

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:36:06 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 25 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2030
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:36:19 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:36:19 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 26 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2031
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:55:07 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$2,065
							Escalated Phase Element Cost			$4,908

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:55:07 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 26 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2031
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:55:30 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:55:30 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 26 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2031
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:55:47 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$47,170								$85,839	$133,009
(100% Prime)		$4,717	$64,864	$0	$0	$9,924	$0	$6,334		
Total Phase Element Cost	$47,170	$4,717	$64,864	$0	$0	$9,924	$0	$6,334	$85,839	$133,009
							Escalation			$96,657
						Escalated Phase Element Cost				$229,666

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:55:47 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 26 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2031

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:56:06 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	18.00	EA	8.29	0.00	0.00	$149.21	☐
33020402	Decontamination Materials per Sample	18.00	EA	7.46	0.00	0.00	$134.22	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	825.00	LF	0.43	0.00	0.00	$356.65	☐
33021509	Water Quality Parameter Testing Device	1.00	WK	236.67	0.00	0.00	$236.67	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	18.00	EA	176.55	0.00	0.00	$3,177.84	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	18.00	EA	140.27	0.00	0.00	$2,524.88	☐
33230509	4" Submersible Pump Rental, Day	2.00	DAY	79.58	0.00	0.00	$159.16	☐
33231186	Well Development Equipment Rental (weekly)	1.00	WK	236.67	0.00	0.00	$236.67	☐
				Total Element Cost			**$6,975.32**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:56:06 PM

Phase Element Technology Cost Detail Report
(without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	8.00	MI	0.37	0.00	0.00	$2.97	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	303.00	HR	0.00	42.32	0.00	$12,823.14	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	32.00	HR	0.00	28.24	0.00	$903.82	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐
				Total Element Cost			**$40,194.30**	
				Total 1st Year Technology Cost			**$47,169.62**	
				Total Phase Element Cost			**$47,169.62**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:56:06 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 26 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2031
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:56:24 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Five-Year Review	$7,546								$14,553	$22,099
(100% Prime)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Total Phase Element Cost	$7,546	$1,638	$10,329	$0	$0	$1,578	$0	$1,007	$14,553	$22,099
							Escalation			$16,059
						Escalated Phase Element Cost				$38,158

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:56:24 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 26 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2031

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:56:38 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Five-Year Review

Element: Document Review

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	8.00	HR	0.00	70.31	0.00	$562.47	☐
33220105	Project Engineer	9.00	HR	0.00	52.05	0.00	$468.48	☐
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	13.00	HR	0.00	40.40	0.00	$525.15	☐
				Total Element Cost			**$1,852.34**	

Element: Interviews

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	10.00	HR	0.00	70.31	0.00	$703.08	☐
				Total Element Cost			**$703.08**	

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐

Phase Element Technology Cost Detail Report (without Markups)

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	8.00	HR	0.00	40.40	0.00	$323.17	☐
				Total Element Cost			**$1,335.33**	

Element: Report

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	14.00	HR	0.00	52.05	0.00	$728.74	☐
33220108	Project Scientist	12.00	HR	0.00	42.32	0.00	$507.85	☐
33220109	Staff Scientist	24.00	HR	0.00	40.40	0.00	$969.51	☐
				Total Element Cost			**$2,557.64**	

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	3.00	DAY	50.33	0.00	0.00	$151.00	☐
33010202	Per Diem (per person)	3.00	DAY	149.00	0.00	0.00	$447.00	☑
33041101	Airfare	1.00	LS	500.00	0.00	0.00	$500.00	☑

Phase Element Technology Cost Detail Report
(without Markups)

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
				Total Element Cost			**$1,098.00**	
			Total 1st Year Technology Cost				**$7,546.39**	
				Total Phase Element Cost			**$7,546.39**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:56:38 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 27 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2032
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:56:59 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$2,140
							Escalated Phase Element Cost			$4,983

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:56:59 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 27 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2032

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:57:13 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
				Total 1st Year Technology Cost			**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:57:13 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 28 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2033
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:57:31 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$2,214
								Escalated Phase Element Cost		$5,057

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:57:31 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 28 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2033
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:57:50 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:57:50 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 29 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2034
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:58:09 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$2,289
							Escalated Phase Element Cost			$5,132

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:58:09 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 29 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2034

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:58:22 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:58:22 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 30 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2035
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:58:40 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$2,363
							Escalated Phase Element Cost			$5,206

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:58:40 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 30 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2035

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:58:53 PM

Phase Element Technology Cost Detail Report
(without Markups)

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:58:53 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 30 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2035
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:59:14 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$47,170								$85,839	$133,009
(100% Prime)		$4,717	$64,864	$0	$0	$9,924	$0	$6,334		
Total Phase Element Cost	$47,170	$4,717	$64,864	$0	$0	$9,924	$0	$6,334	$85,839	$133,009
							Escalation			$110,596
						Escalated Phase Element Cost				$243,605

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:59:14 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Groundwater Monitoring/Hydrologic Control
ID: Dryden
Type: None
Description: Long-Term Monitoring of OU6 TCE plume

Phase Element

Name: Calendar Year 30 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2035

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 4:59:26 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	18.00	EA	8.29	0.00	0.00	$149.21	☐
33020402	Decontamination Materials per Sample	18.00	EA	7.46	0.00	0.00	$134.22	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	825.00	LF	0.43	0.00	0.00	$356.65	☐
33021509	Water Quality Parameter Testing Device	1.00	WK	236.67	0.00	0.00	$236.67	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	18.00	EA	176.55	0.00	0.00	$3,177.84	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	18.00	EA	140.27	0.00	0.00	$2,524.88	☐
33230509	4" Submersible Pump Rental, Day	2.00	DAY	79.58	0.00	0.00	$159.16	☐
33231186	Well Development Equipment Rental (weekly)	1.00	WK	236.67	0.00	0.00	$236.67	☐
				Total Element Cost			**$6,975.32**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:59:26 PM

Phase Element Technology Cost Detail Report
(without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	8.00	MI	0.37	0.00	0.00	$2.97	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	303.00	HR	0.00	42.32	0.00	$12,823.14	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	32.00	HR	0.00	28.24	0.00	$903.82	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐
				Total Element Cost			**$40,194.30**	
				Total 1st Year Technology Cost			**$47,169.62**	
				Total Phase Element Cost			**$47,169.62**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 4:59:26 PM

Markups Template Preferences Report

Template: System Defaults

Description	Professional Labor	Craft Labor	Materials	Equipment
Prime General Conditions < 10,000	25.00	25.00	17.00	40.00
Prime General Conditions 10,000 to 25,000	15.00	20.00	12.00	30.00
Prime General Conditions 25,001 to 50,000	10.00	17.50	10.00	20.00
Prime General Conditions 50,001 to 100,000	7.50	15.00	8.00	15.00
Prime General Conditions 100,001 to 250,000	5.00	12.00	6.50	10.00
Prime General Conditions 250,001 to 500,000	5.00	10.00	5.00	8.00
Prime General Conditions > 500,000	5.00	8.00	5.00	6.00
Prime Overhead	160.00	30.00	8.00	8.00
Sub General Conditions < 10,000	25.00	25.00	17.00	40.00
Sub General Conditions 10,000 to 25,000	15.00	20.00	12.00	30.00
Sub General Conditions 25,001 to 50,000	10.00	17.50	10.00	20.00
Sub General Conditions 50,001 to 100,000	7.50	15.00	8.00	15.00
Sub General Conditions 100,001 to 250,000	5.00	12.00	6.50	10.00
Sub General Conditions 250,001 to 500,000	5.00	10.00	5.00	8.00
Sub General Conditions > 500,000	5.00	8.00	5.00	6.00
Sub Overhead	160.00	30.00	8.00	8.00

Prime Markup on Sub	3.5
Prime Profit	8.5
Risk (Contingency)	0
Owner Cost	5
Sub Profit	8.5

This report for official U.S. Government use only.

Site Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Calendar Year 01 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 01 - Chem Oxidation and We	$31,853,793								$11,654,885	$43,508,678

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:47:53 PM

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
(System Defaults)		$1,969,030	$4,367,810	$0	$0	$3,246,204	$0	$2,071,842		
Calendar Year 01 - Chem Oxidation and We	$0								$0	$0
(System Defaults)		$0	$0	$0	$0	$0	$0	$0		
Calendar Year 01 through 03 - Well Inst.	$411,248								$538,461	$949,709
(System Defaults)		$24,869	$397,510	$0	$0	$70,858	$0	$45,224		
Calendar Year 02 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 03 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 03 - Chemical Oxidation	$20,573,066								$6,497,527	$27,070,593
(System Defaults)		$1,028,653	$2,160,047	$0	$0	$2,019,750	$0	$1,289,076		
Calendar Year 03 - Chemical Oxidation (O	$0								$0	$0
(System Defaults)		$0	$0	$0	$0	$0	$0	$0		
Calendar Year 04 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:47:53 PM

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Calendar Year 04 - Long-Term Monitoring	$54,555								$92,342	$146,897
(System Defaults)		$4,148	$70,238	$0	$0	$10,960	$0	$6,995		
Calendar Year 05 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 06 - 5-year Review	$7,119								$14,042	$21,161
(System Defaults)		$1,581	$9,966	$0	$0	$1,523	$0	$972		
Calendar Year 06 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 06 - Long-Term Monitoring	$54,555								$92,342	$146,897
(System Defaults)		$4,148	$70,238	$0	$0	$10,960	$0	$6,995		
Calendar Year 07 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 08 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 08 - Long-Term Monitoring	$54,555								$92,342	$146,897

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:47:53 PM

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
(System Defaults)		$4,148	$70,238	$0	$0	$10,960	$0	$6,995		
Calendar Year 09 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 10 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 10 - Long-Term Monitoring	$54,555								$92,342	$146,897
(System Defaults)		$4,148	$70,238	$0	$0	$10,960	$0	$6,995		
Calendar Year 10 - Site Close-out	$1,033,445								$410,178	$1,443,623
(System Defaults)		$68,165	$166,877	$0	$0	$106,905	$0	$68,231		
Total Site Cost	$54,112,990	$3,112,914	$7,387,993	$0	$0	$5,491,201	$0	$3,504,678	$19,496,787	$73,609,777
							Escalation			$7,504,760
							Escalated Site Cost			$81,114,537

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:47:53 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 01 through 03 - Well Inst. and Mon
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2006
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 9:54:36 AM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Groundwater Monitoring Well	$55,527								$27,457	$82,984
(100% Prime)		$5,248	$12,067	$0	$0	$6,191	$0	$3,952		
Off-site Transportation and Waste Disposal	$4,953								$1,516	$6,469
(100% Prime)		$324	$401	$0	$0	$483	$0	$308		
Discharge to POTW	$3,791								$1,266	$5,057
(100% Prime)		$266	$381	$0	$0	$377	$0	$241		
Monitoring	$346,977								$508,223	$855,200
(100% Prime)		$19,031	$384,661	$0	$0	$63,807	$0	$40,724		
Total Phase Element Cost	$411,248	$24,869	$397,510	$0	$0	$70,858	$0	$45,224	$538,461	$949,709
								Escalation		$98,939
								Escalated Phase Element Cost		$1,048,648

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:54:36 AM

Phase Element Technology Cost Detail Report (without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 01 through 03 - Well Inst. and Mon
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None

Phase Element Technology Cost Detail Report (without Markups)

Approach: None
Start Date: 01/01/2006

Markup Template: System Defaults
O&M Markup Template: N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Groundwater Monitoring Well

Element: Aquifer 1

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020303	Organic Vapor Analyzer Rental, per Day	8.00	DAY	118.98	0.00	0.00	$951.88	☐
33170808	Decontaminate Rig, Augers, Screen (Rental Equipment)	8.00	DAY	112.50	0.00	0.00	$900.01	☐
33220112	Field Technician	97.00	HR	0.00	28.24	0.00	$2,739.70	☐
33230101	2" PVC, Schedule 40, Well Casing	490.00	LF	1.18	3.98	7.01	$5,965.80	☐
33230201	2" PVC, Schedule 40, Well Screen	70.00	LF	2.73	5.14	9.04	$1,183.83	☐
33230301	2" PVC, Well Plug	7.00	EA	5.76	5.98	10.51	$155.72	☐
33231126	Air Rotary, 6" Dia Borehole (Consolidated), Depth <= 100 ft	567.00	LF	0.00	16.39	28.82	$25,634.24	☐
33231182	Furnish 55 Gallon Drum for Drill Cuttings & Development Water	17.00	EA	78.35	0.00	0.00	$1,331.96	☐
33231401	2" Screen, Filter Pack	84.00	LF	3.07	3.39	5.96	$1,042.85	☐
33231811	2" Well, Portland Cement Grout	469.00	LF	1.14	0.00	0.00	$536.63	☐
33232101	2" Well, Bentonite Seal	7.00	EA	9.13	13.45	23.65	$323.59	☐
				Total Element Cost			**$40,766.20**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:55:38 AM

Phase Element Technology Cost Detail Report
(without Markups)

Element: General Aquifers

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
19040621	550 Gallon Horizontal Plastic Sump with 4" NPT Connection	1.00	EA	1,404.91	354.64	0.00	$1,759.55	☐
33010101	Mobilize/DeMobilize Drilling Rig & Crew	1.00	LS	0.00	1,195.31	2,102.02	$3,297.33	☐
33231504	Surface Pad, Concrete, 2' x 2' x 4"	7.00	EA	40.00	124.58	3.97	$1,179.80	☐
95010201	Low-flow pump	7.00	EA	1,034.75	182.93	0.00	$8,523.74	☑
				Total Element Cost			**$14,760.42**	
				Total 1st Year Technology Cost			**$55,526.62**	

Phase Element Technology Cost Detail Report (without Markups)

Technology: Off-site Transportation and Waste Disposal

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33190102	Bulk Solid Hazardous Waste Loading Into Truck	21.00	CY	0.00	1.10	1.27	$49.80	☐
33190211	Dump Truck Transportation Hazardous Waste 300 - 399 Miles	680.00	MI	2.41	0.00	0.00	$1,638.80	☐
33190311	Truck Washout/Decontamination	2.00	EA	162.11	0.00	0.00	$324.21	☐
33197283	Landfill hazardous solid bulk waste, Requiring stabilization	21.00	CY	140.00	0.00	0.00	$2,940.00	☑
				Total Element Cost			**$4,952.81**	
				Total 1st Year Technology Cost			**$4,952.81**	

Phase Element Technology Cost Detail Report (without Markups)

Technology: Discharge to POTW

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
19040621	550 Gallon Horizontal Plastic Sump with 4" NPT Connection	1.00	EA	1,404.91	354.64	0.00	$1,759.55	☐
33130274	Coconut-based, High Capacity, 12 x 30 Sieve, 1100 Iodine, 2,000 - 10,000 Lb	2,000.00	LB	1.02	0.00	0.00	$2,031.80	☐
				Total Element Cost			**$3,791.35**	
				Total 1st Year Technology Cost			**$3,791.35**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:55:38 AM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	132.00	EA	8.29	0.00	0.00	$1,094.24	☐
33020402	Decontamination Materials per Sample	132.00	EA	7.46	0.00	0.00	$984.30	☐
33021509	Water Quality Parameter Testing Device	4.00	WK	236.67	0.00	0.00	$946.69	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	132.00	EA	176.55	0.00	0.00	$23,304.19	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	132.00	EA	140.27	0.00	0.00	$18,515.80	☐
				Total Element Cost			**$44,845.22**	

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	64.00	MI	0.37	0.00	0.00	$23.77	☐
33220102	Project Manager	44.00	HR	0.00	70.31	0.00	$3,093.57	☐
33220105	Project Engineer	220.00	HR	0.00	52.05	0.00	$11,451.68	☐

Phase Element Technology Cost Detail Report
(without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	902.00	HR	0.00	42.32	0.00	$38,173.18	☐
33220109	Staff Scientist	660.00	HR	0.00	40.40	0.00	$26,661.43	☐
33220112	Field Technician	256.00	HR	0.00	28.24	0.00	$7,230.54	☐
33220114	Word Processing/Clerical	176.00	HR	0.00	23.41	0.00	$4,119.39	☐
33220115	Draftsman/CADD	88.00	HR	0.00	36.27	0.00	$3,191.95	☐
				Total Element Cost			**$93,945.50**	
				Total 1st Year Technology Cost			**$138,790.72**	
				Total Phase Element Cost			**$203,061.50**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:55:38 AM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 01 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2006
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 9:56:48 AM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$222
							Escalated Phase Element Cost			$3,065

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:56:48 AM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 01 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 9:57:34 AM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2006 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:57:34 AM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 01 - Chem Oxidation and Well Inst
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: Ex Situ
Start Date: 01/01/2006
Media/Waste Type: N/A
Secondary Media/Waste Type: N/A
Contaminant: None
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 9:58:04 AM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Off-site Transportation and Waste Disposal	$870,935								$251,903	$1,122,838
(100% Prime)		$43,775	$70,884	$0	$0	$83,775	$0	$53,468		
Special Well Drilling & Installation	$10,674,360								$4,012,595	$14,686,955
(100% Prime)		$681,275	$1,536,141	$0	$0	$1,095,801	$0	$699,379		
Special Well Drilling & Installation	$10,671,062								$4,011,284	$14,682,346
(100% Prime)		$681,053	$1,535,614	$0	$0	$1,095,457	$0	$699,159		
Special Well Drilling & Installation	$5,864,089								$2,204,321	$8,068,410
(100% Prime)		$374,259	$843,864	$0	$0	$601,988	$0	$384,210		
Advanced Oxidation Processes	$3,773,348								$1,174,780	$4,948,128
(100% Prime)		$188,667	$381,306	$0	$0	$369,182	$0	$235,625		
Total Phase Element Cost	$31,853,793	$1,969,030	$4,367,810	$0	$0	$3,246,204	$0	$2,071,842	$11,654,885	$43,508,678
							Escalation			$3,398,026
							Escalated Phase Element Cost			$46,906,704

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:58:04 AM

Markups Template Preferences Report

Template: System Defaults

Description	Professional Labor	Craft Labor	Materials	Equipment
Prime General Conditions < 10,000	25.00	25.00	17.00	40.00
Prime General Conditions 10,000 to 25,000	15.00	20.00	12.00	30.00
Prime General Conditions 25,001 to 50,000	10.00	17.50	10.00	20.00
Prime General Conditions 50,001 to 100,000	7.50	15.00	8.00	15.00
Prime General Conditions 100,001 to 250,000	5.00	12.00	6.50	10.00
Prime General Conditions 250,001 to 500,000	5.00	10.00	5.00	8.00
Prime General Conditions > 500,000	5.00	8.00	5.00	6.00
Prime Overhead	160.00	30.00	8.00	8.00
Sub General Conditions < 10,000	25.00	25.00	17.00	40.00
Sub General Conditions 10,000 to 25,000	15.00	20.00	12.00	30.00
Sub General Conditions 25,001 to 50,000	10.00	17.50	10.00	20.00
Sub General Conditions 50,001 to 100,000	7.50	15.00	8.00	15.00
Sub General Conditions 100,001 to 250,000	5.00	12.00	6.50	10.00
Sub General Conditions 250,001 to 500,000	5.00	10.00	5.00	8.00
Sub General Conditions > 500,000	5.00	8.00	5.00	6.00
Sub Overhead	160.00	30.00	8.00	8.00

Prime Markup on Sub	3.5
Prime Profit	8.5
Risk (Contingency)	0
Owner Cost	5
Sub Profit	8.5

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Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 01 - Chem Oxidation and Well Inst
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: Ex Situ
Media/Waste Type: N/A
Secondary Media/Waste Type: N/A
Contaminant: None
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 9:58:25 AM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2006 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Off-site Transportation and Waste Disposal

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
17020401	Dump Charges	4,983.00	CY	131.30	0.00	0.00	$654,267.90	☑
33190102	Bulk Solid Hazardous Waste Loading Into Truck	4,983.00	CY	0.00	1.10	1.27	$11,816.69	☐
33190211	Dump Truck Transportation Hazardous Waste 300 - 399 Miles	85,000.00	MI	2.41	0.00	0.00	$204,850.00	☐
				Total Element Cost			**$870,934.59**	
				Total 1st Year Technology Cost			**$870,934.59**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:58:25 AM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Special Well Drilling & Installation

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010101	Mobilize/DeMobilize Drilling Rig & Crew	1.00	LS	0.00	1,195.31	2,102.02	$3,297.33	☐
33170808	Decontaminate Rig, Augers, Screen (Rental Equipment)	1,075.00	DAY	112.50	0.00	0.00	$120,938.47	☐
33230102	4" PVC, Schedule 40, Well Casing	87,412.50	LF	2.78	5.98	10.51	$1,684,106.71	☐
33230202	4" PVC, Schedule 40, Well Screen	14,985.00	LF	6.23	8.01	14.08	$424,406.67	☐
33230302	4" PVC, Well Plug	999.00	EA	24.13	8.77	15.41	$48,260.59	☐
33231128	Air Rotary, 8" Dia Borehole (Consolidated), Depth <= 100 ft	100,899.00	LF	0.00	21.17	37.23	$5,892,148.45	☐
33231172	Split Spoon Sample, 2" x 24", During Drilling	20,179.00	EA	42.99	0.00	0.00	$867,406.42	☐
33231178	Move Rig/Equipment Around Site	998.00	EA	57.79	171.83	302.17	$530,718.54	☐
33231182	Furnish 55 Gallon Drum for Drill Cuttings & Development Water	5,502.00	EA	78.35	0.00	0.00	$431,086.10	☐
33231186	Well Development Equipment Rental (weekly)	100.00	WK	236.67	0.00	0.00	$23,667.33	☐
33231402	4" Screen, Filter Pack	17,982.00	LF	5.42	5.98	10.51	$393,962.24	☐
33231812	4" Well, Portland Cement Grout	80,919.00	LF	1.72	0.00	0.00	$138,889.37	☐
33232102	4" Well, Bentonite Seal	999.00	EA	22.83	33.62	59.13	$115,471.11	☐

Phase Element Technology Cost Detail Report
(without Markups)

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
				Total Element Cost			**$10,674,359.34**	
			Total 1st Year Technology Cost				**$10,674,359.34**	

Phase Element Technology Cost Detail Report (without Markups)

Technology: Special Well Drilling & Installation

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33170808	Decontaminate Rig, Augers, Screen (Rental Equipment)	1,075.00	DAY	112.50	0.00	0.00	$120,938.47	☐
33230102	4" PVC, Schedule 40, Well Casing	87,412.50	LF	2.78	5.98	10.51	$1,684,106.71	☐
33230202	4" PVC, Schedule 40, Well Screen	14,985.00	LF	6.23	8.01	14.08	$424,406.67	☐
33230302	4" PVC, Well Plug	999.00	EA	24.13	8.77	15.41	$48,260.59	☐
33231128	Air Rotary, 8" Dia Borehole (Consolidated), Depth <= 100 ft	100,899.00	LF	0.00	21.17	37.23	$5,892,148.45	☐
33231172	Split Spoon Sample, 2" x 24", During Drilling	20,179.00	EA	42.99	0.00	0.00	$867,406.42	☐
33231178	Move Rig/Equipment Around Site	998.00	EA	57.79	171.83	302.17	$530,718.54	☐
33231182	Furnish 55 Gallon Drum for Drill Cuttings & Development Water	5,502.00	EA	78.35	0.00	0.00	$431,086.10	☐
33231186	Well Development Equipment Rental (weekly)	100.00	WK	236.67	0.00	0.00	$23,667.33	☐
33231402	4" Screen, Filter Pack	17,982.00	LF	5.42	5.98	10.51	$393,962.24	☐
33231812	4" Well, Portland Cement Grout	80,919.00	LF	1.72	0.00	0.00	$138,889.37	☐
33232102	4" Well, Bentonite Seal	999.00	EA	22.83	33.62	59.13	$115,471.11	☐
				Total Element Cost			**$10,671,062.01**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:58:25 AM

Phase Element Technology Cost Detail Report
(without Markups)

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
			Total 1st Year Technology Cost				**$10,671,062.01**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:58:25 AM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Special Well Drilling & Installation

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33170808	Decontaminate Rig, Augers, Screen (Rental Equipment)	591.00	DAY	112.50	0.00	0.00	$66,488.03	☐
33230102	4" PVC, Schedule 40, Well Casing	48,037.50	LF	2.78	5.98	10.51	$925,500.08	☐
33230202	4" PVC, Schedule 40, Well Screen	8,235.00	LF	6.23	8.01	14.08	$233,232.49	☐
33230302	4" PVC, Well Plug	549.00	EA	24.13	8.77	15.41	$26,521.59	☐
33231128	Air Rotary, 8" Dia Borehole (Consolidated), Depth <= 100 ft	55,449.00	LF	0.00	21.17	37.23	$3,238,027.53	☐
33231172	Split Spoon Sample, 2" x 24", During Drilling	11,089.00	EA	42.99	0.00	0.00	$476,667.32	☐
33231178	Move Rig/Equipment Around Site	548.00	EA	57.79	171.83	302.17	$291,416.59	☐
33231182	Furnish 55 Gallon Drum for Drill Cuttings & Development Water	3,024.00	EA	78.35	0.00	0.00	$236,932.82	☐
33231186	Well Development Equipment Rental (weekly)	55.00	WK	236.67	0.00	0.00	$13,017.03	☐
33231402	4" Screen, Filter Pack	9,882.00	LF	5.42	5.98	10.51	$216,501.77	☐
33231812	4" Well, Portland Cement Grout	44,469.00	LF	1.72	0.00	0.00	$76,326.59	☐
33232102	4" Well, Bentonite Seal	549.00	EA	22.83	33.62	59.13	$63,457.10	☐
				Total Element Cost			**$5,864,088.95**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:58:25 AM

Phase Element Technology Cost Detail Report
(without Markups)

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
			Total 1st Year Technology Cost				**$5,864,088.95**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:58:25 AM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Advanced Oxidation Processes

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220106	Staff Engineer	1,260.00	HR	0.00	41.48	0.00	$52,261.65	☐
95010101	In-situ Chemical Oxidation Equipment Per Well - Permanganate	537.00	WELL	3,900.00	0.00	0.00	$2,094,300.00	☑
95010102	In-situ Chemical Oxidation On-site Support Per Well - Permanganate	537.00	WELL	2,751.00	0.00	0.00	$1,477,287.00	☑
95010105	In-situ Chemical Oxidation Reagent Cost per Well - Permanganate	537.00	WELL	188.00	0.00	0.00	$100,956.00	☑
95010106	In-situ Chemical Oxidation Mob/Demob - Permanganate	1.00	LS	48,543.00	0.00	0.00	$48,543.00	☑

Total Element Cost	**$3,773,347.65**
Total 1st Year Technology Cost	**$3,773,347.65**
Total Phase Element Cost	**$31,853,792.54**

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 9:58:25 AM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 02 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2007
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 10:00:08 AM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$289
								Escalated Phase Element Cost		$3,132

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 10:00:08 AM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 02 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 10:00:26 AM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2007 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 10:00:26 AM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 03 - Chemical Oxidation
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: Ex Situ
Start Date: 01/01/2008
Media/Waste Type: N/A
Secondary Media/Waste Type: N/A
Contaminant: None
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 10:00:58 AM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Advanced Oxidation Processes	$20,573,066								$6,497,527	$27,070,593
(100% Prime)		$1,028,653	$2,160,047	$0	$0	$2,019,750	$0	$1,289,076		
Total Phase Element Cost	$20,573,066	$1,028,653	$2,160,047	$0	$0	$2,019,750	$0	$1,289,076	$6,497,527	$27,070,593
							Escalation			$3,416,307
						Escalated Phase Element Cost				$30,486,900

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 10:00:58 AM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 03 - Chemical Oxidation
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: Ex Situ
Start Date: 01/01/2008

Media/Waste Type: N/A
Secondary Media/Waste Type: N/A
Contaminant: None
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 10:01:20 AM

Phase Element Technology Cost Detail Report
(without Markups)

Phase Element Technology Cost Detail Report (without Markups)

Technology: Advanced Oxidation Processes

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220106	Staff Engineer	8,156.00	HR	0.00	41.48	0.00	$338,290.49	☐
95010301	In-situ Chemical Oxidation Equipment Per Well - Fenton's	2,039.00	WELL	3,045.00	0.00	0.00	$6,208,755.00	☑
95010302	In-situ Chemical Oxidation On-site Support Per Well - Fenton's	2,039.00	WELL	2,148.00	0.00	0.00	$4,379,772.00	☑
95010304	In-situ Chemical Oxidation Mob/Demob - 3 events	1.00	LS	30,324.00	0.00	0.00	$30,324.00	☑
95010305	In-Situ Chemical Oxidation Reagent Cost per Well	2,039.00	WELL	4,716.00	0.00	0.00	$9,615,924.00	☑

Total Element Cost	**$20,573,065.49**
Total 1st Year Technology Cost	**$20,573,065.49**
Total Phase Element Cost	**$20,573,065.49**

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 10:01:20 AM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 03 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2008
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 10:02:12 AM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$358
							Escalated Phase Element Cost			$3,201

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 10:02:12 AM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 03 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 10:02:30 AM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2008 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 10:02:30 AM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 04 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2009
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 10:04:12 AM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$54,555								$92,342	$146,897
(100% Prime)		$4,148	$70,238	$0	$0	$10,960	$0	$6,995		
Total Phase Element Cost	$54,555	$4,148	$70,238	$0	$0	$10,960	$0	$6,995	$92,342	$146,897
							Escalation			$22,181
						Escalated Phase Element Cost				$169,078

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 10:04:12 AM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 04 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 10:04:33 AM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2009 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	33.00	EA	8.29	0.00	0.00	$273.56	☐
33020402	Decontamination Materials per Sample	33.00	EA	7.46	0.00	0.00	$246.07	☐
33021509	Water Quality Parameter Testing Device	1.00	WK	236.67	0.00	0.00	$236.67	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	33.00	EA	176.55	0.00	0.00	$5,826.05	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	33.00	EA	140.27	0.00	0.00	$4,628.95	☐
				Total Element Cost			**$11,211.31**	

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	16.00	MI	0.37	0.00	0.00	$5.94	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐

Phase Element Technology Cost Detail Report
(without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	356.00	HR	0.00	42.32	0.00	$15,066.13	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	64.00	HR	0.00	28.24	0.00	$1,807.64	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐
				Total Element Cost			**$43,344.08**	
				Total 1st Year Technology Cost			**$54,555.39**	
				Total Phase Element Cost			**$54,555.39**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 10:04:33 AM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 04 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2009
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 10:05:01 AM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$429
							Escalated Phase Element Cost			$3,272

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 10:05:01 AM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 04 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 10:05:26 AM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2009 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 10:05:26 AM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 05 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2010
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:28:48 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$501
							Escalated Phase Element Cost			$3,344

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:28:48 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 05 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:29:23 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2010 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:29:23 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 06 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2011
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:30:53 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$54,555								$92,342	$146,897
(100% Prime)		$4,148	$70,238	$0	$0	$10,960	$0	$6,995		
Total Phase Element Cost	$54,555	$4,148	$70,238	$0	$0	$10,960	$0	$6,995	$92,342	$146,897
							Escalation			$29,717
						Escalated Phase Element Cost				$176,614

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:30:53 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 06 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:31:37 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2011 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	33.00	EA	8.29	0.00	0.00	$273.56	☐
33020402	Decontamination Materials per Sample	33.00	EA	7.46	0.00	0.00	$246.07	☐
33021509	Water Quality Parameter Testing Device	1.00	WK	236.67	0.00	0.00	$236.67	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	33.00	EA	176.55	0.00	0.00	$5,826.05	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	33.00	EA	140.27	0.00	0.00	$4,628.95	☐
				Total Element Cost			**$11,211.31**	

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	16.00	MI	0.37	0.00	0.00	$5.94	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐

Phase Element Technology Cost Detail Report
(without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	356.00	HR	0.00	42.32	0.00	$15,066.13	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	64.00	HR	0.00	28.24	0.00	$1,807.64	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐
				Total Element Cost			**$43,344.08**	
				Total 1st Year Technology Cost			**$54,555.39**	
				Total Phase Element Cost			**$54,555.39**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:31:37 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 06 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2011
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:32:27 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$575
							Escalated Phase Element Cost			$3,418

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:32:27 PM

Markups Template Preferences Report

Template: System Defaults

Description	Professional Labor	Craft Labor	Materials	Equipment
Prime General Conditions < 10,000	25.00	25.00	17.00	40.00
Prime General Conditions 10,000 to 25,000	15.00	20.00	12.00	30.00
Prime General Conditions 25,001 to 50,000	10.00	17.50	10.00	20.00
Prime General Conditions 50,001 to 100,000	7.50	15.00	8.00	15.00
Prime General Conditions 100,001 to 250,000	5.00	12.00	6.50	10.00
Prime General Conditions 250,001 to 500,000	5.00	10.00	5.00	8.00
Prime General Conditions > 500,000	5.00	8.00	5.00	6.00
Prime Overhead	160.00	30.00	8.00	8.00
Sub General Conditions < 10,000	25.00	25.00	17.00	40.00
Sub General Conditions 10,000 to 25,000	15.00	20.00	12.00	30.00
Sub General Conditions 25,001 to 50,000	10.00	17.50	10.00	20.00
Sub General Conditions 50,001 to 100,000	7.50	15.00	8.00	15.00
Sub General Conditions 100,001 to 250,000	5.00	12.00	6.50	10.00
Sub General Conditions 250,001 to 500,000	5.00	10.00	5.00	8.00
Sub General Conditions > 500,000	5.00	8.00	5.00	6.00
Sub Overhead	160.00	30.00	8.00	8.00

Prime Markup on Sub	3.5
Prime Profit	8.5
Risk (Contingency)	0
Owner Cost	5
Sub Profit	8.5

This report for official U.S. Government use only.

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 06 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:32:42 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2011 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:32:42 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 06 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2011
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:33:40 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Five-Year Review	$7,119								$14,042	$21,161
(100% Prime)		$1,581	$9,966	$0	$0	$1,523	$0	$972		
Total Phase Element Cost	$7,119	$1,581	$9,966	$0	$0	$1,523	$0	$972	$14,042	$21,161
								Escalation		$4,281
								Escalated Phase Element Cost		$25,442

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:33:40 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 06 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:34:05 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2011 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Five-Year Review

Element: Document Review

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	8.00	HR	0.00	70.31	0.00	$562.47	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐
33220108	Project Scientist	6.00	HR	0.00	42.32	0.00	$253.92	☐
33220109	Staff Scientist	11.00	HR	0.00	40.40	0.00	$444.36	☐
				Total Element Cost			**$1,625.12**	

Element: Interviews

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	10.00	HR	0.00	70.31	0.00	$703.08	☐
				Total Element Cost			**$703.08**	

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐

Phase Element Technology Cost Detail Report (without Markups)

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	8.00	HR	0.00	40.40	0.00	$323.17	☐
				Total Element Cost			**$1,335.33**	

Element: Report

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	14.00	HR	0.00	52.05	0.00	$728.74	☐
33220108	Project Scientist	12.00	HR	0.00	42.32	0.00	$507.85	☐
33220109	Staff Scientist	24.00	HR	0.00	40.40	0.00	$969.51	☐
				Total Element Cost			**$2,557.64**	

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	3.00	DAY	50.33	0.00	0.00	$151.00	☐
33010202	Per Diem (per person)	3.00	DAY	149.00	0.00	0.00	$447.00	☑
33041101	Airfare	1.00	LS	300.00	0.00	0.00	$300.00	☑

Phase Element Technology Cost Detail Report
(without Markups)

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
				Total Element Cost			**$898.00**	
			Total 1st Year Technology Cost				**$7,119.17**	
				Total Phase Element Cost			**$7,119.17**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:34:05 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 07 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2012
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:34:24 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$649
								Escalated Phase Element Cost		$3,492

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:34:24 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 07 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:34:44 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2012 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:34:44 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 08 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2013
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:35:30 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$724
							Escalated Phase Element Cost			$3,567

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:35:30 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 08 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:35:49 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2013 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:35:49 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 09 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2014
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:36:11 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$798
							Escalated Phase Element Cost			$3,641

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:36:11 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 09 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:36:27 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2014 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:36:27 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 08 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2014
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:36:46 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$54,555								$92,342	$146,897
(100% Prime)		$4,148	$70,238	$0	$0	$10,960	$0	$6,995		
Total Phase Element Cost	$54,555	$4,148	$70,238	$0	$0	$10,960	$0	$6,995	$92,342	$146,897
							Escalation			$41,278
						Escalated Phase Element Cost				$188,175

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:36:46 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 08 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:37:01 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2014 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	33.00	EA	8.29	0.00	0.00	$273.56	☐
33020402	Decontamination Materials per Sample	33.00	EA	7.46	0.00	0.00	$246.07	☐
33021509	Water Quality Parameter Testing Device	1.00	WK	236.67	0.00	0.00	$236.67	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	33.00	EA	176.55	0.00	0.00	$5,826.05	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	33.00	EA	140.27	0.00	0.00	$4,628.95	☐
				Total Element Cost			**$11,211.31**	

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	16.00	MI	0.37	0.00	0.00	$5.94	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐

Phase Element Technology Cost Detail Report
(without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	356.00	HR	0.00	42.32	0.00	$15,066.13	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	64.00	HR	0.00	28.24	0.00	$1,807.64	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐
				Total Element Cost			**$43,344.08**	
				Total 1st Year Technology Cost			**$54,555.39**	
				Total Phase Element Cost			**$54,555.39**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:37:01 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 10 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2015
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:37:24 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$873
							Escalated Phase Element Cost			$3,716

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:37:24 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 10 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:37:39 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2015 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:37:39 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 10 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2015
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:38:01 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$54,555								$92,342	$146,897
(100% Prime)		$4,148	$70,238	$0	$0	$10,960	$0	$6,995		
Total Phase Element Cost	$54,555	$4,148	$70,238	$0	$0	$10,960	$0	$6,995	$92,342	$146,897
							Escalation			$45,126
						Escalated Phase Element Cost				$192,023

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:38:01 PM

Phase Element Technology Cost Detail Report (without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 10 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:38:16 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2015 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	33.00	EA	8.29	0.00	0.00	$273.56	☐
33020402	Decontamination Materials per Sample	33.00	EA	7.46	0.00	0.00	$246.07	☐
33021509	Water Quality Parameter Testing Device	1.00	WK	236.67	0.00	0.00	$236.67	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	33.00	EA	176.55	0.00	0.00	$5,826.05	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	33.00	EA	140.27	0.00	0.00	$4,628.95	☐
				Total Element Cost			**$11,211.31**	

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	16.00	MI	0.37	0.00	0.00	$5.94	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐

Phase Element Technology Cost Detail Report
(without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	356.00	HR	0.00	42.32	0.00	$15,066.13	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	64.00	HR	0.00	28.24	0.00	$1,807.64	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐
				Total Element Cost			**$43,344.08**	
				Total 1st Year Technology Cost			**$54,555.39**	
				Total Phase Element Cost			**$54,555.39**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:38:16 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 10 - Site Close-out
Type: Site Close-out
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2015

Media/Waste Type: N/A
Secondary Media/Waste Type: N/A
Contaminant: None
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:38:39 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Site Close-Out Documentation	$15,242								$8,481	$23,723
(100% Prime)		$223	$6,677	$0	$0	$966	$0	$616		
WELL ABANDONMENT	$1,018,203								$401,697	$1,419,900
(100% Prime)		$67,942	$160,201	$0	$0	$105,939	$0	$67,614		
Total Phase Element Cost	$1,033,445	$68,165	$166,877	$0	$0	$106,905	$0	$68,231	$410,178	$1,443,623
								Escalation		$443,482
								Escalated Phase Element Cost		$1,887,105

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 2:38:39 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Chemical Reaction
ID: Dryden
Type: None
Description: Chemical Oxidation of OU6 TCE plume using Fenton's and Permanganate, monitoring, and close-out.

Phase Element

Name: Calendar Year 10 - Site Close-out
Type: Site Close-out
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2015

Media/Waste Type: N/A
Secondary Media/Waste Type: N/A
Contaminant: None
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 2:38:54 PM

Phase Element Technology Cost Detail Report
(without Markups)

Phase Element Technology Cost Detail Report
(without Markups)

Technology: Site Close-Out Documentation

Element: Meetings

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	6.00	DAY	50.33	0.00	0.00	$302.00	☐
33010202	Per Diem (per person)	18.00	DAY	149.00	0.00	0.00	$2,682.00	☑
33041101	Airfare	1.00	LS	8,100.00	0.00	0.00	$8,100.00	☑
33220102	Project Manager	14.00	HR	0.00	70.31	0.00	$984.32	☐
33220106	Staff Engineer	13.00	HR	0.00	41.48	0.00	$539.21	☐
33220114	Word Processing/Clerical	5.00	HR	0.00	23.41	0.00	$117.03	☐
33220115	Draftsman/CADD	1.00	HR	0.00	36.27	0.00	$36.27	☐
				Total Element Cost			**$12,760.82**	

Element: Abandon wells

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220106	Staff Engineer	1.00	HR	0.00	41.48	0.00	$41.48	☐
33220109	Staff Scientist	1.00	HR	0.00	40.40	0.00	$40.40	☐
				Total Element Cost			**$81.87**	

Phase Element Technology Cost Detail Report
(without Markups)

Element: Documents

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	9.00	HR	0.00	70.31	0.00	$632.77	☐
33220104	Senior Staff Engineer	2.00	HR	0.00	70.18	0.00	$140.36	☐
33220106	Staff Engineer	26.00	HR	0.00	41.48	0.00	$1,078.42	☐
33220114	Word Processing/Clerical	11.00	HR	0.00	23.41	0.00	$257.46	☐
33220115	Draftsman/CADD	8.00	HR	0.00	36.27	0.00	$290.18	☐
				Total Element Cost			**$2,399.19**	
			Total 1st Year Technology Cost				**$15,241.89**	

Phase Element Technology Cost Detail Report
(without Markups)

Technology: WELL ABANDONMENT

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33231823	Well Abandonment, 4" Well	26,950.00	LF	1.14	13.28	23.36	$1,018,203.34	☐
				Total Element Cost			**$1,018,203.34**	
			Total 1st Year Technology Cost				**$1,018,203.34**	
				Total Phase Element Cost			**$1,033,445.23**	

Cost Database Date: 2003

Cost Type: User-Defined

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Markups Template Preferences Report

Template: System Defaults

Description	Professional Labor	Craft Labor	Materials	Equipment
Prime General Conditions < 10,000	25.00	25.00	17.00	40.00
Prime General Conditions 10,000 to 25,000	15.00	20.00	12.00	30.00
Prime General Conditions 25,001 to 50,000	10.00	17.50	10.00	20.00
Prime General Conditions 50,001 to 100,000	7.50	15.00	8.00	15.00
Prime General Conditions 100,001 to 250,000	5.00	12.00	6.50	10.00
Prime General Conditions 250,001 to 500,000	5.00	10.00	5.00	8.00
Prime General Conditions > 500,000	5.00	8.00	5.00	6.00
Prime Overhead	160.00	30.00	8.00	8.00
Sub General Conditions < 10,000	25.00	25.00	17.00	40.00
Sub General Conditions 10,000 to 25,000	15.00	20.00	12.00	30.00
Sub General Conditions 25,001 to 50,000	10.00	17.50	10.00	20.00
Sub General Conditions 50,001 to 100,000	7.50	15.00	8.00	15.00
Sub General Conditions 100,001 to 250,000	5.00	12.00	6.50	10.00
Sub General Conditions 250,001 to 500,000	5.00	10.00	5.00	8.00
Sub General Conditions > 500,000	5.00	8.00	5.00	6.00
Sub Overhead	160.00	30.00	8.00	8.00

Prime Markup on Sub	3.5
Prime Profit	8.5
Risk (Contingency)	0
Owner Cost	5
Sub Profit	8.5

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Site Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ G
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Calendar Year 01 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 01 - Chem Oxidation	$203,307								$67,022	$270,329

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:56:34 PM

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
(System Defaults)		$13,263	$20,717	$0	$0	$20,169	$0	$12,873		
Calendar Year 01 - Chem Oxidation (O&M)	$0								$0	$0
(System Defaults)		$0	$0	$0	$0	$0	$0	$0		
Calendar Year 01 through 05 - Well Inst.	$337,563								$509,271	$846,834
(System Defaults)		$26,564	$379,200	$0	$0	$63,183	$0	$40,325		
Calendar Year 02 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 03 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 04 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 05 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 06 - 5-year Review	$7,119								$14,042	$21,161
(System Defaults)		$1,581	$9,966	$0	$0	$1,523	$0	$972		

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Calendar Year 06 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 07 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 07 - Long-Term Monitoring	$63,774								$100,153	$163,927
(System Defaults)		$4,871	$75,244	$0	$0	$12,231	$0	$7,806		
Calendar Year 08 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 09 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 09 - Long-Term Monitoring	$63,774								$100,153	$163,927
(System Defaults)		$4,871	$75,244	$0	$0	$12,231	$0	$7,806		
Calendar Year 10 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 11 - 5-year Review	$7,346								$14,553	$21,899

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:56:34 PM

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
(System Defaults)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Calendar Year 11 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 11 - Long-Term Monitoring	$63,774								$100,153	$163,927
(System Defaults)		$4,871	$75,244	$0	$0	$12,231	$0	$7,806		
Calendar Year 12 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 13 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 14 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 15 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 16 - 5-year Review	$7,446								$14,553	$21,999
(System Defaults)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Calendar Year 16 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 16 - Long-Term Monitoring	$63,774								$100,153	$163,927
(System Defaults)		$4,871	$75,244	$0	$0	$12,231	$0	$7,806		
Calendar Year 17 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 18 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 19 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 20 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 21 - 5-year Review	$7,496								$14,553	$22,049
(System Defaults)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Calendar Year 21 - Access Restrictions	$1,610								$1,233	$2,843

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:56:34 PM

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 21 - Long-Term Monitoring	$63,774								$100,153	$163,927
(System Defaults)		$4,871	$75,244	$0	$0	$12,231	$0	$7,806		
Calendar Year 22 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 23 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 24 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 25 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 26 - 5-year Review	$7,546								$14,553	$22,099
(System Defaults)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Calendar Year 26 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		

Site Cost Detail Report
(with Markups)

Phase Element (Markup Template)	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Calendar Year 26 - Long-Term Monitoring	$63,774								$100,153	$163,927
(System Defaults)		$4,871	$75,244	$0	$0	$12,231	$0	$7,806		
Calendar Year 27 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 28 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 29 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 30 - Access Restrictions	$1,610								$1,233	$2,843
(System Defaults)		$402	$483	$0	$0	$212	$0	$135		
Calendar Year 30 - Long-Term Monitoring	$63,774								$100,153	$163,927
(System Defaults)		$4,871	$75,244	$0	$0	$12,231	$0	$7,806		
Total Site Cost	$1,072,538	$94,131	$992,399	$0	$0	$183,165	$0	$116,902	$1,386,598	$2,459,136
							Escalation			$784,029
						Escalated Site Cost				$3,243,165

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:56:34 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 01 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2006
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
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Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$222
							Escalated Phase Element Cost			$3,065

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 6:58:12 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 01 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 6:58:43 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2006 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 6:58:43 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 01 through 05 - Well Inst. LTM
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2006
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 6:59:14 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Groundwater Monitoring Well	$11,463								$6,068	$17,531
(100% Prime)		$1,604	$2,320	$0	$0	$1,308	$0	$835		
Off-site Transportation and Waste Disposal	$3,436								$1,106	$4,542
(100% Prime)		$275	$276	$0	$0	$339	$0	$216		
Discharge to POTW	$3,791								$1,337	$5,128
(100% Prime)		$328	$381	$0	$0	$383	$0	$244		
Monitoring	$318,872								$500,762	$819,634
(100% Prime)		$24,356	$376,222	$0	$0	$61,153	$0	$39,030		
Total Phase Element Cost	$337,563	$26,564	$379,200	$0	$0	$63,183	$0	$40,325	$509,271	$846,834
								Escalation		$105,989
								Escalated Phase Element Cost		$952,823

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 6:59:14 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 01 through 05 - Well Inst. LTM
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 6:59:29 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2006 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Groundwater Monitoring Well

Element: Aquifer 1

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020303	Organic Vapor Analyzer Rental, per Day	2.00	DAY	118.98	0.00	0.00	$237.97	☐
33170808	Decontaminate Rig, Augers, Screen (Rental Equipment)	2.00	DAY	112.50	0.00	0.00	$225.00	☐
33220112	Field Technician	14.00	HR	0.00	28.24	0.00	$395.42	☐
33230102	4" PVC, Schedule 40, Well Casing	70.00	LF	2.78	5.98	10.51	$1,348.63	☐
33230202	4" PVC, Schedule 40, Well Screen	10.00	LF	6.23	8.01	14.08	$283.22	☐
33230302	4" PVC, Well Plug	1.00	EA	24.13	8.77	15.41	$48.31	☐
33231128	Air Rotary, 8" Dia Borehole (Consolidated), Depth <= 100 ft	81.00	LF	0.00	21.17	37.23	$4,730.12	☐
33231182	Furnish 55 Gallon Drum for Drill Cuttings & Development Water	3.00	EA	78.35	0.00	0.00	$235.05	☐
33231402	4" Screen, Filter Pack	12.00	LF	5.42	5.98	10.51	$262.90	☐
33231812	4" Well, Portland Cement Grout	67.00	LF	1.72	0.00	0.00	$115.00	☐
33232102	4" Well, Bentonite Seal	1.00	EA	22.83	33.62	59.13	$115.59	☐
				Total Element Cost			**$7,997.21**	

Cost Database Date: 2003

Cost Type: User-Defined

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Phase Element Technology Cost Detail Report (without Markups)

Element: General Aquifers

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010101	Mobilize/DeMobilize Drilling Rig & Crew	1.00	LS	0.00	1,195.31	2,102.02	$3,297.33	☐
33231504	Surface Pad, Concrete, 2' x 2' x 4"	1.00	EA	40.00	124.58	3.97	$168.54	☐
				Total Element Cost			**$3,465.88**	
			Total 1st Year Technology Cost				**$11,463.09**	

Phase Element Technology Cost Detail Report (without Markups)

Technology: Off-site Transportation and Waste Disposal

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33190102	Bulk Solid Hazardous Waste Loading Into Truck	3.00	CY	0.00	1.10	1.27	$7.11	☐
33190211	Dump Truck Transportation Hazardous Waste 300 - 399 Miles	340.00	MI	2.41	0.00	0.00	$819.40	☐
33190307	Minimum Charges for Bulk Shipments	1.00	EA	2,053.33	0.00	0.00	$2,053.33	☐
33190311	Truck Washout/Decontamination	1.00	EA	162.11	0.00	0.00	$162.11	☐
33197264	Landfill Hazardous Solid Bulk Waste by CY	3.00	CY	131.30	0.00	0.00	$393.90	☑
				Total Element Cost			**$3,435.85**	
				Total 1st Year Technology Cost			**$3,435.85**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 6:59:29 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Discharge to POTW

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
19040621	550 Gallon Horizontal Plastic Sump with 4" NPT Connection	1.00	EA	1,404.91	354.64	0.00	$1,759.55	☐
33130274	Coconut-based, High Capacity, 12 x 30 Sieve, 1100 Iodine, 2,000 - 10,000 Lb	2,000.00	LB	1.02	0.00	0.00	$2,031.80	☐
				Total Element Cost			**$3,791.35**	
				Total 1st Year Technology Cost			**$3,791.35**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 6:59:29 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	46.00	EA	8.29	0.00	0.00	$381.33	☐
33020402	Decontamination Materials per Sample	46.00	EA	7.46	0.00	0.00	$343.01	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	2,075.00	LF	0.43	0.00	0.00	$897.02	☐
33021509	Water Quality Parameter Testing Device	2.00	WK	236.67	0.00	0.00	$473.35	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	46.00	EA	176.55	0.00	0.00	$8,121.16	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	46.00	EA	140.27	0.00	0.00	$6,452.48	☐
33230510	4" Submersible Pump Rental, Week	2.00	WK	238.74	0.00	0.00	$477.48	☐
33231186	Well Development Equipment Rental (weekly)	2.00	WK	236.67	0.00	0.00	$473.35	☐
				Total Element Cost			**$17,619.17**	

Cost Database Date: 2003

Cost Type: User-Defined

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Phase Element Technology Cost Detail Report
(without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	24.00	MI	0.37	0.00	0.00	$8.91	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	401.00	HR	0.00	42.32	0.00	$16,970.56	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	96.00	HR	0.00	28.24	0.00	$2,711.45	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐

Total Element Cost	**$46,155.30**
Total 1st Year Technology Cost	**$63,774.47**
Total Phase Element Cost	**$82,464.76**

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 6:59:29 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 01 - Chem Oxidation
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: Ex Situ
Start Date: 01/01/2006
Media/Waste Type: N/A
Secondary Media/Waste Type: N/A
Contaminant: None
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 6:59:55 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS	$1,610								$994	$2,604
(100% Prime)		$193	$483	$0	$0	$194	$0	$124		
Advanced Oxidation Processes	$201,697								$66,027	$267,724
(100% Prime)		$13,070	$20,234	$0	$0	$19,975	$0	$12,749		
Total Phase Element Cost	$203,307	$13,263	$20,717	$0	$0	$20,169	$0	$12,873	$67,022	$270,329
								Escalation		$21,112
								Escalated Phase Element Cost		$291,441

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 6:59:55 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 01 - Chem Oxidation
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: Ex Situ
Start Date: 01/01/2006

Media/Waste Type: N/A
Secondary Media/Waste Type: N/A
Contaminant: None
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:00:35 PM

Phase Element Technology Cost Detail Report
(without Markups)

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:00:35 PM

Phase Element Technology Cost Detail Report (without Markups)

Technology: Advanced Oxidation Processes

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220106	Staff Engineer	65.00	HR	0.00	41.48	0.00	$2,696.04	☐
95010101	In-situ Chemical Oxidation Equipment Per Well - Permanganate	22.00	WELL	3,900.00	0.00	0.00	$85,800.00	☑
95010102	In-situ Chemical Oxidation On-site Support Per Well - Permanganate	22.00	WELL	2,751.00	0.00	0.00	$60,522.00	☑
95010105	In-situ Chemical Oxidation Reagent Cost per Well - Permanganate	22.00	WELL	188.00	0.00	0.00	$4,136.00	☑
95010106	In-situ Chemical Oxidation Mob/Demob - Permanganate	1.00	LS	48,543.00	0.00	0.00	$48,543.00	☑

Total Element Cost	**$201,697.04**
Total 1st Year Technology Cost	**$201,697.04**
Total Phase Element Cost	**$203,306.80**

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:00:35 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 02 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2007
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:00:56 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$289
							Escalated Phase Element Cost			$3,132

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:00:56 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 02 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:01:09 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2007 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:01:09 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 03 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2008
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:01:28 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$358
							Escalated Phase Element Cost			$3,201

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:01:28 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 03 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:01:40 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2008 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:01:40 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 04 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2009
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:02:15 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$429
								Escalated Phase Element Cost		$3,272

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:02:15 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 04 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:02:28 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2009 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
				Total 1st Year Technology Cost			**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:02:28 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 05 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2010
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:02:51 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$501
							Escalated Phase Element Cost			$3,344

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:02:51 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 05 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:03:06 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2010 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:03:06 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 06 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2011
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:03:25 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Five-Year Review	$7,119								$14,042	$21,161
(100% Prime)		$1,581	$9,966	$0	$0	$1,523	$0	$972		
Total Phase Element Cost	$7,119	$1,581	$9,966	$0	$0	$1,523	$0	$972	$14,042	$21,161
								Escalation		$4,281
								Escalated Phase Element Cost		$25,442

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:03:25 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 06 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:03:38 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2011 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Five-Year Review

Element: Document Review

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	8.00	HR	0.00	70.31	0.00	$562.47	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐
33220108	Project Scientist	6.00	HR	0.00	42.32	0.00	$253.92	☐
33220109	Staff Scientist	11.00	HR	0.00	40.40	0.00	$444.36	☐
				Total Element Cost			**$1,625.12**	

Element: Interviews

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	10.00	HR	0.00	70.31	0.00	$703.08	☐
				Total Element Cost			**$703.08**	

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐

Phase Element Technology Cost Detail Report (without Markups)

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	8.00	HR	0.00	40.40	0.00	$323.17	☐
				Total Element Cost			**$1,335.33**	

Element: Report

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	14.00	HR	0.00	52.05	0.00	$728.74	☐
33220108	Project Scientist	12.00	HR	0.00	42.32	0.00	$507.85	☐
33220109	Staff Scientist	24.00	HR	0.00	40.40	0.00	$969.51	☐
				Total Element Cost			**$2,557.64**	

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	3.00	DAY	50.33	0.00	0.00	$151.00	☐
33010202	Per Diem (per person)	3.00	DAY	149.00	0.00	0.00	$447.00	☑
33041101	Airfare	1.00	LS	300.00	0.00	0.00	$300.00	☑

Phase Element Technology Cost Detail Report
(without Markups)

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
				Total Element Cost			**$898.00**	
			Total 1st Year Technology Cost				**$7,119.17**	
				Total Phase Element Cost			**$7,119.17**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:03:38 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 06 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2011
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:03:55 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$575
							Escalated Phase Element Cost			$3,418

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:03:55 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 06 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:04:12 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2011 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:04:12 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 07 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2012
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:04:34 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$649
								Escalated Phase Element Cost		$3,492

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:04:34 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 07 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:04:52 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2012 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:04:52 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 07 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2012
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:05:10 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$63,774								$100,153	$163,927
(100% Prime)		$4,871	$75,244	$0	$0	$12,231	$0	$7,806		
Total Phase Element Cost	$63,774	$4,871	$75,244	$0	$0	$12,231	$0	$7,806	$100,153	$163,927
							Escalation			$37,474
						Escalated Phase Element Cost				$201,401

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:05:10 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 07 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:05:40 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2012 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	46.00	EA	8.29	0.00	0.00	$381.33	☐
33020402	Decontamination Materials per Sample	46.00	EA	7.46	0.00	0.00	$343.01	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	2,075.00	LF	0.43	0.00	0.00	$897.02	☐
33021509	Water Quality Parameter Testing Device	2.00	WK	236.67	0.00	0.00	$473.35	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	46.00	EA	176.55	0.00	0.00	$8,121.16	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	46.00	EA	140.27	0.00	0.00	$6,452.48	☐
33230510	4" Submersible Pump Rental, Week	2.00	WK	238.74	0.00	0.00	$477.48	☐
33231186	Well Development Equipment Rental (weekly)	2.00	WK	236.67	0.00	0.00	$473.35	☐
				Total Element Cost			**$17,619.17**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:05:40 PM

Phase Element Technology Cost Detail Report
(without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	24.00	MI	0.37	0.00	0.00	$8.91	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	401.00	HR	0.00	42.32	0.00	$16,970.56	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	96.00	HR	0.00	28.24	0.00	$2,711.45	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐
				Total Element Cost			**$46,155.30**	
				Total 1st Year Technology Cost			**$63,774.47**	
				Total Phase Element Cost			**$63,774.47**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:05:40 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 08 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2013
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:06:02 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$724
								Escalated Phase Element Cost		$3,567

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:06:02 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 08 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:06:20 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2013 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:06:20 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 09 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2014
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:06:38 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$63,774								$100,153	$163,927
(100% Prime)		$4,871	$75,244	$0	$0	$12,231	$0	$7,806		
Total Phase Element Cost	$63,774	$4,871	$75,244	$0	$0	$12,231	$0	$7,806	$100,153	$163,927
							Escalation			$46,063
						Escalated Phase Element Cost				$209,990

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:06:38 PM

Phase Element Technology Cost Detail Report (without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 09 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:06:51 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2014 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	46.00	EA	8.29	0.00	0.00	$381.33	☐
33020402	Decontamination Materials per Sample	46.00	EA	7.46	0.00	0.00	$343.01	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	2,075.00	LF	0.43	0.00	0.00	$897.02	☐
33021509	Water Quality Parameter Testing Device	2.00	WK	236.67	0.00	0.00	$473.35	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	46.00	EA	176.55	0.00	0.00	$8,121.16	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	46.00	EA	140.27	0.00	0.00	$6,452.48	☐
33230510	4" Submersible Pump Rental, Week	2.00	WK	238.74	0.00	0.00	$477.48	☐
33231186	Well Development Equipment Rental (weekly)	2.00	WK	236.67	0.00	0.00	$473.35	☐
				Total Element Cost			**$17,619.17**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:06:51 PM

Phase Element Technology Cost Detail Report (without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	24.00	MI	0.37	0.00	0.00	$8.91	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	401.00	HR	0.00	42.32	0.00	$16,970.56	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	96.00	HR	0.00	28.24	0.00	$2,711.45	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐

Total Element Cost	**$46,155.30**
Total 1st Year Technology Cost	**$63,774.47**
Total Phase Element Cost	**$63,774.47**

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:06:51 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 09 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2014
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:07:08 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$798
							Escalated Phase Element Cost			$3,641

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:07:08 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 09 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:07:24 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2014 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:07:24 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 10 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2015
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:07:42 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$873
								Escalated Phase Element Cost		$3,716

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:07:42 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 10 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:08:09 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2015 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:08:09 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 11 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2016
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:16:20 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$63,774								$100,153	$163,927
(100% Prime)		$4,871	$75,244	$0	$0	$12,231	$0	$7,806		
Total Phase Element Cost	$63,774	$4,871	$75,244	$0	$0	$12,231	$0	$7,806	$100,153	$163,927
							Escalation			$54,653
						Escalated Phase Element Cost				$218,580

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:16:20 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 11 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:16:57 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2016 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	46.00	EA	8.29	0.00	0.00	$381.33	☐
33020402	Decontamination Materials per Sample	46.00	EA	7.46	0.00	0.00	$343.01	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	2,075.00	LF	0.43	0.00	0.00	$897.02	☐
33021509	Water Quality Parameter Testing Device	2.00	WK	236.67	0.00	0.00	$473.35	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	46.00	EA	176.55	0.00	0.00	$8,121.16	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	46.00	EA	140.27	0.00	0.00	$6,452.48	☐
33230510	4" Submersible Pump Rental, Week	2.00	WK	238.74	0.00	0.00	$477.48	☐
33231186	Well Development Equipment Rental (weekly)	2.00	WK	236.67	0.00	0.00	$473.35	☐
				Total Element Cost			**$17,619.17**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:16:57 PM

Phase Element Technology Cost Detail Report (without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	24.00	MI	0.37	0.00	0.00	$8.91	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	401.00	HR	0.00	42.32	0.00	$16,970.56	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	96.00	HR	0.00	28.24	0.00	$2,711.45	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐

Total Element Cost	**$46,155.30**
Total 1st Year Technology Cost	**$63,774.47**
Total Phase Element Cost	**$63,774.47**

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:16:57 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 11 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2016
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:17:16 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Five-Year Review	$7,346								$14,553	$21,899
(100% Prime)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Total Phase Element Cost	$7,346	$1,638	$10,329	$0	$0	$1,578	$0	$1,007	$14,553	$21,899
							Escalation			$7,301
						Escalated Phase Element Cost				$29,200

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:17:16 PM

Phase Element Technology Cost Detail Report (without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 11 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:17:30 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2016 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Five-Year Review

Element: Document Review

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	8.00	HR	0.00	70.31	0.00	$562.47	☐
33220105	Project Engineer	9.00	HR	0.00	52.05	0.00	$468.48	☐
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	13.00	HR	0.00	40.40	0.00	$525.15	☐
				Total Element Cost			**$1,852.34**	

Element: Interviews

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	10.00	HR	0.00	70.31	0.00	$703.08	☐
				Total Element Cost			**$703.08**	

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐

Phase Element Technology Cost Detail Report (without Markups)

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	8.00	HR	0.00	40.40	0.00	$323.17	☐
				Total Element Cost			**$1,335.33**	

Element: Report

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	14.00	HR	0.00	52.05	0.00	$728.74	☐
33220108	Project Scientist	12.00	HR	0.00	42.32	0.00	$507.85	☐
33220109	Staff Scientist	24.00	HR	0.00	40.40	0.00	$969.51	☐
				Total Element Cost			**$2,557.64**	

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	3.00	DAY	50.33	0.00	0.00	$151.00	☐
33010202	Per Diem (per person)	3.00	DAY	149.00	0.00	0.00	$447.00	☑
33041101	Airfare	1.00	LS	300.00	0.00	0.00	$300.00	☑

Phase Element Technology Cost Detail Report
(without Markups)

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
				Total Element Cost			**$898.00**	
			Total 1st Year Technology Cost				**$7,346.39**	
				Total Phase Element Cost			**$7,346.39**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:17:30 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 11 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2016
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
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Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$947
							Escalated Phase Element Cost			$3,790

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:17:49 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 11 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:18:03 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2016 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:18:03 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 12 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2017
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:18:22 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,022
							Escalated Phase Element Cost			$3,865

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:18:22 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 12 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:18:44 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2017 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:18:44 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 13 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2018
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:19:02 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,097
							Escalated Phase Element Cost			$3,940

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:19:02 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 13 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:19:15 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2018 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:19:15 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 14 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2019
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:19:38 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,171
							Escalated Phase Element Cost			$4,014

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:19:38 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 14 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:19:51 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2019 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:19:51 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 15 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2020
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:20:29 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,245
							Escalated Phase Element Cost			$4,088

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:20:29 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 15 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:20:44 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2020 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:20:44 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 16 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2021
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:25:44 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,320
							Escalated Phase Element Cost			$4,163

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:25:44 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 16 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:26:32 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2021 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:26:32 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 16 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2021
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:27:01 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$63,774								$100,153	$163,927
(100% Prime)		$4,871	$75,244	$0	$0	$12,231	$0	$7,806		
Total Phase Element Cost	$63,774	$4,871	$75,244	$0	$0	$12,231	$0	$7,806	$100,153	$163,927
							Escalation			$76,144
						Escalated Phase Element Cost				$240,071

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:27:01 PM

Phase Element Technology Cost Detail Report (without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 16 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:27:15 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2021 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	46.00	EA	8.29	0.00	0.00	$381.33	☐
33020402	Decontamination Materials per Sample	46.00	EA	7.46	0.00	0.00	$343.01	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	2,075.00	LF	0.43	0.00	0.00	$897.02	☐
33021509	Water Quality Parameter Testing Device	2.00	WK	236.67	0.00	0.00	$473.35	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	46.00	EA	176.55	0.00	0.00	$8,121.16	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	46.00	EA	140.27	0.00	0.00	$6,452.48	☐
33230510	4" Submersible Pump Rental, Week	2.00	WK	238.74	0.00	0.00	$477.48	☐
33231186	Well Development Equipment Rental (weekly)	2.00	WK	236.67	0.00	0.00	$473.35	☐
				Total Element Cost			**$17,619.17**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:27:15 PM

Phase Element Technology Cost Detail Report (without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	24.00	MI	0.37	0.00	0.00	$8.91	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	401.00	HR	0.00	42.32	0.00	$16,970.56	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	96.00	HR	0.00	28.24	0.00	$2,711.45	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐

Total Element Cost	**$46,155.30**
Total 1st Year Technology Cost	**$63,774.47**
Total Phase Element Cost	**$63,774.47**

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 16 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2021
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:27:35 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Five-Year Review	$7,446								$14,553	$21,999
(100% Prime)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Total Phase Element Cost	$7,446	$1,638	$10,329	$0	$0	$1,578	$0	$1,007	$14,553	$21,999
							Escalation			$10,219
							Escalated Phase Element Cost			$32,218

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:27:35 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 16 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:27:51 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2021 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Five-Year Review

Element: Document Review

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	8.00	HR	0.00	70.31	0.00	$562.47	☐
33220105	Project Engineer	9.00	HR	0.00	52.05	0.00	$468.48	☐
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	13.00	HR	0.00	40.40	0.00	$525.15	☐
				Total Element Cost			**$1,852.34**	

Element: Interviews

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	10.00	HR	0.00	70.31	0.00	$703.08	☐
				Total Element Cost			**$703.08**	

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐

Phase Element Technology Cost Detail Report
(without Markups)

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	8.00	HR	0.00	40.40	0.00	$323.17	☐
				Total Element Cost			**$1,335.33**	

Element: Report

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	14.00	HR	0.00	52.05	0.00	$728.74	☐
33220108	Project Scientist	12.00	HR	0.00	42.32	0.00	$507.85	☐
33220109	Staff Scientist	24.00	HR	0.00	40.40	0.00	$969.51	☐
				Total Element Cost			**$2,557.64**	

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	3.00	DAY	50.33	0.00	0.00	$151.00	☐
33010202	Per Diem (per person)	3.00	DAY	149.00	0.00	0.00	$447.00	☑
33041101	Airfare	1.00	LS	400.00	0.00	0.00	$400.00	☑

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:27:51 PM

Phase Element Technology Cost Detail Report
(without Markups)

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
				Total Element Cost			**$998.00**	
			Total 1st Year Technology Cost				**$7,446.39**	
				Total Phase Element Cost			**$7,446.39**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:27:51 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 17 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2022
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:28:32 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,394
							Escalated Phase Element Cost			$4,237

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:28:32 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 17 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:28:45 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2022 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:28:45 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 18 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2023
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:29:03 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,469
							Escalated Phase Element Cost			$4,312

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:29:03 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 18 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:29:20 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2023 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:29:20 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 19 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2024
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:29:40 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,543
							Escalated Phase Element Cost			$4,386

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:29:40 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 19 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:29:54 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2024 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:29:54 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 20 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2025
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:30:24 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,618
							Escalated Phase Element Cost			$4,461

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:30:24 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 21 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2026
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:35:03 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,693
							Escalated Phase Element Cost			$4,536

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:35:03 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 21 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:35:27 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2026 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:35:27 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 21 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2026
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:35:48 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$63,774								$100,153	$163,927
(100% Prime)		$4,871	$75,244	$0	$0	$12,231	$0	$7,806		
Total Phase Element Cost	$63,774	$4,871	$75,244	$0	$0	$12,231	$0	$7,806	$100,153	$163,927
							Escalation			$97,635
						Escalated Phase Element Cost				$261,562

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:35:48 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 21 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2026 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	46.00	EA	8.29	0.00	0.00	$381.33	☐
33020402	Decontamination Materials per Sample	46.00	EA	7.46	0.00	0.00	$343.01	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	2,075.00	LF	0.43	0.00	0.00	$897.02	☐
33021509	Water Quality Parameter Testing Device	2.00	WK	236.67	0.00	0.00	$473.35	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	46.00	EA	176.55	0.00	0.00	$8,121.16	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	46.00	EA	140.27	0.00	0.00	$6,452.48	☐
33230510	4" Submersible Pump Rental, Week	2.00	WK	238.74	0.00	0.00	$477.48	☐
33231186	Well Development Equipment Rental (weekly)	2.00	WK	236.67	0.00	0.00	$473.35	☐
				Total Element Cost			**$17,619.17**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:36:01 PM

Phase Element Technology Cost Detail Report (without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	24.00	MI	0.37	0.00	0.00	$8.91	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	401.00	HR	0.00	42.32	0.00	$16,970.56	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	96.00	HR	0.00	28.24	0.00	$2,711.45	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐

Total Element Cost	**$46,155.30**
Total 1st Year Technology Cost	**$63,774.47**
Total Phase Element Cost	**$63,774.47**

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:36:01 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 21 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2026
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:36:18 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Five-Year Review	$7,496								$14,553	$22,049
(100% Prime)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Total Phase Element Cost	$7,496	$1,638	$10,329	$0	$0	$1,578	$0	$1,007	$14,553	$22,049
							Escalation			$13,132
						Escalated Phase Element Cost				$35,181

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:36:18 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 21 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:36:30 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2026 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Five-Year Review

Element: Document Review

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	8.00	HR	0.00	70.31	0.00	$562.47	☐
33220105	Project Engineer	9.00	HR	0.00	52.05	0.00	$468.48	☐
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	13.00	HR	0.00	40.40	0.00	$525.15	☐
				Total Element Cost			**$1,852.34**	

Element: Interviews

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	10.00	HR	0.00	70.31	0.00	$703.08	☐
				Total Element Cost			**$703.08**	

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐

Phase Element Technology Cost Detail Report (without Markups)

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	8.00	HR	0.00	40.40	0.00	$323.17	☐
				Total Element Cost			**$1,335.33**	

Element: Report

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	14.00	HR	0.00	52.05	0.00	$728.74	☐
33220108	Project Scientist	12.00	HR	0.00	42.32	0.00	$507.85	☐
33220109	Staff Scientist	24.00	HR	0.00	40.40	0.00	$969.51	☐
				Total Element Cost			**$2,557.64**	

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	3.00	DAY	50.33	0.00	0.00	$151.00	☐
33010202	Per Diem (per person)	3.00	DAY	149.00	0.00	0.00	$447.00	☑
33041101	Airfare	1.00	LS	450.00	0.00	0.00	$450.00	☑

Phase Element Technology Cost Detail Report
(without Markups)

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
				Total Element Cost			**$1,048.00**	
			Total 1st Year Technology Cost				**$7,496.39**	
				Total Phase Element Cost			**$7,496.39**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:36:30 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 22 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2027
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:36:54 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$1,767
								Escalated Phase Element Cost		$4,610

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:36:54 PM

Phase Element Technology Cost Detail Report (without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 22 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:37:06 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2027 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:37:06 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 23 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2028
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:37:25 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,842
							Escalated Phase Element Cost			$4,685

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:37:25 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 23 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:37:40 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2028 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:37:40 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 24 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2029
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:37:57 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,916
							Escalated Phase Element Cost			$4,759

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:37:57 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 24 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:38:10 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2029 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:38:10 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 25 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2030
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:38:35 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$1,991
							Escalated Phase Element Cost			$4,834

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:38:35 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 25 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:38:48 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2030 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:38:48 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 26 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2031
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:39:04 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$63,774								$100,153	$163,927
(100% Prime)		$4,871	$75,244	$0	$0	$12,231	$0	$7,806		
Total Phase Element Cost	$63,774	$4,871	$75,244	$0	$0	$12,231	$0	$7,806	$100,153	$163,927
							Escalation			$119,125
						Escalated Phase Element Cost				$283,052

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:39:04 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 26 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:39:19 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2031 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	46.00	EA	8.29	0.00	0.00	$381.33	☐
33020402	Decontamination Materials per Sample	46.00	EA	7.46	0.00	0.00	$343.01	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	2,075.00	LF	0.43	0.00	0.00	$897.02	☐
33021509	Water Quality Parameter Testing Device	2.00	WK	236.67	0.00	0.00	$473.35	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	46.00	EA	176.55	0.00	0.00	$8,121.16	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	46.00	EA	140.27	0.00	0.00	$6,452.48	☐
33230510	4" Submersible Pump Rental, Week	2.00	WK	238.74	0.00	0.00	$477.48	☐
33231186	Well Development Equipment Rental (weekly)	2.00	WK	236.67	0.00	0.00	$473.35	☐
				Total Element Cost			**$17,619.17**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:39:19 PM

Phase Element Technology Cost Detail Report (without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	24.00	MI	0.37	0.00	0.00	$8.91	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	401.00	HR	0.00	42.32	0.00	$16,970.56	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	96.00	HR	0.00	28.24	0.00	$2,711.45	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐

Total Element Cost	**$46,155.30**
Total 1st Year Technology Cost	**$63,774.47**
Total Phase Element Cost	**$63,774.47**

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:39:19 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 26 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2031
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:39:35 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
								Escalation		$2,065
								Escalated Phase Element Cost		$4,908

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:39:35 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 26 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:39:48 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2031 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:39:48 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 26 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2031
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:40:04 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Five-Year Review	$7,546								$14,553	$22,099
(100% Prime)		$1,638	$10,329	$0	$0	$1,578	$0	$1,007		
Total Phase Element Cost	$7,546	$1,638	$10,329	$0	$0	$1,578	$0	$1,007	$14,553	$22,099
							Escalation			$16,059
						Escalated Phase Element Cost				$38,158

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:40:04 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 26 - 5-year Review
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:40:19 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2031 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Five-Year Review

Element: Document Review

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	8.00	HR	0.00	70.31	0.00	$562.47	☐
33220105	Project Engineer	9.00	HR	0.00	52.05	0.00	$468.48	☐
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	13.00	HR	0.00	40.40	0.00	$525.15	☐
				Total Element Cost			**$1,852.34**	

Element: Interviews

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	10.00	HR	0.00	70.31	0.00	$703.08	☐
				Total Element Cost			**$703.08**	

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	7.00	HR	0.00	52.05	0.00	$364.37	☐

Phase Element Technology Cost Detail Report (without Markups)

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220108	Project Scientist	7.00	HR	0.00	42.32	0.00	$296.24	☐
33220109	Staff Scientist	8.00	HR	0.00	40.40	0.00	$323.17	☐
				Total Element Cost			**$1,335.33**	

Element: Report

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33220102	Project Manager	5.00	HR	0.00	70.31	0.00	$351.54	☐
33220105	Project Engineer	14.00	HR	0.00	52.05	0.00	$728.74	☐
33220108	Project Scientist	12.00	HR	0.00	42.32	0.00	$507.85	☐
33220109	Staff Scientist	24.00	HR	0.00	40.40	0.00	$969.51	☐
				Total Element Cost			**$2,557.64**	

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	3.00	DAY	50.33	0.00	0.00	$151.00	☐
33010202	Per Diem (per person)	3.00	DAY	149.00	0.00	0.00	$447.00	☑
33041101	Airfare	1.00	LS	500.00	0.00	0.00	$500.00	☑

Phase Element Technology Cost Detail Report
(without Markups)

Element: Travel

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
				Total Element Cost			**$1,098.00**	
			Total 1st Year Technology Cost				**$7,546.39**	
				Total Phase Element Cost			**$7,546.39**	

Cost Database Date: 2003

Cost Type: User-Defined

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Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 27 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2032
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
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Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$2,140
							Escalated Phase Element Cost			$4,983

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:41:20 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 27 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:41:41 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2032 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:41:41 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 28 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2033
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:42:09 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$2,214
							Escalated Phase Element Cost			$5,057

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:42:09 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 28 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:42:24 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2033 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:42:24 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 29 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2034
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:42:42 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$2,289
							Escalated Phase Element Cost			$5,132

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:42:42 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 29 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:42:57 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2034 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:42:57 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 30 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2035
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:43:16 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
Monitoring	$63,774								$100,153	$163,927
(100% Prime)		$4,871	$75,244	$0	$0	$12,231	$0	$7,806		
Total Phase Element Cost	$63,774	$4,871	$75,244	$0	$0	$12,231	$0	$7,806	$100,153	$163,927
							Escalation			$136,305
						Escalated Phase Element Cost				$300,232

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:43:16 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 30 - Long-Term Monitoring
Type: Long Term Monitoring
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:43:29 PM

Phase Element Technology Cost Detail Report (without Markups)

Start Date: 01/01/2035 **O&M Markup Template:** N/A

Phase Element Technology Cost Detail Report (without Markups)

Technology: Monitoring (12 - months only)

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33020401	Disposable Materials per Sample	46.00	EA	8.29	0.00	0.00	$381.33	☐
33020402	Decontamination Materials per Sample	46.00	EA	7.46	0.00	0.00	$343.01	☐
33020561	Nylon Tubing, 1/4" Outside Diameter	2,075.00	LF	0.43	0.00	0.00	$897.02	☐
33021509	Water Quality Parameter Testing Device	2.00	WK	236.67	0.00	0.00	$473.35	☐
33022131	Purgeable Halocarbons (SW 5030B/SW 8021B Halocarbons), Water Analysis	46.00	EA	176.55	0.00	0.00	$8,121.16	☐
33022132	Purgeable Aromatics (SW 5030B/SW 8021B Aromatics), Water Analysis	46.00	EA	140.27	0.00	0.00	$6,452.48	☐
33230510	4" Submersible Pump Rental, Week	2.00	WK	238.74	0.00	0.00	$477.48	☐
33231186	Well Development Equipment Rental (weekly)	2.00	WK	236.67	0.00	0.00	$473.35	☐
				Total Element Cost			**$17,619.17**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:43:29 PM

Phase Element Technology Cost Detail Report
(without Markups)

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
33010104	Car or Van Mileage Charge	24.00	MI	0.37	0.00	0.00	$8.91	☐
33220102	Project Manager	24.00	HR	0.00	70.31	0.00	$1,687.40	☐
33220105	Project Engineer	120.00	HR	0.00	52.05	0.00	$6,246.37	☐
33220108	Project Scientist	401.00	HR	0.00	42.32	0.00	$16,970.56	☐
33220109	Staff Scientist	360.00	HR	0.00	40.40	0.00	$14,542.60	☐
33220112	Field Technician	96.00	HR	0.00	28.24	0.00	$2,711.45	☐
33220114	Word Processing/Clerical	96.00	HR	0.00	23.41	0.00	$2,246.94	☐
33220115	Draftsman/CADD	48.00	HR	0.00	36.27	0.00	$1,741.07	☐

Total Element Cost	**$46,155.30**
Total 1st Year Technology Cost	**$63,774.47**
Total Phase Element Cost	**$63,774.47**

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:43:29 PM

Phase Element Cost Detail Report
(with Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers: **Material** 1.0807 (Modified)
Labor 1.4603 (Modified)
Equipment 1.0248 (Modified)
Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 30 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Start Date: 01/01/2035
Description: GIS Maintenance

Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults
O&M Markup Template: N/A

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:43:46 PM

Phase Element Cost Detail Report
(with Markups)

Technology	Direct Cost	General Conditions	Overhead	Sub Profit	Prime Markup on Sub	Prime Profit	Risk	Owner Cost	Markup Total	Total
ACCESS RESTRICTIONS (100% Prime)	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
Total Phase Element Cost	$1,610	$402	$483	$0	$0	$212	$0	$135	$1,233	$2,843
							Escalation			$2,363
							Escalated Phase Element Cost			$5,206

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:43:46 PM

Phase Element Technology Cost Detail Report
(without Markups)

Folder: EAFB OU6

Project

Name: OU6 FS
ID: OU6
Location: EDWARDS AFB, CALIFORNIA
Modifiers:

Material	1.0807	(Modified)
Labor	1.4603	(Modified)
Equipment	1.0248	(Modified)

Category: None
Report Option: Calendar Year
Description: ou6 fs cal

Site

Name: Dryden - Source Cont. & Hydr. Cont. w/ GW Monit.
ID: Dryden
Type: None
Description: Chemical oxidation at source area at OU6 TCE plume and hydrologic control with groundwater monitoring

Phase Element

Name: Calendar Year 30 - Access Restrictions
Type: Remedial Action
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Approach: None
Media/Waste Type: Groundwater
Secondary Media/Waste Type: N/A
Contaminant: Volatile Organic Compounds (VOCs)
Secondary Contaminant: None
Markup Template: System Defaults

Cost Database Date: 2003
Cost Type: User-Defined
Print Date: 05/24/2004 7:44:01 PM

Phase Element Technology Cost Detail Report
(without Markups)

Start Date: 01/01/2035 **O&M Markup Template:** N/A

Description: GIS Maintenance

Phase Element Technology Cost Detail Report
(without Markups)

Technology: ACCESS RESTRICTIONS

Element: N/A

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Cost Override
95010403	GIS Comp Operator	24.00	HR	0.00	67.07	0.00	$1,609.76	☑
				Total Element Cost			**$1,609.76**	
			Total 1st Year Technology Cost				**$1,609.76**	
				Total Phase Element Cost			**$1,609.76**	

Cost Database Date: 2003

Cost Type: User-Defined

Print Date: 05/24/2004 7:44:01 PM

Markups Template Preferences Report

Template: System Defaults

Description	Professional Labor	Craft Labor	Materials	Equipment
Prime General Conditions < 10,000	25.00	25.00	17.00	40.00
Prime General Conditions 10,000 to 25,000	15.00	20.00	12.00	30.00
Prime General Conditions 25,001 to 50,000	10.00	17.50	10.00	20.00
Prime General Conditions 50,001 to 100,000	7.50	15.00	8.00	15.00
Prime General Conditions 100,001 to 250,000	5.00	12.00	6.50	10.00
Prime General Conditions 250,001 to 500,000	5.00	10.00	5.00	8.00
Prime General Conditions > 500,000	5.00	8.00	5.00	6.00
Prime Overhead	160.00	30.00	8.00	8.00
Sub General Conditions < 10,000	25.00	25.00	17.00	40.00
Sub General Conditions 10,000 to 25,000	15.00	20.00	12.00	30.00
Sub General Conditions 25,001 to 50,000	10.00	17.50	10.00	20.00
Sub General Conditions 50,001 to 100,000	7.50	15.00	8.00	15.00
Sub General Conditions 100,001 to 250,000	5.00	12.00	6.50	10.00
Sub General Conditions 250,001 to 500,000	5.00	10.00	5.00	8.00
Sub General Conditions > 500,000	5.00	8.00	5.00	6.00
Sub Overhead	160.00	30.00	8.00	8.00

Prime Markup on Sub	3.5
Prime Profit	8.5
Risk (Contingency)	0
Owner Cost	5
Sub Profit	8.5

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