

**GROUP 8 – WESTERN PORTION OF AREA IV  
RCRA FACILITY INVESTIGATION REPORT  
SANTA SUSANA FIELD LABORATORY  
VENTURA COUNTY, CALIFORNIA**

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***VOLUME III – RFI SITE REPORTS***

***APPENDIX C***

***EMPIRE STATE ATOMIC DEVELOPMENT AUTHORITY AREA (SWMU 7.9)***


**Prepared For:**


**THE BOEING COMPANY**

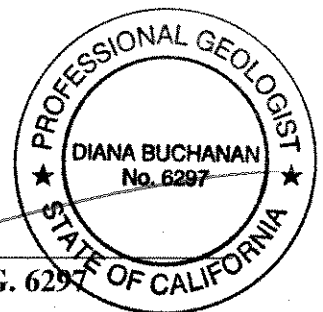
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## APPENDIX C TABLE OF CONTENTS

<b><u>Section No.</u></b>	<b><u>Page No.</u></b>
<b>C.1 INTRODUCTION.....</b>	<b>1-1</b>
C.1.1 Report Organization.....	1-2
C.1.2 Historical Reference Documents .....	1-3
<b>C.2 SITE HISTORY, CHEMICAL USE AND CURRENT CONDITIONS.....</b>	<b>2-1</b>
C.2.1 SWMUs and AOCs at the ESADA RFI Site .....	2-2
C.2.2 ESADA RFI Site History .....	2-2
C.2.3 ESADA RFI Site Chemical Use Areas .....	2-6
C.2.4 Site Conditions.....	2-6
<b>C.3 NATURE AND EXTENT OF CHEMICAL IMPACTS .....</b>	<b>3-1</b>
C.3.1 Sampling Objectives .....	3-1
C.3.2 Sampling Scope .....	3-2
C.3.3 Key Decision Points.....	3-3
C.3.4 Soil Matrix and Soil Vapor Findings .....	3-4
C.3.6 Surface Water Findings.....	3-10
<b>C.4 RISK ASSESSMENT FINDINGS SUMMARY .....</b>	<b>4-1</b>
C.4.1 Key Decision Points.....	4-1
C.4.2 Human Health Risk Assessment Findings .....	4-2
C.4.3 Ecological Risk Assessment Findings .....	4-3
<b>C.5 ESADA RFI SITE ACTION RECOMMENDATIONS .....</b>	<b>5-1</b>
C.5.1 RFI Reporting Requirements .....	5-1
C.5.2 Basis for Site Action Recommendations .....	5-2
C.5.3 ESADA RFI Site Recommendations .....	5-4
<b>C.6 REFERENCES.....</b>	<b>6-1</b>

## LIST OF TABLES

### **Table No.**

C.2-1	ESADA RFI Site Building Inventory
C.2-2	ESADA RFI Site Tank Inventory
C.2-3	ESADA RFI Site Transformer Inventory
C.2-4	ESADA RFI Site Documented Chemical Use
C.3-1A	ESADA RFI Site Sampling Summary
C.3-1B	ESADA RFI Site Soil Vapor Sampling and Analytical Summary
C.3-1C	ESADA RFI Site Soil Matrix Sampling and Analytical Summary
C.3-2A	Description of Chemical Use Areas and Soil Sampling Results Summary
C.3-2B	ESADA RFI Site Summary and Evaluation of Groundwater Sampling Results
C.3-3A	ESADA RFI Site Analytical Data Screening Summary and Data Quality (Soil)
C.3-3B	ESADA RFI Site Analytical Data Screening Summary and Data Quality (Soil Vapor)
C.4-1	Chemicals of Potential Concern for Human Health
C.4-2	Human Health Risk Estimates B-19
C.4-3	Human Health Risk Assessment Uncertainty Analysis
C.4-4	Summary of Chemicals of Potential Ecological Concern
C.4-5	Risk Estimates for Ecological Receptors
C.4-6	Ecological Risk Assessment Uncertainty Analysis
C.5-1	ESADA RFI Site Surficial Media Site Action Recommendations
C.5-2	Summary of ESADA RFI Site Surficial Media CMS Recommendations



## LIST OF FIGURES

### **Figure No.**

C.1-1	Site Location Map
C.2-1	Chemical Use Areas
C.2-2	Sample and Trench Locations
C.2-3	Surficial Cross Sections A-A' and B-B'
C.2-4	Soil Disturbance Areas
C.3-1	Organics Chemical Data Results
C.3-2	Inorganics Chemical Data Results
C.4-1	Human Health Risk Assessment Conceptual Site Model
C.4-2	Ecological Risk Assessment Conceptual Site Model
C.5-1	ESADA RFI Site Surficial Media Site Action Recommendations

## LIST OF ATTACHMENTS

### **Attachment No.**

C-1	Regulatory Agency Correspondence (none to report)
C-2	Subsurface Information (Electronic Copy)
C-3	Data Quality, Validation and Laboratory Reports (Electronic Copies)

## LIST OF ACRONYMS AND ABBREVIATIONS

AI	Atomics International
AOC	Area of Concern
AMEC	AMEC Earth and Environmental
AST	aboveground storage tank
BBI	Brandeis-Bardin Institute
Boeing	The Boeing Company
bgs	below ground surface
B009 LF	Building 009 Leach Field
B056 Landfill	Building 056
B100	Building 100
B886	Building 886
BMP	best management practice
BTEX	benzene, toluene, ethylbenzene and xylenes
CCR	Current Conditions Report
CFOU	Chatsworth Formation Operable Unit
CHCF	Component Handling Cleaning Facility
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
COPC	chemical of potential concern
CPEC	chemical of potential environmental concern
CSM	conceptual site model
CTE	Central Tendency Exposure
DCA	dichloroethane
DCE	dichloroethene
DHS	Department of Health Services
DHS-RHB	Department of Health Services- Radiological Health Branch
Dioxins/Furans	(a) - <i>see table below</i>
Dowanol PM	Propylene glycol methyl ether
DOE	United States Department of Energy
DQO	Data Quality Objective
DTSC	Department of Toxic Substances Control
ECL	Environmental Chemistry Laboratory
EIR	Environmental Impact Report
EPC	exposure point concentration
ERA	ecological risk assessment
ESADA	Empire State Atomic Development Authority
ETEC	Energy Technology Engineering Center
FLUTe	Flexible Underground Liner Technology
FSDF	Former Sodium Disposal Facility

## LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

GRC	Groundwater Resource Consultants, Inc.
GWCC	groundwater comparison concentration
HRA	human health risk assessment
HAS	Historical Site Assessment
HQ	hazard quotient
HI	hazard index
H&A	Haley and Aldrich
HML	Hazardous Materials Laboratory
HSA	Historical Site Assessment
ICF	ICF Kaiser Engineers
ILCR	incremental lifetime cancer risk
IM	interim measures
IT	IT Corporation
LLID	large leak injector device
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
msl	mean sea level
MW	Montgomery Watson
NA	not applicable
NAA	North American Aviation
ND	not detected
NDMA	N-nitrosodimethylamine
NFA	no further action
NPDES	National Pollutant Discharge Elimination System
NSGW	near-surface groundwater
Ogden	Ogden Environmental and Energy Services Company, Inc.
OU	operable unit
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
pCi/g	picocuries per gram

## LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

PDU	Process Development Unit
pg/g	picograms per gram
ppb	parts per billion ( $\mu\text{g}/\text{kg}$ or $\mu\text{g}/\text{L}$ )
ppm	parts per million ( $\text{mg}/\text{kg}$ or $\text{mg}/\text{L}$ )
QA	quality assurance
RBSL	risk-based screening level
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RME	reasonable maximum exposure
Rocketdyne	Rocketdyne Propulsion and Power
Rockwell	Rockwell International
RWQCB	Los Angeles Regional Water Quality Control Board
SAIC	Science Applications International Corporation
SGR	Sodium Graphite Reactor
SRAM	Standardized Risk Assessment Methodology
SRE	Sodium Reactor Experiment
SSFL	Santa Susana Field Laboratory
Surficial OU	Surficial Media Operable Unit
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TEQ	toxicity equivalency quotient
TIC	tentatively identified compound
TOC	top of casing
TCE	trichloroethene
TPH	total petroleum hydrocarbons
USEPA	United States Environmental Protection Agency
$\mu\text{g}/\text{dl}$	micrograms per deciliter
$\mu\text{g}/\text{kg}$	micrograms per kilogram
$\mu\text{g}/\text{L}$	micrograms per liter
$\mu\text{g}/\text{Lv}$	micrograms per liter vapor
VOC	volatile organic compound
WPA	RFI Work Plan Addendum
WPAA	RFI Work Plan Addendum Amendments
ZrH <sub>2</sub>	zirconium hydride

**(a) Definition of dioxin/furan congeners**

PCDD/PCDDs	Polychlorinated dibenzo-p-dioxins/dibenzofurans
2,3,7,8-TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
1,2,3,7,8-PeCDD	1,2,3,7,8-pentachlorodibenzo-p-dioxin
1,2,3,4,7,8-HxCDD	1,2,3,4,7,8-hexachlorodibenzo-p-dioxin
1,2,3,6,7,8-HxCDD	1,2,3,6,7,8-hexachlorodibenzo-p-dioxin
1,2,3,7,8,9-HxCDD	1,2,3,7,8,9-hexachlorodibenzo-p-dioxin
1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin
OCDD	1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin
2,3,7,8-TCDF	2,3,7,8-tetrachlorodibenzofuran
1,2,3,7,8-PeCDF	1,2,3,7,8-pentachlorodibenzofuran
2,3,4,7,8-PeCDF	2,3,4,7,8-pentachlorodibenzofuran
1,2,3,4,7,8-HxCDF	1,2,3,4,7,8-hexachlorodibenzofuran
1,2,3,6,7,8-HxCDF	1,2,3,6,7,8-hexachlorodibenzofuran
2,3,4,6,7,8-HxCDF	2,3,4,6,7,8-hexachlorodibenzofuran
1,2,3,7,8,9-HxCDF	1,2,3,7,8,9-hexachlorodibenzofuran
1,2,3,4,6,7,8-HpCDF	1,2,3,4,6,7,8-heptachlorodibenzofuran
1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8,9-heptachlorodibenzofuran
OCDF	1,2,3,4,6,7,8,9-octachlorodibenzofuran
TEQ	Toxic Equivalency Quotient (normalized to 2,3,7,8 TCDD)



## C.1 INTRODUCTION

This appendix to the Group 8 Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report presents findings and recommendations based on the results of the investigation conducted at the Empire State Atomic Development Authority (ESADA) RFI Site of the Santa Susana Field Laboratory (SSFL). The ESADA RFI Site contains one Solid Waste Management Unit (SWMU), SWMU 7.9. The RCRA Corrective Action Program at the SSFL is being conducted under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC).

The ESADA RFI Site is one of four RFI sites included in the Group 8 RFI Report. The location of the ESADA RFI Site within the SSFL and Group 8 Reporting Area is shown on Figure C.1-1. An RFI Site is an area that includes at least one SWMU and/or an AOC (Area of Concern) and some adjacent land for the purpose of characterization. The other three Group 8 RFI sites are the Building 056 Landfill (B056 Landfill) (SWMU 7.1), the Former Sodium Disposal Facility (FSDF) (SWMU 7.3), and the Building 009 Leach Field (B009 LF) (an Area IV AOC). The ESADA RFI Site is located in the western portion of Area IV, south of the FSDF RFI Site (Figure C.1-1).

The ESADA RFI Site was operated by Atomics International (AI), a division of North American Aviation (NAA) and later of Rockwell International (Rockwell) (predecessor companies of The Boeing Company [Boeing]).

The SSFL RFI was conducted to (1) characterize the presence of SSFL-operation-related chemicals in environmental media; (2) estimate risks to human health and the environment (i.e., the ecosystem); (3) gather data for the next phase of RCRA Corrective Action the Corrective Measures Study (CMS); and, (4) identify areas for further work.

The SSFL has been divided into two operable units (OUs): the Surficial Media Operable Unit (Surficial OU) and the Chatsworth Formation Operable Unit (CFOU). The ESADA RFI Site characterization presented in this appendix comprises data for both the Surficial OU and the CFOU. The Surficial OU includes soil, sediment, surface water, air, biota, and near-surface groundwater (NSGW) at the SSFL. NSGW is defined as groundwater occurring within alluvium or weathered bedrock of the Chatsworth formation. The CFOU includes Chatsworth formation bedrock and deeper groundwater that occurs within the unweathered bedrock of the Chatsworth formation.

### C.1.1 Report Organization

This ESADA RFI Site Report provides detailed sampling data and evaluation pertaining to the ESADA RFI Site, including the relevant information needed to evaluate the completeness of characterization, risk assessment results, and site recommendations. This information is presented in sections organized as follows:

- **Section C.2 – Site History, Chemical Use, and Current Conditions.** Presents the site history and chemical use, and the current conditions including geology and groundwater conditions. Changes in site conditions and soil disturbance areas are described.
- **Section C.3 – Nature and Extent of Chemical Impacts.** Presents a summary of Surficial OU, NSGW, and CFOU characterization information for the ESADA RFI Site.
- **Section C.4 – Risk Assessment Findings Summary.** Presents a summary of the human health risk assessment (HRA) and ecological risk assessment (ERA) results. The complete ESADA RFI Risk Assessment is included in Appendix F, Attachment F3.
- **Section C.5 – Site Actions Recommendations.** Presents a summary of ESADA areas recommended for either (1) no further action (NFA), or (2) further evaluation in the CMS. CMS Areas recommended for stabilization measures to prevent contaminant migration are also identified, if any.
- **Section C.6 – References.** Includes a summary of cited references.

Site-specific additional information is provided in the following attachments:

- **Attachment C-1:** Site-specific regulatory agency documents and correspondence (none to report).
- **Attachment C-2:** Subsurface information (soil boring, trench, piezometer, and well logs).
- **Attachment C-3:** Data quality, validation, and laboratory reports.

Information regarding characterization for the ESADA RFI Site is provided in the following figures and tables:

- **Figure C.1-1:** Presents the location of the ESADA RFI Site within the SSFL and the Group 8 Reporting Area.
- **Figure C.2-1:** Presents a view of the ESADA RFI Site, showing known and potential chemical use areas. Tables C.2-1 through C.2-4 present summaries of buildings, tanks, transformers, and chemicals used at the ESADA RFI Site.
- **Figure C.2-2:** Presents a view of the ESADA RFI Site, showing soil and vapor sampling locations, cross-section locations, and nearby monitoring wells.



- Figure C.2-3: Presents geologic cross-sections across the ESADA RFI Site.
- Figures C.3-1 and C.3-2: Present characterization details for all soil and vapor sampling at the ESADA RFI Site. Soil and vapor sampling results are shown on the maps and correlate with appropriate sections of Table C.3-2A.
- Table C.3-2B: Presents a summary of groundwater characterization.

Information regarding Group 8 area-wide conditions, transport and fate of chemicals between RFI sites, and other evaluations of area-wide issues are contained in the Group 8 RFI Report and appendices. Pertinent appendices to this Group 8 RFI Report are:

- **Appendix E:** Presents information regarding groundwater conditions in the Group 8 Reporting Area, including the ESADA RFI Site. Information includes groundwater occurrence and quality, chemical transport, data set representativeness, and supporting data (monitoring results, time-series plots, and hydrographs), as well as an evaluation of naturally occurring constituents.
- **Appendix F:** Presents risk assessment information, including risk calculations, result tables, all transport and fate modeling (except groundwater), and a description of any methodology variances from the Standardized Risk Assessment Methodology (SRAM) Work Plan.

### C.1.2 Historical Reference Documents

Historical documents for the Group 8 Reporting Area are being submitted to DTSC along with this report (Boeing, 2007). These documents represent a compilation of information from multiple sources that were searched in an attempt to find SSFL documents relevant to the Group 8 RFI. Included in the document submittal are the available photographs, maps and drawings, manifests, memoranda, tabulations, facility records, correspondence, and reports relevant to site operations and types and sources of chemicals that may have been used, handled, or released in the Group 8 Reporting Area. Documents pertaining to the entire SSFL are also included if they have relevant information also specific to Group 8. These documents were reviewed to (1) determine the history of site operations, (2) identify areas of known or potential chemical use for evaluation in the RFI, (3) compile site characterization data, and (4) identify areas where additional data were required to adequately characterize environmental site conditions. The results of the historical document review and sampling data collected relevant to the ESADA RFI Site are presented in this Site Report. This document review, coupled with the site characterization data, provides a solid basis for the recommendations provided in Section C.5 of this report, including areas that are recommended for further evaluation in the CMS and areas that are recommended for NFA.

It is worth noting that information presented in this report is supplemented by other environmental reports that contain information about site and facility background, Surficial OU Program background, and methodologies/procedures. Key historical documents are listed below with brief descriptions:

- RCRA Facility Assessment (RFA) (Science Applications International Corporation [SAIC], 1991 and 1994). This report contains:
  - A brief description of the SSFL facility, including an operational history, physical setting information, and regulatory programs and oversight during the late 1980s and early 1990s.
  - Visual inspection records performed at facility operations.
  - Definition and description of SWMUs and AOCs identified during the assessment.
- Current Conditions Report (CCR) (ICF Kaiser Engineers [ICF], 1993). This report contains:
  - A general description of the SSFL facility, including an operational history, physical setting information, and regulatory programs and oversight during the late 1980s and early 1990s.
  - Description of SWMUs and AOCs, including presentation of results from environmental sampling performed to assess current conditions.
  - A draft work plan for further investigation during the RFI for selected SWMUs and AOCs.
- RFI Work Plan Addendum (WPA) [Ogden Environmental and Energy Services Company, Inc. (Ogden), 1996], RFI Work Plan Addendum Amendments (WPAA); Ogden 2000a and b]. These reports contain:
  - Sampling procedures and rationale.
  - RFI site descriptions and operational history.
  - Shallow groundwater characterization sampling and analysis plan for the SSFL.
- RFI Program Report (MWH, 2004). This report contains:
  - A general description of the SSFL facility, including an operational history, physical setting information, and regulatory programs and oversight.
  - A summary of the RCRA Corrective Action Program being conducted at the SSFL and a description of the OUs.
  - A comprehensive description of the Surficial OU field sampling program, including work plans followed, overall sampling scope, sampling methods and subcontractors used, and protocol followed.
  - Details of the analytical program for the Surficial OU RFI, including laboratories used, data validation findings, and Data Quality Assessment findings.

- Programmatic key decision points or significant issues that influenced sampling, laboratory procedures, methodologies, or step-out requirements.
- Standardized Risk Assessment Methodology (SRAM) Work Plan, Revision 2 (MWH, 2005). This report contains:
  - Procedures for completing HRAs and ERAs.
  - Background soil concentrations and groundwater comparison concentrations (GWCC).
  - A biological conditions report for the SSFL.
- Near-Surface Groundwater Characterization Report (MWH, 2003b). This report contains:
  - Nature and extent of near-surface groundwater at the SSFL.
  - Distribution, transport, and fate of trichloroethene (TCE) and other chemicals of concern, and the relationship of NSGW to CFOU groundwater.
- CFOU Characterization Reports (Montgomery Watson, 2000; MWH, 2002 and 2003a). These reports contain:
  - Geologic framework at the SSFL and hydrogeologic conditions of both NSGW and CFOU groundwater.
  - Transport and fate of TCE, and the occurrence and transport of other chemicals of concern in the CFOU.
- Annual and quarterly groundwater monitoring reports, including:
  - Annual Groundwater Monitoring Report (Haley & Aldrich, Inc. [H&A], 2006a).
  - First Quarter 2006 Groundwater Monitoring Report (H&A, 2006b).
  - Second Quarter 2006 Groundwater Monitoring Report (H&A, 2006c).
  - Third Quarter 2006 Groundwater Monitoring Report (H&A, 2006d).
- Historical Site Assessment (Sapere, 2005). This report contains:
  - Facility descriptions and historical operational information for all buildings in Area IV.
  - Information regarding demolition activities, radiological surveys, releases, and removal actions conducted for radiological areas within Area IV.

## **C.2 SITE HISTORY, CHEMICAL USE AND CURRENT CONDITIONS**

The ESADA RFI Site is approximately 1.5 acres and is located in the western portion of Area IV at the SSFL. The site location within the SSFL is shown on Figure C.1-1, and this figure also shows the Group 8 Reporting Area boundary. The site layout and the locations of identified and potential chemical use areas are shown on Figure C.2-1. The sampling locations and the locations of surficial cross-sections across the site are shown on Figure C.2-2.

During the RFA, various SMWUs and AOCs within the SSFL were identified. The ESADA Chemical Storage Yard (now referred to as the ESADA Former Storage Yard) was identified as SWMU 7.9 in the RFA (SAIC, 1994). No other SWMUs or AOCs were identified within the boundary of the ESADA RFI Site as it is defined in this report (Figure C.2-1).

A comprehensive review of historical documents generated during facility operations or in subsequent environmental investigations was performed to identify known or potential chemical use areas at or near the ESADA RFI Site. As provided in the documents submitted in conjunction with this report (Boeing, 2007), thousands of records (some dating back to 1957) were reviewed to identify areas of potential environmental concern at the Group 8 RFI sites or elsewhere within the Group 8 Reporting Area. As described in Section 1, documents reviewed included facility operational reports, maps and drawings, internal and external correspondence, regulatory compliance information, historical and aerial photographs, facility personnel interview records, and previous environmental reports. Based on a comprehensive review of this compiled information, the ESADA RFI Site boundary was defined to include operations associated with the SWMU identified above, but also nearby facilities or features that warranted assessment in the RFI. These include the ESADA Pistol Range, located east of the former storage yard, the transformer in the area northwest of the ESADA Pistol Range, and two horizontal storage tanks formerly located north of the former storage yard. Known and potential chemical use areas at the ESADA RFI Site are shown on Figure C.2-1.

The following sections describe the SWMU, site history and operations, chemical uses, and current conditions at the ESADA RFI Site.

### **C.2.1 SWMUs and AOCs at the ESADA RFI Site**

The ESADA RFI Site was used for testing pipe strength during sodium-water reactions, drum storage, and includes a pistol range area. The ESADA RFI Site contains a single SWMU (SAIC, 1994), SWMU 7.9. A brief description of this SWMU is presented below.

#### **ESADA Area (SWMU 7.9)**

The ESADA area was identified as SWMU 7.9 during the RFA (SAIC, 1991 and 1994). The site was used primarily in the 1960s for testing piping burst characteristics under sodium-water reaction conditions at Building 814. Underground piping connected Building 814 to a down-slope, concrete-lined submergence pit in the southeast section of the FSDF, just north of Building 886 (DOE, 2000). This pit is identified as the Concrete Pool in the FSDF RFI Site report (Chemical Use Area 1d at FSDF, Appendix D). The concrete pool was used for the cleaning of alkali bearing components. Following the late 1960s, the ESADA area was used for drum storage and surrogate fuel pellet testing, and the eastern portion of the site was used as a pistol range.

Sections C.2.2 and C.2.3 of this report provide a site chronology and a description of chemical uses at the ESADA RFI Site. A total of nine buildings formerly existed at the site (Table C.2-1). All buildings have been demolished.

### **C.2.2 ESADA RFI Site History**

A summary of the site chronology, including descriptions of site operations and investigation activities for the ESADA RFI Site, is presented below. Facility correspondence, investigation reports, waste disposal records, facility maps, drawings, photographs, and personnel interview records were reviewed and evaluated to compile the site history information presented below (Boeing, 2007). Primary sources of information include the following:

- RFA (SAIC, 1991 and 1994)
- CCR (ICF, 1993)
- RFI WPA (Ogden, 1996)
- SSFL Aerial Photographic Analysis (USEPA, 1997)
- Area IV HSA (Sapere, 2005)

- Investigation of Soil and Shallow Groundwater Conditions (GRC, 1989); and,
- ESADA SGR Development Program. Quarterly Progress Report, April – June, 1964 (AI, 1964b)

### **Site Chronology**

1964 – 1968	<p>Sodium-water tests were conducted at the Building 814 test structure. Building 814 was a large leak injector device (LLID), where heated sodium, high-pressure water, and steam flowed via tubes and piping to a test section to simulate tube failure in a sodium graphite reactor (SGR). To initiate the tests, discs that blocked the high-pressure water and steam lines from the test section were mechanically ruptured (Rockwell, 1964a). The main components of the test structure included a 2-foot diameter by 2-foot long horizontally-mounted steam supply boiler (Tank B-1), a high-pressure water supply tank (T-2), a 220-gallon sodium storage tank (T-4), and a 6-foot diameter by 14.5-foot high reaction products relief tank (T-5).</p> <p>The electrical enclosure panels and circuit breakers for Building 814 were housed at Building 514, located just southeast of the test area and outside the Building 814 perimeter fence. Site personnel would control, observe, and record the sodium-water tests and results from Building 314, where the controls for Building 814 were housed (Sapere, 2005). A pipe rack that housed the control wires leading to Buildings 814 and 514 were constructed above ground and ran along the southern perimeter of the ESADA Former Storage Yard. A personnel observation bunker and a retaining wall covered by an earthen fill were constructed on the west side of Building 514, facing the test area.</p> <p>Asbestos was used in the construction of the Building 814 test structure (Rockwell, date not specified).</p>
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1966 – 1973	Zirconium hydride (ZrH <sub>2</sub> ) covered surrogate pellets were tested in the eastern portion of the ESADA RFI Site. Tests were conducted at the Isotope Impact Test Device (Building 820), and test controls were located in Building 730, which served as the control building. The process involved the firing of a small mass of ZrH <sub>2</sub> fuel into a granite target. This was repeated 12 times at varying velocities. The experiments were conducted in an enclosed casing with three openings: two for camera lenses and one for the projectile (Sapere, 2005). Reviewed documents did not indicate that these were radioactive fuel pellets (Sapere, 2005; Boeing, 2007).
1970s – 1983	The portion of the ESADA Former Storage Yard south of the asphalt road (the southern storage area) was used for the storage of more than 500 drums containing Dowanol <sup>TM</sup> glycol ethers and ethanol, and empty drums (number unspecified in reviewed documents). Approximately 120 drums contained Dowanol PM (propylene glycol methyl ether), which was nearly saturated with sodium. The Dowanol PM was used to clean piping and components at the Sodium Reactor Experiment (SRE) RFI Site in northeast section of Area IV of the SSFL (AI, 1964b). Over 400 of the drums contained denatured ethanol. The ethanol drums had varying concentrations of sodium, and some of them were known to have leaked (Rockwell, 1983b). In addition, approximately 100 empty drums were located north of the road (the northern storage area) (Rockwell, 1983a). The drums were removed in 1983. The alcohol waste was sent to the Component Handling Cleaning Facility (CHCF), Building 463, located in the Building 100 (B100) Trench RFI Site (SWMU 7.5), and the sodium waste went to Energy Technology Engineering Center (ETEC) (specific location was not identified) (SAIC, 1994).
1980 – 1995	The ESADA Pistol Range was constructed in the southeastern portion of the site, in the area formerly used for surrogate fuel pellet testing. SSFL site security personnel would conduct firearm practice by firing shot gun and hand gun rounds from Buildings 317 and 318 at targets that were placed in front of an earthen berm located along the southeast site boundary, approximately 90 feet south of the firing locations. Approximately 8,500 pounds of lead shot were used at the ESADA Pistol Range during this time (Boeing, 1999).

1986	A small fire at the ESADA Pistol Range destroyed eight of the target positions (approximately two thirds of the target backboard structure). The fire was caused by a re-kindling of smoldering ashes and debris from a recent nearby fire. It was quickly brought under control by site personnel (Rockwell, 1986).
1989	An asbestos renovation activity was conducted at the ESADA RFI Site. Approximately 81 square feet of tank insulation and 15 linear feet of pipe insulation were removed from the site (Rockwell, 1989a).
1991	Building 814 was removed from the site (DOE, 2000).
1995	The 100-foot by 150-foot storage area west of Building 314 was demolished, and the area was regraded (Ogden, 1996).
1995	The ESADA RFI Site was included in the Area IV Radiological Survey performed by Rockwell to locate and characterize any previously unknown areas of elevated radioactivity in area IV. Radiation levels were found to be indistinguishable from background levels (Rockwell, 1996).
2000	The northern portion of the ESADA area was regraded during remedial activities at the adjacent FSDF RFI Site to route surface water drainage from south of H Street into a ditch and through a culvert into a swale which runs along the eastern side of FSDF and Channel B (Shaw, 2002).

### **Site Inventories**

Inventories of buildings, tanks, transformers, and chemicals used at the ESADA RFI Site were compiled during preparation of this RFI report. Historical reports and facility drawings were reviewed, and visual site inspections were conducted. The locations of identified buildings, tanks, and transformers are shown on Figure C.2-1. The inventories are included as the following tables:

- Building inventory – Table C.2-1
- Fuel and solvent storage tank inventory – Table C.2-2
- Transformer inventory – Table C.2-3
- Documented chemical use – Table C.2-4



### **C.2.3 ESADA RFI Site Chemical Use Areas**

Chemical use areas are locations where chemicals were documented to have been (or potentially may have been) used, stored, spilled, discharged and/or disposed of. Chemical use areas at the ESADA RFI Site are shown on Figure C.2-1 and described in detail in Section C.3. The five ESADA RFI Site chemical use areas evaluated at or near the site are listed below in order of chemical use area number:

- 1 – ESADA Former Storage Yard
- 2 – ESADA Sodium Test Area
- 3 – Former Process Development Unit (PDU) Aboveground Storage Tank (AST) Area
- 4 – ESADA Pistol Range
- 5 – Transformer Area

The site characterization information is described relative to these chemical use areas in Section C.3.

### **C.2.4 Site Conditions**

This section provides summaries of site conditions near the ESADA RFI Site, including topography, geology, soils, groundwater, surface water, seeps and springs, and biology.

#### **General Conditions and Topography**

The ESADA RFI site is located in the western portion of Area IV. The site is currently inactive and vacant, with no remaining structures. The concrete foundations from Buildings 314, 317, and 318 are still in place, as is the concrete pad in the former surrogate fuel pellet testing area (Building 820). The site entrance road, the road that divides the northern and southern portions of the ESADA Former Storage Yard, and the site parking lot are still paved with asphalt.

The portion of the site where operations occurred is flat, with a relatively steep topographic rise to the south and a gentle descending slope to the north. Current surface elevations at the ESADA RFI Site range from a low of approximately 1,870 feet above mean sea level (msl) near the boundary with FSDf to a high of approximately 1,900 feet msl along the southern edge of the RFI site. Topography for the site is shown in two geologic cross sections, one

oriented west-east, and one oriented southwest-northeast through the middle of the ESADA RFI Site (Surficial Cross Section A-A' and B-B; Figure C.2-3). Locations of the cross-sections are shown on Figure C.2-2.

As described above, the buildings and most concrete foundations have been removed at the site. Historical aerial photographs from the mid- to late-1970s and 1988 show soil disturbance areas west of the ESADA RFI Site, extending to the east toward the solar concentrator facility at the B009 LF RFI Site (Figure C.2-4; see also Volume I Figure 3-2). Adjacent to the ESADA area, a soil scarp was created and it appears this area may have been used as a soil borrow area. Facility records do not indicate any chemical use in this area (Boeing, 2007). During the 1990s and in 2000, remedial activities at the nearby FSDF RFI Site altered the regional surface topography through extensive excavation, backfilling, and regrading. In 2000, in order to minimize surface water flow across the FSDF area, the grading in the northern ESADA area was revised to route surface water from south of H Street into a ditch and through a culvert into a swale which runs along the eastern side of FSDF and Upper Channel B (Shaw, 2002).

These soil disturbance features predate RFI sampling, so the recorded soil sample depths represent the depths from current surface grade. The extent of soil disturbance at the ESADA RFI Site is shown in relationship to soil sampling locations on Figure C.2-4.

### **Geology**

The Burro Flats Fault, located in the southern part of the Group 8 Reporting Area, strikes approximately east-west in the vicinity of the ESADA RFI Site (Dibblee, 1992; MWH, 2002). The ESADA RFI Site is located in proximity of the Upper Burro Flats member of the Upper Chatsworth formation to the north of the fault, and the Santa Susana formation to the south of the fault. A series of deformation bands is also present north and northeast of the ESADA RFI Site. These deformation bands generally strike northeast-southwest and have currently been defined by geologic site mapping to comprise the western extent of the North Fault zone (MWH, 2002).

Beds of the Upper Burro Flats member generally strike N70°E and dip 25°NW. The Upper Burro Flats member is predominantly composed of medium-grained sandstone with minor interbeds of siltstone and shale. The Santa Susana formation is predominantly composed of micaceous claystone and siltstone, with a few minor sandstone beds (Dibblee, 1992). The

locations of the Burro Flats Fault and the deformation bands are shown on Plate E-1 in Appendix E. Additional geologic information is presented in Appendix E of the Group 8 RFI Report.

### **Soils**

Based on geologic logs prepared for soil borings throughout most of the ESADA RFI Site, soils are generally thin, typically ranging from approximately 3 feet to 14 feet thick. A map depicting the distribution of alluvial soils within the Group 8 Reporting Area is provided as Figure 2-4 in the Group 8 RFI Report (Volume I). Soils at the ESADA RFI Site consist primarily of sandy silt, with clay, sand, and trace gravel. Clayey soils in the area are common, likely due to the presence of the Santa Susana formation to the south. Weathered sandstone and siltstone underlie the unconsolidated alluvium. Soil boring logs are included as Attachment C-2 to this appendix.

### **Groundwater**

The groundwater system and monitoring network in RFI Group 8 is described in detail in Appendix E. Figure C.2-1 shows well locations in and around the ESADA RFI Site. NSGW

NSGW is only present at the ESADA RFI Site (in well RS-23) following significant rainfall events (MWH, 2003b), and has been measured at depths as shallow as approximately 6 feet below the top of the well casing (TOC) (1,881 feet msl). Chatsworth formation groundwater beneath the ESADA RFI Site is monitored at well RD-50 (Figure C.2-1). In this area, Chatsworth formation groundwater is encountered at depths ranging from approximately 38 feet below the TOC to 112 feet below the TOC (1,877 feet msl to 1,803 feet msl). Groundwater levels in RD-50 are typically 30 to 70 feet below those monitored in NSGW well RS-23. However, on several occasions the groundwater level in RD-50 has risen to elevations consistent with the weathered bedrock zone monitored by RS-23. Thus, both perched and continuous NSGW conditions are considered likely at the ESADA RFI Site.

Chatsworth formation groundwater flow is toward the northwest. Estimated horizontal gradients in the vicinity of the ESADA RFI Site are approximately 0.1 foot/foot, based on recent groundwater level measurements. Since groundwater levels are highly variable in RD-50 as described above, lateral groundwater gradients in the vicinity of the ESADA RFI Site can also vary widely. Additional information on groundwater occurrence and flow is provided in Appendix E.

### **Surface Water**

Surface water flow at the ESADA RFI Site is shown on Figure 2-7B of the Group 8 RFI Report (Volume I). Surface water exists intermittently at the site primarily as the result of seasonal precipitation events. With the exception of the northeast corner of the ESADA RFI Site, surface water discharge is via sheet flow to the northeast toward the FSDF RFI Site. Surface flow is into a diversion channel that was constructed during the 2000 FSDF interim measures (IM) to divert water around the FSDF excavation area. This diversion drainage also receives surface water flow from the southern portion of the FSDF RFI Site (south of the dirt road), and this water flows to the northeast into a culvert beneath H Street. The culvert discharges into a north-east trending drainage (Channel B) along the east side of the FSDF RFI Site. Prior to the IM, surface water flow at the ESADA RFI Site was generally similar; however, the southern diversion channel did not exist, so sheet flow across the road into the southern portion of the FSDF site and then into the northeast drainage (now Channel B) may have occurred.

Surface water runoff at the site is regularly monitored as part of the National Pollutant Discharge Elimination System (NPDES) monitoring program under the oversight of the Regional Water Quality Control Board (RWQCB). Storm water discharge from the ESADA RFI Site is directed as described above toward NPDES Outfall 006, in the northern portion of the FSDF RFI Site (see Volume I, Figure 2-7B).

### **Seeps and Springs**

No seeps or springs are located within or near the ESADA RFI Site. Seeps and springs near the Group 8 Reporting Area are described in Appendix E.

### **Biology**

Biological conditions at the ESADA RFI Site, including vegetation types and sensitive species, are shown on Figure 2-13 of the Group 8 RFI Report (Volume I). The majority of the area within the RFI site boundary contains non-native, annual grassland. Areas of ruderal habitat are also found within the site. Areas surrounding the ESADA area are mapped as chaparral, nonnative grassland, or coast live oak woodland. Only one sensitive species, the Santa Susana tarplant, has been identified at the ESADA RFI Site, while species including mule deer, San Diego black tailed jackrabbit, and Plummer's mariposa lily are located in the vicinity of the site.

During the September/October 2005 Topanga Fire, no vegetation within the ESADA RFI Site boundary was burned (MWH, 2006b). However, much of the surrounding area was burned, and significant ash was deposited.

In June 2007, reconnaissance-level vegetation mapping was conducted at the Group 8 RFI Sites in support of the site-specific ecological risk assessment. The vegetation map is included as Attachment F6 of Appendix F.

### **C.3 NATURE AND EXTENT OF CHEMICAL IMPACTS**

This section describes the data used to define the nature and extent of chemical impacts to environmental media at the ESADA RFI Site. The presentation includes sampling objectives, scope, key decision points related to characterization activities, and findings.

Transport and fate evaluations are discussed in the following sections of the report:

- Group 8 RFI Report, Section 5, Contaminant Transport and Fate - Potential migration via surface water flow
- Group 8 RFI Report Appendix E, Groundwater Characterization - Potential migration from soil to groundwater, and groundwater migration
- Group 8 RFI Report Appendix F, Risk Assessment - Potential volatile organic compound (VOC) migration from groundwater to soil, soil to indoor air

#### **C.3.1 Sampling Objectives**

Soil and sediment samples were collected to characterize the extent of potential chemical impacts at the ESADA RFI Site. As described in Section 1, extensive historical documents (Boeing, 2007) were reviewed to identify potential chemical use areas for RFI sampling. The process of selecting sampling locations, depths, and analytical methods considered the following objectives:

- Defining the lateral and vertical extent of impacts
- Defining potential chemical gradients
- Obtaining sufficient data for risk assessment
- Obtaining data sufficient to estimate CMS soil volumes to within a factor of 10

To achieve these objectives, soil sampling was conducted as described in the RFI Work Plans (Ogden, 1996 and 2000a) or as directed by DTSC direction during the RFI field program. Additional sampling was also performed to achieve the objectives outlined above, considering the following:

- Additional information regarding site use and observed site conditions
- Site sampling results and data trends
- Knowledge of chemical properties (e.g., mobility, volatility, association with other chemicals, etc.)

- SSFL metals and dioxin background concentrations
- SSFL SRAM-based screening concentrations for human health and ecological receptors
- Risk assessment results and knowledge of areas recommended to require further evaluation during the CMS

Groundwater has been sampled to meet site-wide routine monitoring requirements and additional characterization objectives according to regulatory agency-approved work plans (see Section C.3.2). Based on detected RFI site chemicals, chemical distribution, and site conditions, additional groundwater sampling and analysis was also conducted to complete characterization of individual RFI sites and provide data sufficient for risk assessment. Groundwater sampling was conducted as described in the Sampling Analysis Plans (GRC, 1995a and 1995b) and the *Shallow Zone Groundwater Investigation Work Plan* (Ogden, 2000b).

### **C.3.2 Sampling Scope**

A total of 77 soil matrix samples and 16 soil vapor samples were collected between August 1988 and May 2007 to assess potential impact associated with the chemical use areas at the ESADA RFI Site. Sampling locations and analytical suites were based on DTSC requests, sampling results from previous investigations, additional facility information from historical records, site inspections and/or personnel interviews, and historical and/or aerial photographs. Sampling schedules are presented in Tables C.3-1A through C.3-1C.

Both Chatsworth formation groundwater and NSGW have been sampled and analyzed according to agency-approved work plans (GRC, 1995a and 1995b; Ogden, 2000b). Two monitoring wells (RS-23 and RD-50) were used to characterize groundwater specifically at the ESADA RFI Site. As described in the risk assessment, groundwater monitoring data from the most impacted well within the Group 8 Reporting Area were used to characterize the potential direct exposure route for human receptors. RFI site groundwater monitoring data were used for potential indirect groundwater exposures at that site. Groundwater characterization data for the ESADA RFI Site are presented with the entire Group 8 groundwater data set in Appendix E of the Group 8 RFI Site Report.

Based on a quality assurance (QA) review conducted on soil, soil vapor, sediment, and piezometer sampling results, data have been deemed usable and meet RFI program

requirements as defined by DTSC-approved Quality Assurance Project Plans (Ogden, 2000a). The RFI QA program included individual sample data validation, assessment of each laboratory's performance, and a qualitative review of the precision, accuracy, representativeness, reliability, and completeness parameters for the datasets. Historical samples (collected prior to the beginning of the RFI in 1996) were typically not validated for the subsequent RFI, but are deemed useable for the RFI since they were collected and reviewed according to the QA protocols for those programs. Overall data quality is described in the RFI Program Report (MWH, 2004). Site-specific data quality summaries for the ESADA RFI Site are described by media in the sections below.

As an ongoing, additional QA measure, DTSC's Environmental Chemistry Laboratory (ECL, formerly the Hazardous Materials Laboratory [HML]) is performing independent data quality audits of up to 5 to 10 percent of the surficial media analyses performed for the RFI. The ECL data quality audits included data validation, electronic data file audits, and split sample comparisons. The ECL findings are compiled in a report for each audit and those available by 2004 are published in the Program Report (MWH, 2004). In these reports, the ECL deemed the sample results acceptable or qualified as estimated data points.

This report presents characterization results for all media sampled at the ESADA RFI Site, including the following:

- Soil vapor
- Soil matrix (including soil and pond/drainage sediment)
- Groundwater

### **C.3.3 Key Decision Points**

DTSC has been an integral part of the decision-making process during the SSFL RFI program. The ESADA RFI Site has been included in the RFI program since 1996 (Ogden, 1996). Additional RFI sampling at the ESADA RFI Site was requested by DTSC during a comprehensive SSFL RFI site review in 1999. At that time, DTSC requested soil sampling based on review of historical operations, sampling results, and physical site inspection. Evaluation of shallow groundwater conditions was also requested by DTSC and was included in the Shallow Groundwater Work Plan (Ogden, 2000b). DTSC provided review during the SSFL RFI field sampling, selected additional step-out sample locations, and reviewed field sampling protocols. Additional site assessment has recently been performed to address



revised, DTSC-approved requirements for risk assessment (MWH, 2005) and evaluate new potential chemical use areas. Sampling of new chemical use areas and recent step-out sampling followed DTSC-approved work plan protocols for the RFI.

Site-specific characterization decision points are listed below. These decision points represent either assumptions upon which sampling was based, or decisions made during step-out sampling or data evaluation. Programmatic decision points (those common to all RFI sites) are described and included in the RFI Program Report (MWH, 2004).

- 1) Areas where further assessment in the CMS is recommended were not characterized beyond the need for the CMS.
- 2) The ESADA Former Storage Yard was sampled at representative locations for semivolatile organic compounds (SVOCs) based on the documented storage of drums containing Dowanol™ and ethanol. Analysis for metals was conducted at representative locations within this area due to documented saturation of some of the Dowanol-containing drums with sodium.
- 3) Sampling for mercury was performed within the ESADA RFI Site to evaluate it as a potential source of mercury, which was detected at elevated concentrations in down-slope samples at the FSDF RFI Site.
- 4) Screening for volatile organic compounds, total petroleum hydrocarbons (TPH), and polychlorinated biphenyls (PCBs) was conducted at the ESADA Former Storage Yard to evaluate their potential release from drums with undocumented contents.
- 5) The ESADA Sodium Test Area was screened for VOCs to assess whether impacts were present as a result of the potential use of cleaning solvents at the site. Sodium samples were collected in the storage yard adjacent to the former test area.
- 6) The former PDU AST area was sampled for VOCs, SVOCs, PCBs, TPH, and metals to evaluate their presence due to the documented storage of “green liquor” waste water, which contains organic compounds, sulfur compounds, and ash (ICF, 1993).
- 7) The ESADA Pistol Range was sampled for metals at representative locations to evaluate their presence as a result of activities associated with firing practice in that area. Soil conditions and lead shot presence was visually inspected and logged to evaluate and document the deposition of lead shot associated with firing range activities. Screening for other chemicals (VOCs, TPH, and PCBs) was conducted to evaluate their potential presence resulting from earlier operations in the area.

#### **C.3.4 Soil Matrix and Soil Vapor Findings**

All soil sampling results and characterization findings are summarized in Table C.3-2A. The goals of the table are to:

1. Present summaries of sampling results, including nature and extent of impacts.
2. Demonstrate that soil characterization is adequate and that no further sampling is warranted.
3. For areas recommended for CMS evaluation, indicate that soil volumes are estimable within a factor of ten for comparison of remedial alternatives.

Goals 2 and 3 are achieved through an iterative evaluation process that takes into account the risk assessment results and CMS recommendations as well as the soil analytical data. For example, if detected concentrations are sufficiently high to indicate that further evaluation in the CMS will be necessary, the data are considered to be adequate for the purpose of risk assessment. Similarly, the risk assessment results can be used along with the soil analytical results to delineate CMS areas and estimate soil volumes within an order of magnitude (Goal 3). Other criteria used to evaluate characterization completeness include the sampling results compared to screening levels, the presence and magnitude of concentration gradients, the types of historical site operations and chemical uses, and analytical detection limits. Data quality summaries for the ESADA RFI Site are provided in Tables C.3-3A (soil) and C.3-3B (soil vapor).

#### **C.3.4.1 Soil Data Presentation**

Relevant site information, sampling rationale, analytical results, and evaluation of results are presented in Table C.3-2A. This table refers to chemical results that are shown by chemical group category (organic and inorganic compounds) on Figures C.3-1 and C.3-2. Table C.3-2A presents the following site characterization information by each Chemical Use Area (Figure C.2-1) for each relevant chemical group within the Chemical Use Area:

- Relevant site history, site characteristics, and activities related to chemical use for each Chemical Use Area by Chemical Use Number.
- Sampling scope and rationale for each Chemical Use Area by Chemical Use Number.
- Summary of sampling results for soil and soil vapor for each Chemical Use Area by Chemical Use Number. As appropriate, sample results are compared to established SSFL background concentrations (metals and dioxins only) and/or SSFL risk-based screening levels (RBSLs)<sup>1</sup>. The screening levels are also displayed on Tables C.3-1A and C.3-1B.

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<sup>1</sup> The use of the SRAM-based screening levels for comparison purpose does not serve as a risk assessment. These screening levels are not used to determine if a chemical use area will be recommended for further consideration in the CMS, but only as a tool to evaluate the characterization data. The SRAM-based screening levels represent conservative concentrations that pose a low level of risk. See Appendix F.

- Determination if characterization of chemical gradients is sufficient such that the risk assessment reflects the approximate maximum analyte concentration OR a concentration sufficiently high to result in risk requiring a recommendation for evaluation during CMS.
- Determination if nature and extent of chemicals is defined sufficiently to estimate soil volumes (within a factor of 10) for areas that require further consideration in the CMS (if needed).

#### **C.3.4.2 Soil Data Summary**

As detailed in Table C.3-2A, five confirmed and potential chemical use areas were investigated at the ESADA RFI Site. A summary of the chemicals detected above screening criteria is provided below by chemical analytical group.

##### **VOCs**

- VOCs were not detected at the ESADA RFI Site.

##### **SVOCs**

- Sixteen SVOCs, including one tentatively identified compound (TIC), were detected at the ESADA Former Storage Yard (Chemical Use Area 1), the former PDU AST area (Chemical Use Area 3), and the ESADA Pistol Range (Chemical Use Area 4). None of the detected SVOC concentrations exceeded RBSLs. The maximum concentration detected was of bis(2-ethylhexyl) phthalate at 720 micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ). The reported TIC, a '906 branched hydrocarbon C6' compound was detected at 900  $\mu\text{g}/\text{kg}$ , less than the gasoline-range RBSL.

##### **TPH**

- Lubricant oil-range hydrocarbons (C21 – C30) were detected at the ESADA Former Storage Yard (Chemical Use Area 1), the former PDU AST area (Chemical Use Area 3), and ESADA Pistol Range (Chemical Use Area 4) at concentrations up to 11 milligrams per kilogram ( $\text{mg}/\text{kg}$ ) (estimated). None of the detected concentrations for TPH exceeded RBSLs.

##### **PCBs**

- PCBs were detected in a total of five samples from the ESADA Former Storage Yard (Chemical Use Area 1) and the former PDU AST area (Chemical Use Area 3). Trace concentrations of Aroclor 1254 and 1260 were detected in three and four samples ranging up to 30  $\mu\text{g}/\text{kg}$  and 21  $\mu\text{g}/\text{kg}$ , (estimated), respectively. None of the detected concentrations exceeded the RBSLs.

## **Metals**

- Aluminum, sodium, and vanadium were detected above background concentrations at the ESADA Former Storage Yard (Chemical Use Area 1). Concentrations of aluminum and vanadium exceeded ecological RBSLs, but were less than human health RBSLs.
  - Aluminum concentrations (up to 31,100 mg/kg) exceeded background at locations in and around the northern and southern storage areas. There are no discernable patterns or concentration gradients in the aluminum concentrations detected above background, except that these occurrences are associated with higher concentrations of clay in the soil. As described above and in Table C.3-2A, the clay-rich Santa Susana formation is present to the south, and soil derived from this material will likely yield higher naturally-occurring aluminum concentrations.
  - The highest sodium concentrations (up to 732 mg/kg) were detected in samples from the southern storage area, and concentrations generally decreased with increasing distance from Building 814.
  - Vanadium (at 64.8 mg/kg) exceeded the background concentration (at 62 mg/kg) at one location, near the northwest portion of the former storage yard. All other vanadium concentrations were below background.
- Concentrations of three metals (aluminum, sodium, and mercury) exceeded background in the three samples collected near the former PDU AST area (Chemical Use Area 3). Concentrations did not exceed residential RBSLs, and only aluminum was present at concentrations exceeding the ecological RBSL.
  - The highest aluminum concentration (26,900 mg/kg) was detected in a sample collected north of the former PDU AST area at the FSDF RFI site. This result is only slightly higher than the aluminum concentration detected at the former PDU tank and similar to those detected in the storage areas described above.
  - The highest sodium concentration (319 mg/kg) was also detected in the sample collected north of the former PDU tank at the FSDF RFI site. Again, this sodium detection was similar to those detected near Building 814 within the northern and southern storage areas.
  - Mercury (at 0.27 mg/kg) was detected above background (at 0.09 mg/kg) at one of the sample locations near for the former PDU AST. Mercury was not detected at concentrations exceeding background or the RBSLs in any other samples collected from the ESADA RFI Site.
- Concentrations of five metals (antimony, arsenic, boron, lead, and selenium) exceeded background concentrations, residential RBSLs, and/or ecological RBSLs at the ESADA Pistol Range (Chemical Use Area 4):
  - The maximum concentration of antimony (up to 870 mg/kg), arsenic (up to 350 mg/kg), and lead (up to 27,000 mg/kg) were detected in samples collected in the target (i.e., south) area of the pistol range. The concentrations of these metals decreased with increasing distance from the southern target area, and

concentrations in the samples collected farthest from the target area were below background.

- None of the detected selenium concentrations (up to 1.2 mg/kg) exceeded the residential RBSL.
- Boron concentrations (up to 14 mg/kg) exceeded the ecological RBSL at one location near the pistol range. All boron concentrations were less than the residential RBSL.

The potential contribution of the 2005 Topanga Fire to the concentrations of metals in soil has been considered in the characterization of the nature and extent of chemicals at the ESADA RFI Site. This evaluation was done to determine if any elevated concentrations of six metals (barium, boron, copper, lead, thallium and zinc) in soil samples collected after the fire could be due to the presence of ash and burned materials deposited in surficial soil. None of the post-fire samples were analyzed for dioxins since there were no chemical use areas that included burning activities. Only those surficial soil samples collected between 0- to 12-inches collected after the fire were considered in this evaluation. For the ESADA RFI Site there were approximately 20 post-fire soil samples analyzed for metals. Of the approximately 20 samples analyzed for metals, one sample (ESBS0012S01 at 27,000 mg/kg) had elevated concentrations of lead; however, the detected concentration is much higher than the fire ash levels and the sample was collected near the target area of the ESADA Pistol Range, which has a documented source of lead. For these reasons, this evaluation concludes that there are no measurable impacts of fire ash on soil metal concentrations at ESADA.

### **C.3.5 Groundwater Findings**

Groundwater occurrence and impacts at the ESADA RFI Site are described below.

#### **C.3.5.1 Groundwater Data Presentation**

Groundwater sampling results and characterization findings are summarized in Table C.3-2B. The purposes of the table are to:

- Summarize soil impacts as they potentially relate to groundwater impacts.
- Summarize groundwater sampling results.
- Demonstrate that groundwater characterization is sufficient for the purposes of risk assessment, including:

- That groundwater characterization is adequate for detected site-related chemical constituents.
- That site soil characterization is adequate for detected groundwater chemical constituents.

Similar to Table C.3-2A, Table C.3-2B describes groundwater data by chemical group (metals, VOCs, SVOCs, etc.). Table C.3-2B is organized as follows:

- Column 1 – Analytical group
- Column 2 – Summary of site soil impacts
- Column 3 – Confirmation that chemicals detected in site soil are monitored in groundwater
- Column 4 – Summary of groundwater impacts
- Column 5 – Discussion of whether chemicals are site-related
- Column 6 – Conclusion regarding adequacy of groundwater characterization

A detailed compilation of groundwater data is provided in Appendix E of this Group 8 RFI Report. The groundwater appendix contains a description of hydrogeologic conditions (occurrence, water levels, recharge, yield, etc.), groundwater quality, and transport and fate. These data include the following:

- Laboratory analytical results
- Hydrographs
- Time-series plots
- Cumulative distribution plots

A site-wide report on SSFL groundwater will be prepared as part of the RFI Program. This report will comprehensively address across the site the same characterization and transport and fate issues addressed in Appendix E.

### **C.3.5.2 Groundwater Data Summary**

Groundwater conditions at the ESADA RFI Site are characterized by one NSGW monitoring well (RS-23) and one Chatsworth formation monitoring well (RD-50). Groundwater findings from these wells are presented on Table C.3-2B. As described in Section C.2, both perched and continuous NSGW conditions exist at the site.

A few VOCs, SVOCs, TPH, and two metals have been detected at concentrations exceeding comparison levels in groundwater samples collected from RD-50. Organic chemicals above regulatory criteria include benzene, toluene, benzoic acid, bis(2-chloroethyl)ether, and gasoline-range hydrocarbons. The detections of benzene and toluene are considered related to the discrete interval multi-level Flexible Underground Liner Technology (FLUTe) groundwater sampling system installed at that well. Elevated benzene was first detected in samples collected from RD-50 in February 2003 following the FLUTe installation. Other VOCs and gasoline-range TPH groundwater detections are considered related to historical, incidental, small spills in the area. Current soil sample data at ESADA do not indicate a significant release; however, historical releases from which no mass remains in surficial media may have occurred within the sampling area. Also, it is worth noting that VOCs were not detected in RS-23, the shallow well within the ESADA operational area.

Lead was the only metal detected in groundwater above its GWCC. Based on lead concentrations in soil, lead is potentially site-related in groundwater. However, the analysis date (1993) of the elevated concentration may indicate that elevated results are related to analytical laboratory methods.

### **C.3.6 Surface Water Findings**

Surface water samples have not been collected at the ESADA RFI Site, since surface water bodies are not present at the site.

## **C.4 RISK ASSESSMENT FINDINGS SUMMARY**

The following sections summarize the findings of the HRA and ERA performed for the ESADA RFI Site within the Group 8 RFI Reporting Area. Details regarding how the HRA and ERA were conducted are presented in the SRAM (MWH, 2005) and in Attachment F1 of Appendix F of this Group 8 RFI Report.

### **C.4.1 Key Decision Points**

Site-specific key decision points for the HRA and ERA are listed below and described more fully in Appendix F and Attachment F3 of Appendix F. These decisions were made for the risk assessments based on site-specific conditions, chemical characteristics, and assessment findings. Programmatic decision points are described and included in the RFI Program Report (MWH, 2004). Site-specific key decision points include the following:

1. While both direct (drinking water) and indirect (vapor) exposures were evaluated in the risk assessment (Appendix F), only indirect exposures are presented here because there is no current or planned future use of groundwater for drinking water.
2. Exposure Point Concentration (EPC) calculations were based on collected characterization data, as follows:
  - All groundwater EPCs were based on maximum levels detected in a single highest-concentration well at the ESADA RFI Site (RD-50) for indirect exposure or detected within a single highest-concentration well within the Group 8 area (RS-54) for direct exposure.
  - A review of time series plots for chemical constituents, groundwater gradients, and source areas indicates maximum concentrations detected during the last consecutive three years conservatively represent potential future conditions for the purpose of estimating future risks.
  - Soil EPCs were based on maximum concentrations (either detected concentrations or the detection limit if sufficient evidence that the chemical is present) unless there were sufficient data to calculate a statistical upper-bound estimate of the concentration.
3. Large-home range receptors were assumed to live only in source areas within the ESADA RFI Site. Risks for these receptors using home range adjusted exposures were calculated for the purpose of comparing to the RFI site only risks. Large-home range receptor cumulative risk across SSFL will be presented later in a Site-Wide Large-Home Range Report.



4. Aluminum was evaluated in the risk assessment. However, it is not listed as a risk driver or included in the risk estimate totals because (1) concentrations detected at the ESADA RFI Site are considered to be naturally-occurring as a result of high clay-content soils and (2) ecological exposure to soluble, toxic forms of aluminum is considered unlikely given site soil pH measurements. Calculated aluminum exposure risks for ecological receptors this site are based upon toxicity values derived from soluble aluminum. However, the soluble and toxic forms of aluminum are only present in soil under soil pH values of less than 5.5 (USEPA, 2003), and at the ESADA RFI Site pH ranged from 7.4 to 9.6.

#### **C.4.2 Human Health Risk Assessment Findings**

The receptors included in the human health risk assessment are the current worker and potential trespasser and the future resident, worker, and recreator. Since the current potential trespasser and the future recreator have the same exposure parameters, they have been presented together as the recreator.

Supporting information for the HRA is presented in the following tables and figure:

- Chemicals of Potential Concern (COPC) for Human Health – Table C.4-1
- Human Health Risk Estimates – Tables C.4-2
- Human Health Risk Assessment Uncertainty Analysis – Table C.4-3
- Generalized Conceptual Site Model (CSM) of HRA Exposures – Figure C.4-1

A summary of the HRA findings is presented below. For comparison purposes, excess upper bound incremental lifetime cancer risks (ILCRs) at  $10^{-6}$  or less associated with multimedia exposures are considered acceptable. Potential risks between  $10^{-6}$  and  $10^{-4}$  require risk-management decisions, and potential risks above  $10^{-4}$  usually require remediation. Likewise, Hazard Indices (HI) below 1 are considered acceptable, and those above 1 usually require remediation. Also, blood lead concentrations less than 10 micrograms per deciliter ( $\mu\text{g}/\text{dl}$ ) are generally considered to be acceptable for making decisions regarding the necessity for remediation (DTSC, 1992). These criteria were used to make evaluation recommendations for the CMS.

#### **Exposure to Surficial Media Plus Indirect Groundwater Exposure**

The Reasonable Maximum Exposure (RME) risks presented in this section were based on exposures to all relevant surficial media plus indirect exposure to VOCs in groundwater due to vapor migration. The risk assessment results are summarized as follows:

- Estimated cancer risks for all receptors ranged up to  $1 \times 10^{-3}$ , and HIs ranged up to 20 (Future Child Resident). The chemicals contributing to these potential risks were antimony and arsenic in soil.
- Estimated blood lead levels associated with soil exposures were greater than 10 µg/dl for all receptors. Estimated blood lead levels for the Future Child Resident ranged up to 300 µg/dl at the 95th percentile and up to 410 µg/dl at the 99th percentile.

The major issues related to uncertainty and conservatism in these risk estimates are presented in Table C.4-3.

### **C.4.3 Ecological Risk Assessment Findings**

The ecological receptors representing the ESADA RFI Site are the deer mouse, the thrush, the hawk, the bobcat, and the mule deer. Supporting information for the ERA is presented in the following tables and figure:

- Chemicals of Potential Ecological Concern (CPEC) – Table C.4-4
- Risk Estimates for Ecological Receptors – Table C.4-5
- Ecological Risk Assessment Uncertainty Analysis – Table C.4-6
- Graphical CSM for ERA Exposures – Figure C.4-2

A summary of the ERA findings is presented below, including Hazard Quotient (HQ) and Hazard Index (HI) information. HQs are hazard estimates for single CPECs, while HIs are cumulative hazard estimates for all CPECs. For comparison purposes, HQ or HI values less than 1 represent conditions that would not cause unacceptable ecological impacts. HQ or HI values greater than 1 typically require additional evaluation, and may be deemed acceptable or unacceptable by risk managers. The ERA findings included the following:

- Estimated HIs for all receptors ranged from greater than 100 to greater than 1,000 at the ESADA RFI Site. The deer mouse, thrush, hawk and mule deer have estimated HIs in excess of 1,000, while the bobcat has an estimated HI in excess of 100. These HIs are primarily associated with antimony, arsenic, lead, and selenium.
- The deer mouse burrow air inhalation pathway does not contribute significantly to the deer mouse risks, compared to the risks from other non-volatile constituents.

The major items related to uncertainty and conservatism in these risk estimates are presented in Table C.4-6.

## **C.5 ESADA RFI SITE ACTION RECOMMENDATIONS**

This section presents a summary of RFI reporting requirements as they apply to the ESADA RFI Site. Section C.5.1 describes the RFI reporting requirements, particularly with respect to the identification of areas recommended for further work, or ‘site action’ recommendations. The process and criteria used for making site action recommendations is described in Section C.5.2, and site action recommendations for the ESADA RFI Site are summarized in Section C.5.3.

### **C.5.1 RFI Reporting Requirements**

As described in regulatory guidance documents for the SSFL RCRA Corrective Action Program (see Section 1.2.3 of Volume I), the purposes of the RFI are to: (1) characterize the nature and extent of contamination, and identify potential source areas; (2) assess potential migration pathways; (3) estimate risks to actual or potential receptors; and, (4) gather necessary data to support the CMS (DTSC, 1995). The RFI Report is required to (1) present findings regarding the above information, (2) describe completeness of the investigation, and (3) indicate if additional work is needed.

The ESADA RFI Site Report accomplishes these requirements by:

- 1) Presenting detailed characterization findings, source area identification, and investigation completeness determinations by media and by chemical class for all chemical use areas (and associated down-drainage locations) (Tables C.3-2A and C.3.3-2B). Section C.3 summarizes the overall characterization of contamination nature and extent, potential source areas, and an assessment of investigation completeness.
- 2) Evaluating groundwater migration pathways in Appendix E of the Group 8 RFI Site Report and other potential transport pathways in Appendix F of the Group 8 RFI Site Report.
- 3) Identifying potential receptors and estimating potential risks at the ESADA RFI Site (Section C.4 and Appendix F).
- 4) Identifying ESADA RFI Site areas requiring further work (this Section).

### **C.5.2 Basis for Site Action Recommendations**

In summary, site action recommendations included in the ESADA RFI Site Report identify areas for the following:

- Further evaluation in the CMS (CMS Areas)
- No further action (NFA Areas)
- Interim corrective measures to stabilize source areas and control contaminant migration (Stabilization Areas)

Site action recommendations are based on information in historical documents, site characterization data, and risk assessment findings. Historical document review findings are used to determine areas of potential chemical use and identify areas for additional RFI sampling and characterization. Characterization findings provide definition of the nature and extent of site contaminants, based on chemical data and transport and fate evaluation. Risk assessments evaluate characterization data, estimate human health and ecological risks based on specified land use scenarios, and identify chemicals that drive or contribute to those risks.

Based on the review and evaluation of extensive historical records and environmental sampling data collected prior to and during the RFI, additional sampling was performed in areas where chemicals were potentially used, handled, stored, or released within the Group 8 Reporting Area. Samples were also collected in areas where the existing analytical data were considered to be inadequate for site characterization and/or risk assessment (including down-gradient locations). Similarly, for areas where no historical chemical use, storage, or handling was indicated in the historical documents (i.e., for areas determined to have very limited or no potential for environmental concern), no samples were collected. Based on the documents reviewed and nearby sampling results, if any, these non-chemical use areas are recommended for NFA.

NFA and CMS recommendations for the areas sampled within the Group 8 Reporting Area are based on an integrated evaluation of characterization and risk assessment results. Information in the historical documents indicating past chemical use practices and areas, coupled with site characterization data indicating environmental impacts or lack thereof, provide a solid basis for the NFA and CMS recommendations made in this report. Stabilization Area recommendations rely on characterization evaluations, including transport and fate analysis, and comparison to risk-based levels. Each process is described further below.

### **CMS and NFA Site Action Evaluation Process**

CMS or NFA site action recommendations are based on a 4-step process. This process, which is presented in detail in Section 7.1 of the Group 8 RFI Report, is summarized as follows:

- **Site Action Evaluation Step 1.** Risk assessment results for human and ecological receptors are compared to “acceptable” levels published by the USEPA or DTSC as guidance for site managers (DTSC, 1992; USEPA, 1992). The low end of the risk range (i.e.,  $1 \times 10^{-6}$ , or 1 in 1,000,000, or  $HI = 1.0$ ) is used to conservatively estimate the areal extent that is recommended for site action.
- **Site Action Evaluation Step 2.** When estimated RFI site risks are greater than  $1 \times 10^{-6}$  (cancer risks) or HI values are greater than 1 (noncancer and ecological risks), the RFI site’s risks are reviewed on a chemical-by-chemical basis to identify risk-drivers and significant risk contributors to the cumulative, total risk for each potential receptor.
- **Site Action Evaluation Step 3.** Characterization findings from the entire RFI site are evaluated to identify areas where higher concentrations of risk drivers and contributors are detected. The identified areas are termed in this report ‘CMS Areas’ and represent locations recommended for further evaluation during the CMS. Areas recommended for further evaluation during the CMS are comprehensive of all appropriate potential receptors or land use scenarios.
- **Site Action Evaluation Step 4.** The fourth step identifies any uncertainties in the RFI site characterization and risk assessments that may affect the findings. For example, some chemicals are assumed to be present in soil based on TPH extrapolation factors (e.g., benzene and PAHs) and contribute to total risk for the RFI site above acceptable levels. Since this assumption is often highly conservative, its use as a basis for CMS recommendations may be further evaluated in the CMS.

Site action recommendations are tabulated by chemical use area, and chemical risk drivers/contributors are identified for each appropriate receptor in Table C.5-1. CMS Areas are also depicted graphically in Figure C.5-1 to illustrate locations and approximate areal extents, and summarized in Table C.5-2.

As described in Step 3 above, the areas of the RFI sites proposed for further evaluation in the CMS (i.e., CMS Areas) are based on identifying chemical concentrations that are above their respective RBSL. This process results in CMS Areas that are larger than would need to be addressed during cleanup to achieve acceptable risks. This is due to comparing individual soil sample results to RBSLs as ‘bright-line’ criteria, instead of using an area-average concentration. Area-averaged concentrations will be used in the CMS to refine the cleanup extent at these recommended CMS Areas.

Two additional aspects of RFI reporting will serve to confirm and/or finalize the areas recommended in Group RFI Reports for evaluation in the CMS. The first is an ecological evaluation for large-home range receptors (e.g., mule deer and hawk). The second is a groundwater evaluation that will be reported in the Site-Wide Groundwater Report.

### **Source Area Stabilization Site Action Evaluation Process**

Chemical data collected during the RFI are evaluated to determine the potential for contaminant migration. Resulting site action recommendations focus on stabilization measures related to sediment transport via the surface water pathway.

Criteria used to evaluate if source area stabilization measures are needed to control surface water migration include the following:

- Presence of chemical concentrations above background or RBSLs in surficial (not deeper) soils
- Proximity of surficial impacts to an active surface water drainage pathway
- Moderate to steep topography
- Absence of containment features (e.g., surface coatings, dams)
- Concentration gradients that indicate prior transport away from the source of surficial impacts

Each criterion is considered important, and a weight-of-evidence evaluation is used to make a recommendation for source area stabilization measures. Source area stabilization measures, which include the use of best management practices (BMPs), are used to prevent migration to surface water. BMPs may include the installation of straw bales, fiber rolls, and silt fencing, and/or covering of areas with plastic tarps. Erosion control measures have been applied to many surficial soil source areas at the SSFL to prevent contaminant migration. These are described in the SSFL Storm Water Pollution and Prevention Plan (MWH, 2006a).

### **C.5.3 ESADA RFI Site Recommendations**

The ESADA RFI Site action recommendations are listed in Table C.5-1 and are presented on Figure C.5-1. Table C.5-1 lists CMS and NFA recommendations and identifies chemical risk drivers and contributors for each appropriate receptor. A summary of the ESADA RFI Site CMS Areas is presented in Table C.5-2. As noted above, recommendations reported in this

document will be reviewed upon completion of the site-wide groundwater report and large-home range receptor evaluations, and updates to this report prepared as needed.

Recommendations for further evaluation of aluminum concentrations at the ESADA RFI Site during the CMS were not made because these concentrations are considered naturally-occurring. In addition, as described in Section C.4, estimated aluminum exposure risks for ecological receptors are based on toxicity values derived from soluble aluminum present in soil with pH values of less than 5.5 (USEPA, 2003). ESADA site soil pH measurements ranged from 7.4 to 9.6, indicating limited (if any) ecological exposure to the soluble, toxic form of aluminum.

ESADA RFI Site areas recommended for evaluation in the CMS are summarized below. One CMS Area was identified, including:

- **ESADA-1:** ESADA Pistol Range. Chemical risk drivers and contributors include antimony, arsenic, lead, and selenium.

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## TABLES

**TABLE C.2-1**  
**ESADA RFI SITE BUILDING INVENTORY**  
 (Page 1 of 1)

<b>Building<sup>(a)</sup></b>	<b>Chemical Use Area Location</b>	<b>Current Use</b>	<b>Former Use</b>	<b>Operational Status Existing/Removed</b>	<b>DTSC Site Visit Date</b>
Building 314	East of 1	NA	Large Leak Injector Device Test Control	Removed	Removed prior to DTSC Site Visit in June 1999.
Building 317	4	NA	Shelter for ESADA Pistol Range	Removed	Removed prior to DTSC Site Visit in June 1999.
Building 318	4	NA	Shelter for ESADA Pistol Range	Removed	Removed prior to DTSC Site Visit in June 1999.
Building 370	3	NA	Storage Shed	Removed	Removed prior to DTSC Site Visit in June 1999.
Building 514	East of 2	NA	Sodium Water Reaction Test Center	Removed	Removed prior to DTSC Site Visit in June 1999.
Building 730 <sup>(b)</sup>	4	NA	Impact Test Control Building	Removed	Removed prior to DTSC Site Visit in June 1999.
Building 814	2	NA	Large Leak Injector Device	Removed	Removed prior to DTSC Site Visit in June 1999.
Building 820	4	NA	Isotope System Impact Test Device	Removed	Removed prior to DTSC Site Visit in June 1999.
Shed	West of 3	NA	Storage Shed	Removed	Removed prior to DTSC Site Visit in June 1999.

**Notes:**

- (a) Buildings are sometimes identified with the Administrative Area number followed by the building number (e.g Building 886 vs. Building 4886).
- (b) Building 730 was relocated from the FSDF area in 1966 (AI, 1966d).

**Acronyms:**

AI = Atomics International  
 NA = Not Applicable

**Sources:**

Field inspection, aerial photographs (USEPA, 1997), historical facility photographs (Boeing, 2007a), historical reference documents (Boeing, 2007a; Rockwell, 1984; Sapere, 2005), and historical facility drawings (AI, 1964b, 1964c, 1966a, 1966b, 1974a, 1974b, 1974c, 1974d)

**TABLE C.2-2**  
**ESADA RFI SITE TANK INVENTORY**  
 (Page 1 of 1)

<b>Tank Designator<sup>(a)</sup></b>	<b>Chemical Use Area Number</b>	<b>Location</b>	<b>Contents</b>	<b>Tank Size (gallons)</b>	<b>Operational Status Existing / Removed</b>
<b>Aboveground Tanks - Other</b>					
AT-15	4	N of Storage Yard	Green Liquor <sup>(b)</sup>	8000	Removed
--	4	N of Storage Yard	Green Liquor <sup>(b)</sup>	--	Removed
T-2	2	814	High-pressure Water	--	Removed
T-4	2	814	Sodium	220	Removed
T-5	2	814	Sodium-water Reaction Products	--	Removed
B-1	2	814	Steam Supply Boiler	--	Removed
<b>Underground Tanks</b>					
None					

**Notes:**

-- = Tank identification and/or size was not documented (Boeing, 2007a).

<sup>(a)</sup>Tanks listed by category (fuel, solvent, other). If category not indicated on table, then that type of tank was not present on site.

<sup>(b)</sup> Green Liquor is waste water generated during the coal gasification process which contains organics, sulfur compounds, and ash (ICF, 1993).

**Sources:**

Field inspection, aerial photographs (USEPA, 1997), historical facility photographs (Boeing, 2007a), and historical facility documents (AI, 1964a; Rockwell, 1989b; Boeing, 2007a).

**TABLE C.2-3**  
**ESADA RFI SITE TRANSFORMER INVENTORY**  
 (Page 1 of 1)

SSFL Identification Number	Chem Use Area Location	Description	Location	Status	Transformer Oil Sampled for PCBs (Date/ Results)	Soil Sampled (Date/ Results)	Visual Site Inspection (Date/ Findings)	Transformer Condition After 2005 Fire
Pole # X-35 Tag # 144-146	5	3 pole- mounted transformers	NE of Bldg 317	Removed	Yes 1983 2.4 ppm  1987 1.9 ppm	Yes 2007 ESBS0015 ND<54 µg/kg	--	NA Removed prior to 2005

**Notes:**

-- = Transformers and pole were removed prior to soil sampling.

**Acronyms:**

AI = Atomics International

NA = Not Applicable

ND = not detected

ppm = parts per million

µg/kg = micrograms per kilogram

**Sources:**

Field inspection, aerial photographs (USEPA, 1997), historical facility photographs (Boeing, 2007a), and historical facility drawings (AI, 1966d)

**TABLE C.2-4**  
**ESADA RFI SITE DOCUMENTED CHEMICAL USE**  
Page 1 of 1

Chemicals Used	Reference
Alcohols	ICF, 1993 SAIC, 1991 and 1994
Asbestos	Rockwell, 1994
Dowanol <sup>TM</sup> (a)	ICF, 1993 Rockwell, 1983a and 1983b
Ethanol (b)	Rockwell, 1983a and 1983b
Green Liquor (c)	Rockwell, 1989b
Lead	Boeing, 1999a Sapere, 2005
Polychlorinated biphenyls (PCBs) (d)	AI, 1966d Boeing 2007a
Propylene glycol methyl ether (Dowanol PM) (a)	Rockwell, 1983a and 1983b
Sodium	AI, 1964a Rockwell 1983b
Sodium Hydroxide	ICF, 1993 SAIC, 1991 and 1994
Sodium Oxide Solids	SAIC, 1991 and 1994
Zirconium Hydride (ZrH <sub>2</sub> )	Sapere, 2005

**Notes:**

(a) Dowanol <sup>TM</sup> is a series of trademarked commercial solvents. Each type of Dowanol (e.g., Dowanol PM) is comprised of a different glycol ether.

(b) Ethanol stored at ESADA was denatured.

(c) Green Liquor is waste water generated during the coal gasification process which contains organics, sulfur compounds, and ash (ICF, 1993).

(d) PCB-oils contained in pole-mounted transformers.

**Acronyms:**

AI = Atomics International

ICF = ICF Kaiser

SAIC = Science Application International Corporation



**TABLE C.3-1A**  
**ESADA RFI SITE SAMPLING SUMMARY**

<b>Sample Type <sup>(1,5)</sup></b>	<b>Total Number of Samples (2)</b>	<b>Total QC Samples (3)</b>	<b>Total Agency Samples (4)</b>	<b>Total Validated Samples</b>
Soil Vapor Samples (Table C.3-1B)	10	1	0	11
Soil Matrix Samples (Table C.3-1C)	74	3	0	77

**Notes:**

1. Detailed sample and analytical program information is contained in Tables C.3-1B and C.3-1C as indicated above.
2. Total samples = total primary site investigation samples, including historical samples and composite samples.
3. Quality Control (QC) samples = Site-specific QC Samples, co-located duplicates and laboratory split samples.  
The total QC sample count in this table DOES NOT include Trip Blanks, Equipment Rinsates or Field Blanks.  
According to RFI sampling protocols, these types of QC samples are not site-specific and findings will be summarized in the RFI Program report.
4. Agency Samples = Department of Toxic Substance Control (DTSC) or United States Environmental Protection Agency (USEPA) split samples.
5. All groundwater data presented in Appendix E of the Group 8 RFI Report.

**TABLE C.3-1B**  
**ESADA RFI SITE SOIL VAPOR SAMPLING AND ANALYTICAL SUMMARY**  
 (Page 1 of 2)

Sample Location Identification	Unique Sample ID	Sample Identification	Date Collected	Sample Method	Depth (feet bgs)	Sample Type	Sample Analyses (Validated Y/N) <sup>a</sup>	Rationale <sup>(b)</sup>	Consultant <sup>(c)</sup>	Reference Document <sup>(d)</sup>
							VOCs			
ESSV01	RV719	ESSV01S02	09/28/99	Active	10	Primary Sample	Y	DTSC	OGDEN	This Report
ESSV01	RV720	ESSV01S01	09/28/99	Active	5	Primary Sample	Y	DTSC	OGDEN	This Report
ESSV02	RV721	ESSV02S02	09/28/99	Active	9	Primary Sample	Y	DTSC	OGDEN	This Report
ESSV02	RV722	ESSV02S01	09/28/99	Active	5	Primary Sample	Y	DTSC	OGDEN	This Report
ESSV0003	ESSV0003S01	ESSV0003S01	03/05/07	Active	3.5	Primary Sample	Y	DGA	MWH	This report
ESSV0003	ESSV0003S02	ESSV0003S02	03/05/07	Active	7.5	Primary Sample	Y	DGA	MWH	This report
ESSV0004	ESSV0004S01	ESSV0004S01	03/06/07	Active	5	Primary Sample	Y	DGA	MWH	This report
ESSV0004	ESSV0004S02	ESSV0004S02	03/06/07	Active	10	Primary Sample	Y	DGA	MWH	This report
ESSV0005	ESSV0005S01	ESSV0005S01	03/05/07	Active	4	Primary Sample	Y	DGA	MWH	This report
ESSV0005	ESSV0005S02	ESSV0005S02	03/05/07	Active	8	Primary Sample	Y	DGA	MWH	This report
ESSV0006	ESSV0006S01	ESSV0006S01	03/06/07	Active	4.5	Primary Sample	Y	DGA	MWH	This report
ESSV0007	ESSV0007D01	ESSV0007D01	03/06/07	Active	3.5	Field Duplicate	Y	DGA	MWH	This report
ESSV0007	ESSV0007S01	ESSV0007S01	03/06/07	Active	3.5	Primary Sample	Y	DGA	MWH	This report
ESSV0007	ESSV0007S02	ESSV0007S02	03/06/07	Active	7.5	Primary Sample	Y	DGA	MWH	This report
ESSV0009	ESSV0009S01	ESSV0009S01	03/06/07	Active	5	Primary Sample	Y	DGA	MWH	This report
ESSV0009	ESSV0009S02	ESSV0009S02	03/06/07	Active	10	Primary Sample	Y	DGA	MWH	This report
Total Primary Samples: 10						Validated:	11			
Total QC (Duplicate) Samples: 1						Not Validated	0			
Number of Delta RFI Site Soil Vapor Samples: 11										

Notes:

**TABLE C.3-1B**  
**ESADA RFI SITE SOIL VAPOR SAMPLING AND ANALYTICAL SUMMARY**  
**(Page 2 of 2)**

**Sample Location Identification** - Vapor probe number

**Unique Sample ID** - Laboratory reporting code

**Sample Identification** - RFI site and sample identifier code

(a) **Validated** indicates at least one analysis has been validated following RFI protocols; agency split samples were not validated but were reviewed for comparability. Data collected prior to the RFI were not typically subsequently validated using RFI protocols but were collected and reviewed following QA procedures established for earlier investigation programs.

(b) **Rationale (see below):**

**DTSC** - Indicates samples collected at direction of DTSC resulting from site review during the RFI field program.

**DGA** - Indicates samples collected in 2007 as a part of the Data Gaps Analysis to address delineation with stepout samples, elevated detection limit issues, and specific DTSC requests.

**WP** - Indicates samples collected based on DTSC-approved Work Plan scope.

**STEP** - Indicates stepout samples were collected as a part of the RFI program (prior to Data Gaps Analysis) to delineate concentrations above comparison levels or anomalous conditions.

(c) **Consultant** - indicates contractor responsible for sampling and reporting for each location.

(d) **Reference Document** indicates where data are published; "This report" includes the RFI site appendix and the Group 8 RFI Report (See References, Section C.6).

**Laboratory Analytical Methods Represented (EPA Method No.)**

**VOC** - 8260, 8260B

TABLE C.3-1C  
ESADA RFI SITE SOIL MATRIX SAMPLING AND ANALYTICAL SUMMARY  
(Page 1 of 2)

TABLE C.3-1C

Sample Location Identification	Unique Sample ID	Sample Identification	Date Collected	Sample Method (a)	Depth (feet bgs)	Sample Type	Sample Analyses (Validated Yes/No)						Validated (b)	Rationale (c)	Consultant (d)	Reference Document (e)
							Inorganics	Metals	PCB	SVOCs	TPH	VOCs				
ESADA-1	ESADA-1-1.5-2.0	ESADA-1-1.5-2.0	08/23/88	HA	2	Primary Sample	Y	Y		Y	Y	Y	Y	WP	GRC	GRC, 1989 <sup>(f)</sup>
ESADA-1	ESADA-1-4.0-4.5	ESADA-1-4.0-4.5	08/23/88	HA	4.5	Primary Sample	Y	Y		Y	Y	Y	Y	WP	GRC	GRC, 1989 <sup>(f)</sup>
ESADA-2	ESADA-2-1.0-1.5	ESADA-2-1.0-1.5	08/23/88	HA	1.5	Primary Sample	Y	Y		Y	Y	Y	Y	WP	GRC	GRC, 1989 <sup>(f)</sup>
ESADA-2	ESADA-2-4.5-5.0	ESADA-2-4.5-5.0	08/23/88	HA	5	Primary Sample	Y	Y		Y	Y	Y	Y	WP	GRC	GRC, 1989 <sup>(f)</sup>
ESADA-3	ESADA-3-1.0-1.5	ESADA-3-1.0-1.5	08/24/88	HA	1.5	Primary Sample	Y	Y		Y	Y	Y	Y	WP	GRC	GRC, 1989 <sup>(f)</sup>
ESADA-3	ESADA-3-3.5-4.0	ESADA-3-3.5-4.0	08/24/88	HA	4	Primary Sample	Y	Y		Y	Y	Y	Y	WP	GRC	GRC, 1989 <sup>(f)</sup>
ESBS01	RJ313	ESBS01S01	04/27/01	HA	0.5	Primary Sample		Y					Y	DTSC	AMEC	This report
ESBS02	RJ314	ESBS02S01	04/27/01	HA	0.5	Primary Sample		Y					Y	DTSC	AMEC	This report
ESBS03	RJ315	ESBS03S01	04/27/01	HA	0.5	Primary Sample		Y					Y	DTSC	AMEC	This report
ESBS04	RJ316	ESBS04S01	05/01/01	HA	0.5	Primary Sample		Y					Y	DTSC	AMEC	This report
ESBS0005	ESBS0005S01	ESBS0005S01	02/21/07	GP	0.5	Primary Sample	Y	Y	Y	Y	Y		Y	DGA	MWH	This report
ESBS0005	ESBS0005S01SP	ESBS0005S01SP	02/21/07	GP	0.5	Split Sample	Y	Y	Y	Y	Y		Y	DGA	MWH	This report
ESBS0005	ESBS0005S02	ESBS0005S02	02/21/07	GP	5.5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0006	ESBS0006S01	ESBS0006S01	02/16/07	HA	0.5	Primary Sample	Y	Y	Y	Y	Y		Y	DGA	MWH	This report
ESBS0006	ESBS0006S02	ESBS0006S02	02/16/07	HA	5	Primary Sample	Y						Y	DGA	MWH	This report
ESBS0007	ESBS0007S01	ESBS0007S01	02/16/07	HA	0.5	Primary Sample	Y	Y	Y	Y	Y		Y	DGA	MWH	This report
ESBS0007	ESBS0007S02	ESBS0007S02	02/16/07	HA	5	Primary Sample	Y						Y	DGA	MWH	This report
ESBS0008	ESBS0008S01	ESBS0008S01	02/21/07	GP	0.5	Primary Sample	Y	Y	Y	Y	Y		Y	DGA	MWH	This report
ESBS0008	ESBS0008S02	ESBS0008S02	02/21/07	GP	5.5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0008	ESBS0008S03	ESBS0008S03	02/21/07	GP	8.5	Primary Sample	Y						Y	DGA	MWH	This report
ESBS0009	ESBS0009S01	ESBS0009S01	02/14/07	HA	1.5	Primary Sample	Y	Y	Y	Y	Y		Y	DGA	MWH	This report
ESBS0009	ESBS0009S02	ESBS0009S02	02/14/07	HA	5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0010	ESBS0010S01	ESBS0010S01	02/21/07	GP	0.5	Primary Sample	Y	Y	Y	Y	Y		Y	DGA	MWH	This report
ESBS0010	ESBS0010S02	ESBS0010S02	02/21/07	GP	5.5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0010	ESBS0010S03	ESBS0010S03	02/21/07	GP	9.5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0011	ESBS0011S01	ESBS0011S01	02/21/07	GP	0.5	Primary Sample	Y	Y	Y	Y	Y		Y	DGA	MWH	This report
ESBS0011	ESBS0011S02	ESBS0011S02	02/21/07	GP	5.5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0011	ESBS0011S03	ESBS0011S03	02/21/07	GP	10.5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0012	ESBS0012S01	ESBS0012S01	02/14/07	HA	0.5	Primary Sample	Y	Y	Y	Y	Y		Y	DGA	MWH	This report
ESBS0012	ESBS0012S02	ESBS0012S02	02/14/07	HA	5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0013	ESBS0013S01	ESBS0013S01	02/15/07	HA	1	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0014	ESBS0014S01	ESBS0014S01	02/15/07	HA	1	Primary Sample	Y						Y	DGA	MWH	This report
ESBS0014	ESBS0014S02	ESBS0014S02	02/16/07	HA	3	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0015S01	ESBS0015S01	ESBS0015S01	02/21/07	HA	0.5	Primary Sample	Y						Y	DGA	MWH	This report
ESBS0015S01	ESBS0015S04	ESBS0015S04	02/21/07	HA	5	Primary Sample	Y						Y	DGA	MWH	This report
ESBS0015S02	ESBS0015S02	ESBS0015S02	02/21/07	GP	0.5	Primary Sample	Y						Y	DGA	MWH	This report
ESBS0015S02	ESBS0015S05	ESBS0015S05	02/21/07	GP	5	Primary Sample	Y						Y	DGA	MWH	This report
ESBS0015S03	ESBS0015S03	ESBS0015S03	02/21/07	HA	0.5	Primary Sample	Y						Y	DGA	MWH	This report
ESBS0015S03	ESBS0015S06	ESBS0015S06	02/21/07	HA	5	Primary Sample	Y						Y	DGA	MWH	This report
ESBS0015S70	ESBS0015S70	ESBS0015S70	02/21/07	HA	0.5	Composite Sample	Y	Y	Y				Y	DGA	MWH	This report
ESBS0019	ESBS0019S01	ESBS0019S01	02/14/07	HA	1.5	Primary Sample	Y						Y	DGA	MWH	This report
ESBS0019	ESBS0019S02	ESBS0019S02	02/16/07	HA	4	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0022	ESBS0022S01	ESBS0022S01	04/03/07	HA	0.5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0022	ESBS0022S02	ESBS0022S02	04/03/07	HA	3	Primary Sample		Y					Y	DGA	MWH	This report
ESBS0023	ESBS0023S01	ESBS0023S01	04/03/07	HA	0.5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0024	ESBS0024S01	ESBS0024S01	04/03/07	HA	0.5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0024	ESBS0024S02	ESBS0024S02	04/03/07	HA	5	Primary Sample		Y					Y	DGA	MWH	This report
ESBS0024	ESBS0024S04	ESBS0024S04	04/03/07	HA	9.5	Primary Sample		Y					Y	DGA	MWH	This report
ESBS0031	ESBS0031S01	ESBS0031S01	04/03/07	HA	5.5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0032	ESBS0032D01	ESBS0032D01	04/03/07	HA	5.5	Field Duplicate	Y	Y					Y	DGA	MWH	This report

TABLE C.3-1C  
ESADA RFI SITE SOIL MATRIX SAMPLING AND ANALYTICAL SUMMARY  
(Page 2 of 2)

TABLE C.3-1C

Sample Location Identification	Unique Sample ID	Sample Identification	Date Collected	Sample Method (a)	Depth (feet bgs)	Sample Type	Sample Analyses (Validated Yes/No)						Validated (b)	Rationale (c)	Consultant (d)	Reference Document (e)
							Inorganics	Metals	PCB	SVOCs	TPH	VOCs				
ESBS0032	ESBS0032S01	ESBS0032S01	04/03/07	HA	5.5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0033	ESBS0033S01	ESBS0033S01	04/03/07	HA	5.5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0034	ESBS0034S01	ESBS0034S01	04/03/07	HA	5.5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0034	ESBS0034S01SP	ESBS0034S01SP	04/03/07	HA	5.5	Split Sample	Y	Y					Y	DGA	MWH	This report
ESBS0035	ESBS0035S01	ESBS0035S01	04/03/07	HA	5.5	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0036	ESBS0036S01	ESBS0036S01	04/03/07	HA	1	Primary Sample	Y	Y					Y	DGA	MWH	This report
ESBS0038	ESBS0038S01	ESBS0038S01	05/15/07	HA	0.5	Primary Sample		Y					Y	DGA	MWH	This report
ESBS0038	ESBS0038S02	ESBS0038S02	05/15/07	HA	5	Primary Sample		Y					Y	DGA	MWH	This report
ESBS0039	ESBS0039S01	ESBS0039S01	05/15/07	HA	0.5	Primary Sample		Y					Y	DGA	MWH	This report
ESBS0039	ESBS0039S02	ESBS0039S02	05/15/07	HA	7.5	Primary Sample		Y					Y	DGA	MWH	This report
ESBS0040	ESBS0040S01	ESBS0040S01	05/15/07	HA	0.5	Primary Sample		Y					Y	DGA	MWH	This report
ESBS0040	ESBS0040S02	ESBS0040S02	05/15/07	HA	7.5	Primary Sample		Y					Y	DGA	MWH	This report
ESBS0041	ESBS0041S01	ESBS0041S01	05/15/07	HA	0.5	Primary Sample		Y					Y	DGA	MWH	This report
ESBS0041	ESBS0041S02	ESBS0041S02	05/15/07	HA	10	Primary Sample		Y					Y	DGA	MWH	This report
ESBS0042	ESBS0042S01	ESBS0042S01	05/14/07	HA	0.5	Primary Sample		Y					Y	DGA	MWH	This report
ESBS0042	ESBS0042S02	ESBS0042S02	05/14/07	HA	7.5	Primary Sample		Y					Y	DGA	MWH	This report
ESBS0043	ESBS0043S01	ESBS0043S01	05/15/07	HA	0.5	Primary Sample		Y					Y	DGA	MWH	This report
ESBS0043	ESBS0043S02	ESBS0043S02	05/15/07	HA	9.5	Primary Sample		Y					Y	DGA	MWH	This report
ESSS01	RS330	ESSS01S01	09/24/99	G	0.5	Primary Sample	Y	Y	Y		Y		Y	DTSC	OGDEN	This report
ESSS02	RJ040	ESSS02S01	09/21/00	G	0	Primary Sample		Y					Y	DTSC	OGDEN	This report
ESSS03	RJ041	ESSS03S01	09/21/00	G	0	Primary Sample		Y					Y	DTSC	OGDEN	This report
ESSS04	RJ042	ESSS04S01	09/21/00	G	0	Primary Sample		Y					Y	DTSC	OGDEN	This report
ESSS05	RJ043	ESSS05S01	09/21/00	G	0	Primary Sample		Y					Y	DTSC	OGDEN	This report
ESSS06	RJ044	ESSS06S01	09/21/00	G	0	Primary Sample		Y					Y	DTSC	OGDEN	This report
ESSS07	RJ045	ESSS07S01	09/21/00	G	0	Primary Sample		Y					Y	DTSC	OGDEN	This report
ESSS08	RJ046	ESSS08S01	09/21/00	G	0	Primary Sample		Y					Y	DTSC	OGDEN	This report
ESSS09	RJ047	ESSS09S01	09/21/00	G	0	Primary Sample		Y					Y	DTSC	OGDEN	This report
Total Primary Samples:							Validated:	50	66	11	15	16	6	77		
Total QC (Duplicate, Split) Samples:							Not Validated	0	0	0	0	0	0	0		
Total Number of ESADA RFI Site Soil Samples:																

Sample Location Identification - Boring or trench number

Unique Sample ID - Laboratory reporting code

Sample Identification - RFI site and sample identifier code

(a) Sample Method:

- G = Grab sample
- GP - Geoprobe - using direct push core barrel.
- HA = Hand Auger sample

(b) Validated: "Y" indicates that a minimum of one analysis has been validated following RFI protocols; agency split samples were not validated but were reviewed for comparability. Data collected prior to the RFI were not typically subsequently validated using RFI protocols but were collected and reviewed following QA procedures established for earlier investigation programs.

(c) Rationale (see below):

- DTSC - Indicates samples collected at direction of DTSC resulting from site review during the RFI field program.
- DGA - Indicates samples collected in 2007 as a part of the Data Gaps Analysis to address delineation with stepout samples, elevated detection limit issues, and specific DTSC requests.
- WP - Indicates samples collected based on DTSC-approved Work Plan scope.
- STEP - Indicates stepout samples were collected as a part of the RFI program (prior to Data Gaps Analysis) to delineate concentrations above comparison levels or anomalous conditions.

(d) Consultant: Contractor responsible for sampling and reporting for each location.

(e) Reference Document: Document containing published data; "This report" includes the RFI site appendix and the Group 8 RFI Report. Refer to Section C.6 (References) for complete citation.

(f) GRC 1989- Phase II Investigation of Soil and Groundwater Conditions- Area IV

Laboratory Analytical Methods Represented (EPA Method No.)

- Inorganics - 9045, 9045C (pH)
- Metals - 6010, 6010B, 6020, 7060, 7471, 7471A, 7740, 7841
- PCB - 8082
- SVOCs - 8270, 8270C SIM
- TPH - 8015, 8015B, 8015M
- VOCs - 8240
- PCB - Polychlorinated biphenyls
- VOCs - Volatile Organic Compound
- SVOCs - Semivolatile Organic Compound
- TPH - Total Petroleum Hydrocarbons

TABLE C.3-2A (PAGE 1 OF 8)

DESCRIPTION OF CHEMICAL USE AREAS AT THE ESADA RFI SITE AND SOIL SAMPLING RESULTS SUMMARY

Map Key <sup>1</sup>	Chemical Use Area Name Status, How Used and Physical Characteristics (see text for Site History)	Potential Chemicals Used / Stored <sup>2</sup>	Sampling Scope and Rationale <sup>2</sup> [See Figure C.2-2 for sampling locations]	Sampling Results <sup>3</sup> Chemical concentrations detected greater than background and/or risk screening levels? <sup>4</sup>	Potential concentration gradients sufficiently evaluated for risk assessment? <sup>5</sup>	Is delineation sufficient to estimate soil volume in CMS? <sup>6,7</sup> [see Figure C.5-1 for CMS areas]
1	<p><b>ESADA Former Storage Yard</b></p> <p>The ESADA Former Storage Yard is a mostly unpaved area divided horizontally by an asphalt road. This Chemical Use Area includes northern and southern storage areas. The ESADA Former Storage Yard is approximately 0.6 acre.</p> <p>The ESADA Former Storage Yard is a generally flat area that slopes gently towards the north-northeast. Surface water drains in that direction toward the down-slope portions of the ESADA site and eventually discharges into drainages in the FSDF RFI site.</p> <p>More than 500 drums containing Dowanol <sup>TM</sup> glycol ethers and ethanol were stored at the ESADA Former Storage Yard in the 1970s. Approximately 120 of these drums contained used Dowanol PM (propylene glycol methyl ether), which was reportedly “nearly saturated with sodium.” Other than storage, the use of Dowanol <sup>TM</sup> glycol ethers has not been documented at ESADA. Dowanol EB (butyl cellosolve) use has been documented for use in pipe cleaning operations at the SRE.</p> <p>Over 400 of the drums contained denatured ethanol. There were also about 100 empty drums located north of the road during the same period. Drums were removed in 1983.</p> <p>Surface water at the ESADA RFI Site discharges via sheet flow to a ditch south of H Street that drains towards the east, then to a culvert that crosses under H Street, and finally toward the north down FSDF Channel B, which runs along the eastern edge of the FSDF RFI Site.</p> <p>Soils at the former storage yard and down-slope areas are primarily sandy and silty clay. Soil thickness at the ESADA Former Storage Yard ranges from 4 to 10 feet bgs.</p>	<p><b>VOCs:</b></p> <p>None documented at the ESADA storage yard; however, solvents potentially present in drums.</p>	<p>Screen for VOCs to evaluate potential presence of VOCs.</p> <p><u>Soil Vapor</u></p> <p>Five soil vapor probes were installed and sampled at representative locations in the drum storage areas.</p> <p>Southern storage area:</p> <ul style="list-style-type: none"><li>ESSV01 at 5 and 10 feet bgs</li></ul> <p>Northern storage area</p> <ul style="list-style-type: none"><li>ESSV01 and ESSV0004 at 5 and 10</li><li>ESSV02 at 5 and 9 feet bgs,</li><li>ESSV0003 at 3.5 and 7.5 feet bgs, and</li><li>ESSV0005 at 4 and 8 feet bgs).</li></ul> <p><u>Soil Matrix</u></p> <p>Four soil samples were collected at two representative boring locations in the southern storage area:</p> <ul style="list-style-type: none"><li>ESADA-1 at 2and 4.5 feet bgs, and</li><li>ESADA-2 1.5 and 5.5 feet bgs).</li></ul> <p>Two soil samples were collected at one location in the northern storage area</p> <ul style="list-style-type: none"><li>ESADA-3 at 1.5 and 4 feet bgs</li></ul>	<p>VOC sample locations are shown on Figure C.2-2.</p> <p><u>Soil Vapor</u></p> <p>No VOCs were detected in any of the representative soil or soil vapor samples collected at the ESADA Former Storage Yard; therefore, no further characterization is warranted.</p>	<p><b>Yes.</b></p> <p>Potential presence of VOCs adequately assessed by representative soil vapor and soil sampling locations.</p>	<p><b>Yes</b></p> <p>VOCs were not detected and area is not recommended for further evaluation in CMS.</p>
		<p><b>SVOCs:</b></p> <p>Dowanol PM (propylene glycol methyl ether), and other SVOCs potentially present in drums.</p>	<p>Samples were collected from across the ESADA storage yard.</p> <p>Five soil samples were collected at three representative boring locations in the southern storage area:</p> <ul style="list-style-type: none"><li>ESADA-1 at 2 and 4.5 feet bgs,</li><li>ESADA-2 at 1.5 and 5 feet bgs, and</li><li>ESBS0009 at 1.5 feet bgs).</li></ul> <p>Six soil samples were collected at representative boring locations in the northern storage area</p> <ul style="list-style-type: none"><li>ESADA-3 at 1.5 and 4 feet bgs, and ESBS0005, ESBS0006, ESBS0007, and ESBS0008, all at 0.5 feet bgs</li></ul>	<p>SVOC results are shown on Figure C.3-1.</p> <p>Phthalates were detected in the shallow sample collected at ESBS0009 from the southern storage area up to 49 µg/kg (di-n-butyl phthalate). All were well below RBSLs (minimum RBSL of 250,000 µg/kg). No other SVOCs were detected in this sample, and no SVOCs were detected in the other two samples in southern storage area.</p> <p>SVOCs detected in the northern storage area include PAHs and phthalates:</p> <ul style="list-style-type: none"><li>PAHs were detected up to 140 µg/kg 2-methylnaphthalene; Benzo(a)pyrene was detected up to 17 µg/kg.</li><li>Phthalates were detected up to 720 µg/kg (bis(2-Ethylhexyl) phthalate).</li><li>Concentrations were generally highest in samples from down-slope locations in the northernmost portion of the former storage yard; however, SVOC concentrations in samples collected from the FSDF RFI Site north were lower than the concentrations detected in the ESADA samples.</li></ul> <p>None of the detected SVOC concentrations exceeded respective RBSLs. Based on the low detected SVOC concentrations in samples from representative locations across the northern and southern ESADA Former Storage Yard areas; no further characterization is warranted.</p>	<p><b>Yes</b></p> <p>SVOC distribution adequately defined by representative sample locations. Only low concentrations detected.</p>	<p><b>Yes</b></p> <p>Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.</p>

TABLE C.3-2A (PAGE 2 OF 8)

DESCRIPTION OF CHEMICAL USE AREAS AT THE ESADA RFI SITE AND SOIL SAMPLING RESULTS SUMMARY

Map Key <sup>1</sup>	Chemical Use Area Name Status, How Used and Physical Characteristics (see text for Site History)	Potential Chemicals Used / Stored <sup>2</sup>	Sampling Scope and Rationale <sup>2</sup> [See Figure C.2-2 for sampling locations]	Sampling Results <sup>3</sup> Chemical concentrations detected greater than background and/or risk screening levels? <sup>4</sup>	Potential concentration gradients sufficiently evaluated for risk assessment? <sup>5</sup>	Is delineation sufficient to estimate soil volume in CMS? <sup>6,7</sup> [see Figure C.5-1 for CMS areas]
		<b>TPH:</b>  No documented use of petroleum hydrocarbons; hydrocarbons potentially present in drums.	Five shallow soil samples were collected at representative boring locations in the southern storage area (ESBS0009 at 1.5 feet bgs) and northern storage area (ESBS0005, ESBS0006, ESBS0007, and ESBS0008 at 0.5 feet bgs) storage areas.  One surface soil sample was collected (ESSS01 at 0.5 feet bgs) to target a location in the northern storage area where discolored soil was observed during 1999 exploratory trenching.	TPH results are shown on Figure C.3-1.  TPH was not detected in the southern storage area.  Lubricant oil range hydrocarbons were detected in two of the five samples (ESBS0006 and ESBS0008) from the northern storage area. TPH was not detected in the sample targeting discolored soil (ESSS01)  Detected TPH concentrations were well below the ResRBSL of 1,400 mg/kg.  Based on the low concentrations of TPH detected in two of six samples from representative and targeted locations across the northern and southern ESADA Former Storage Yard areas, no further characterization is warranted.	<b>Yes</b>  TPH distribution adequately defined by targeted and representative sample locations. Only low concentrations detected.	<b>Yes</b>  Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.
		<b>PCBs:</b>  No documented use of PCBs; potentially present in drums.	Five representative shallow soil samples and one targeted surface soil sample were collected as described above for TPH.	PCB results are shown on Figure C.3-2A.  No PCBs were detected in the sample collected from the southern storage area.  PCBs were detected in three of four samples from the northern storage area: <ul style="list-style-type: none"><li>Aroclor 1254 in samples ESBS0008 (20 J µg/kg and 21 J µg/kg [split sample]) and ESBS0006 (12 J µg/kg).</li><li>Aroclor 1260 in soil samples ESBS0005 (6.3 µg/kg) and ESBS0008 (21 µg/kg).</li></ul> All detected concentrations were below EcoRBSLs (79 µg/kg for both Aroclor 1254 and 1260)  Based on low PCB concentrations detected in representative and targeted samples from the northern and southern ESADA Former Storage Yard areas, no further characterization is warranted.	<b>Yes</b>  PCB distribution adequately defined by targeted and representative sample locations. Only low concentrations detected.	<b>Yes</b>  Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.

TABLE C.3-2A (PAGE 3 OF 8)

DESCRIPTION OF CHEMICAL USE AREAS AT THE ESADA RFI SITE AND SOIL SAMPLING RESULTS SUMMARY

Map Key <sup>1</sup>	Chemical Use Area Name Status, How Used and Physical Characteristics (see text for Site History)	Potential Chemicals Used / Stored <sup>2</sup>	Sampling Scope and Rationale <sup>2</sup> [See Figure C.2-2 for sampling locations]	Sampling Results <sup>3</sup> Chemical concentrations detected greater than background and/or risk screening levels? <sup>4</sup>	Potential concentration gradients sufficiently evaluated for risk assessment? <sup>5</sup>	Is delineation sufficient to estimate soil volume in CMS? <sup>6,7</sup> [see Figure C.5-1 for CMS areas]
		<b>Metals</b>  Approximately 120 drums stored at the ESADA Former Storage Yard were nearly saturated with sodium; other metals potentially associated with drum storage.	<u>1988 Sodium and Potassium Sampling</u> A total of six soil samples were collected from representative locations across the southern storage area (ESADA-1 at 2 and 4.5 feet bgs, ESADA-2 at 1.5 and 5 feet bgs) and the northern storage area (ESADA-3 at 1.5 and 4 feet bgs). Soil borings were conducted to characterize geologic conditions and to facilitate collection of soil samples.  <u>1999 Metals Sampling</u> One surface soil sample was collected (ESSS01 at 0.5 feet bgs) to target a location in the northern storage area where discolored soil was observed during exploratory trenching.  <u>2000 Mercury Sampling</u> Four surface soil samples (ESSS05, ESSS06, and ESSS07 at 0.5 feet bgs) were collected at locations representative of conditions upslope of the FSDF RFI Site to the north, in order to evaluate ESADA as a potential source of mercury to FSDF.  <u>2007 Metals Sampling</u> Eight soil samples were collected at representative locations in the storage areas: <ul style="list-style-type: none"><li>Two samples in the southern storage area (ESBS0009 at 1.5 and 5 feet bgs)</li><li>Four soil samples in the northern storage area (ESBS0005, ESBS0006, ESBS0007, and ESBS0008 at 0.5 feet bgs).</li></ul> Based on aluminum and sodium concentrations at or above background in shallow samples at ESBS0005, ESBS0008, and ESBS0009, deeper samples (5 to 5.5 feet bgs) were analyzed at these locations for aluminum and sodium only. In addition eight step-out locations were sampled for aluminum and sodium around the northern and southern storage areas in adjacent-lateral (ESBS0038), up-slope (ESBS0022 and ESBS0039 to ESBS0043) and down-slope (ESBS0023, ESBS0024, FSBS0003 and FSBS0072) locations.	Metals results are shown on Figure C.3-2.  Aluminum, sodium, and vanadium were detected above background ranges. <ul style="list-style-type: none"><li>Aluminum up to 31,100 mg/kg, above the maximum background of 20,000 mg/kg in eight samples in and around the storage areas. However, aluminum concentrations are considered naturally occurring since:<ul style="list-style-type: none"><li>The area of highest sodium contains aluminum within background range.</li><li>There is no suspected source of aluminum associated with ESADA or SRE where Dowanol EB was used for pipe cleaning.</li><li>The ESADA site is situated on a hill slope comprised of soils derived from Santa Susana formation bedrock. The highest aluminum and vanadium (see below) above background concentrations were detected at location BG04, on Santa Susana fm southwest of ESADA</li><li>High aluminum concentrations are common in clay-rich soils</li></ul></li><li>Sodium up to 732 mg/kg, above the maximum background of 110 mg/kg.<ul style="list-style-type: none"><li>The highest sodium concentrations were detected in samples within the southern/northern storage areas, and decrease in all directions. Bedrock encountered during sampling delineates the vertical extent of impact.</li></ul></li><li>Vanadium at 64.8 mg/kg, above the maximum background of 62 mg/kg, in a split sample at the northwest corner of the former storage yard; the primary sample contained 53 mg/kg. All other vanadium concentrations were within background range.</li></ul> No other metals were detected above background ranges. pH ranged from 7.74 to 9.6 indicating normal pH conditions.  Based on extensive sampling at representative, targeted, and step-out locations throughout the storage areas, no further characterization is warranted.	<b>Yes</b>  Metals distribution adequately assessed by representative, targeted and step out sampling data.	<b>Yes</b>  Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.



TABLE C.3-2A (PAGE 4 OF 8)

DESCRIPTION OF CHEMICAL USE AREAS AT THE ESADA RFI SITE AND SOIL SAMPLING RESULTS SUMMARY

Map Key <sup>1</sup>	Chemical Use Area Name Status, How Used and Physical Characteristics (see text for Site History)	Potential Chemicals Used / Stored <sup>2</sup>	Sampling Scope and Rationale <sup>2</sup> [See Figure C.2-2 for sampling locations]	Sampling Results <sup>3</sup> Chemical concentrations detected greater than background and/or risk screening levels? <sup>4</sup>	Potential concentration gradients sufficiently evaluated for risk assessment? <sup>5</sup>	Is delineation sufficient to estimate soil volume in CMS? <sup>6,7</sup> [see Figure C.5-1 for CMS areas]
2	<b>ESADA Sodium Testing Area</b>  The ESADA Sodium Testing Area was used from 1964 to 1968 to study maximum rates of sodium-water reactions on a mockup of the modular steam generator (MSG). The experimental procedure consisted of admitting heated sodium and high-pressure water and steam into “test sections” (an 8 inch diameter Schedule 304 stainless steel pipe) through mechanically punctured rupture discs.  The test facility at Building 814 consisted of a test device (a large leak injector devise [LLID]); a 2’ diameter x 2’ long horizontally-mounted steam supply boiler (Tank B-1); a high pressure water supply tank (T-2); a 220-gallon sodium storage tank (T-4); and a 6’diameter x 14.5’ high reaction products relief tank (T-5).  The electronic control panels and circuit breakers for the LLID were located at Building 514, just east of the sodium test area. The control, observation, and recording of the sodium tests were conducted at Building 314, located approximately 200 feet east of Building 814. Underground piping connected Building 820 to a down-slope discharge pit at FSDF.  Surface water flow at the ESADA RFI Site is described in Chemical Use 1 above.	<b>VOCs</b>  No documented use of VOCs.	The ESADA Sodium Testing Area was screened for VOCs. One soil vapor sample was collected at a location targeting the former location of Building 814.	VOC sample locations are shown on Figure C.2-2.  VOCs were not detected in soil vapor at the targeted sampled location; therefore, no further characterization is warranted.	<b>Yes</b>  No VOCs were detected in soil vapor at the targeted sample location. Potential VOC presence adequately assessed.	<b>Yes</b>  VOCs were not detected and area not recommended for further evaluation in CMS
		<b>Metals</b>  Sodium was stored and used to test maximum rates of sodium-water reactions.	Targeted samples were not collected for sodium analysis at this chemical use area; however, representative samples were collected from the surrounding area as part of the ESADA Former Storage Yard characterization, which adequately assessed metals concentrations in the area.  Two surface soil samples (ESSS08 and ESSS09 at 0.5 feet bgs) were collected at locations representative of conditions upslope of the FSDF RFI Site to the north, in order to evaluate ESADA as a potential source of mercury to FSDF	Metals results are shown on Figure C.3-2.  Elevated sodium concentrations were detected in samples from the southern storage area of the ESADA Former Storage Yard, and concentrations generally decreased with distance from the southern storage area. Based on decreasing trends in concentrations away from the source area, no additional lateral delineation is warranted. Bedrock encountered during drilling delineates the vertical extent of impact.  Mercury was detected in samples ESSS08 and ESSS09, within background range.	<b>Yes</b>  Metals distribution adequately assessed by representative sampling data.	<b>Yes</b>  Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.

TABLE C.3-2A (PAGE 5 OF 8)

DESCRIPTION OF CHEMICAL USE AREAS AT THE ESADA RFI SITE AND SOIL SAMPLING RESULTS SUMMARY

Map Key <sup>1</sup>	Chemical Use Area Name Status, How Used and Physical Characteristics (see text for Site History)	Potential Chemicals Used / Stored <sup>2</sup>	Sampling Scope and Rationale <sup>2</sup> [See Figure C.2-2 for sampling locations]	Sampling Results <sup>3</sup> Chemical concentrations detected greater than background and/or risk screening levels? <sup>4</sup>	Potential concentration gradients sufficiently evaluated for risk assessment? <sup>5</sup>	Is delineation sufficient to estimate soil volume in CMS? <sup>6,7</sup> [see Figure C.5-1 for CMS areas]
3	<b>Process Development Unit (PDU) AST Area</b>  Two aboveground horizontal tanks were located approximately 46 feet north of the former ESADA Storage Yard and approximately 11 feet south of the shared boundary of the ESADA and FSDF RFI sites. Documentation indicates that that one of the tanks was an 8,000-gallon stainless steel former PDU AST that contained “green liquor”, waste water from coal gasification process, containing organic compounds, sulfur, and ash (ICF, 1993). The contents of the second tank have not been documented. The tanks have been removed.  Surface water flow at the ESADA RFI Site is described in Chemical Use 1 above.  Soil depths in the PDU AST area range from 11 – 13.5 feet bgs.	<b>VOCs</b>  No documented use of VOCs, but potential presence of organic compounds in green liquor.	Two soil vapor samples (5 and 10 feet bgs) were collected at a targeted location (ESSV0009) approximately 25 feet south of the former AST.	VOC sample locations are shown on Figure C.2-2.  No VOCs were detected in soil vapor sample collected from targeted sample location near the PDU AST; no further characterization is warranted.	<b>Yes</b>  No VOCs were detected. Potential VOC presence adequately assessed by targeted sample location.	<b>Yes.</b>  VOCs were not detected and area is not recommended for further evaluation in the CMS.
		<b>SVOCs</b>  No documented use of SVOCs, but potential presence of organic compounds in green liquor.	Two shallow soil samples were collected, targeting both ends of the former tank area and analyzed at the PDU AST area (ESBS0010 and ESBS0011 at 0.5 feet bgs).	SVOC results are shown on Figure C.3-1.  Low concentrations of SVOCs were detected in both samples at the former AST: <ul style="list-style-type: none"><li>Phthalates were detected in both samples up to 34 µg/kg bis(2-Ethylhexyl) phthalate</li><li>PAHs were detected in ESBS0011 up to 130 µg/kg pyrene; benzo(a)pyrene was detected at 32 µg/kg</li></ul> All detected SVOCs were below RBSLs  Based on low SVOCs detected at targeted sample locations, no further characterization is warranted.	<b>Yes.</b>  SVOCs were detected at low concentrations. SVOC distribution adequately defined by targeted sample locations.	<b>Yes.</b>  Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.
		<b>TPH</b>  No documented use of TPH, but potentially associated with tank contents.	Two shallow soil samples were collected as described above for SVOCs	TPH results are shown on Figure C.3-1.  Lubricant oil range hydrocarbons were detected in both samples up to 11 mg/kg, well below the ResRBSL of 1,400 mg/kg. No other hydrocarbon ranges were detected.  Based on low concentrations detected in targeted sample locations, no further characterization is warranted.	<b>Yes.</b>  TPH detected at low concentrations. TPH distribution adequately defined by targeted sample locations.	<b>Yes.</b>  Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.
		<b>PCBs</b>  No documented use of PCBs, but potentially associated with tank contents.	Two shallow soil samples were collected as described above for SVOCs.	PCB results are shown on Figure 3-1.  Aroclor 1254 was detected in both samples (up to 30 µg/kg in ESBS0011). Aroclor 1260 was detected in ESBS0011 at 18 µg/kg. None of the detected concentrations were above RBSLs.  All detected concentrations were below the Eco RBSL for PCBs, and samples from upslope and lateral locations had no detected PCBs; therefore, no further characterization is warranted.	<b>Yes.</b>  PCBs were detected at low concentrations. PCBs distribution adequately defined by targeted sample locations.	<b>Yes.</b>  Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.
		<b>Metals</b>  No documented use of, but potentially associated with tank contents.	PDU AST area screened for metals.  Two shallow soil samples were collected as described above for SVOCs.  Based on elevated aluminum and sodium concentrations in shallow samples, deeper samples were analyzed: <ul style="list-style-type: none"><li>5.5 and 9.5 feet bgs at ESBS0010;</li></ul>	Metals results are shown on Figure C.3-2.  Aluminum, sodium, and mercury were detected above background ranges: <ul style="list-style-type: none"><li>Aluminum up to 24,000 mg/kg at the former PDU AST (ESBS0011), with the down-slope concentration higher at 26,900 mg/kg (FSBS0072). No other down-slope aluminum concentrations exceeded background</li></ul>	<b>Yes.</b>  Metals distribution adequately defined by targeted sample locations.	<b>Yes.</b>  Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.

TABLE C.3-2A (PAGE 6 OF 8)

DESCRIPTION OF CHEMICAL USE AREAS AT THE ESADA RFI SITE AND SOIL SAMPLING RESULTS SUMMARY

Map Key <sup>1</sup>	Chemical Use Area Name Status, How Used and Physical Characteristics (see text for Site History)	Potential Chemicals Used / Stored <sup>2</sup>	Sampling Scope and Rationale <sup>2</sup> [See Figure C.2-2 for sampling locations]	Sampling Results <sup>3</sup> Chemical concentrations detected greater than background and/or risk screening levels? <sup>4</sup>	Potential concentration gradients sufficiently evaluated for risk assessment? <sup>5</sup>	Is delineation sufficient to estimate soil volume in CMS? <sup>6,7</sup> [see Figure C.5-1 for CMS areas]
			<ul style="list-style-type: none"><li>5.5 and 10.5 feet bgs at ESBS0011)</li></ul> <p>In addition, a down-slope step out sample, FSBS0072 at 0.5 feet bgs, was collected in FSDF for aluminum and sodium.</p>	<p>at FSDF.</p> <ul style="list-style-type: none"><li>Sodium up to 200 mg/kg at the former PDU AST (both samples), with the down-slope concentration higher at 319 mg/kg.</li><li>Mercury at 0.27 mg/kg (ESBS0010) at the former PDU AST.</li></ul> <p>No other metals were detected above background ranges. pH ranged from 7.85 to 8.9 indicating normal pH conditions.</p> <p>As described above for Chemical Use Area 1, aluminum is considered naturally occurring based on data distribution, site history (lack of source) and site lithology.</p> <p>Mercury was not detected above background in any other sample in the entire ESADA RFI Site and does not warrant further characterization in association with this AST.</p> <p>Sodium is considered related to concentrations upslope in Chemical Use Area 1 (see above).</p> <p>No further characterization is warranted.</p>		

TABLE C.3-2A (PAGE 7 OF 8)

DESCRIPTION OF CHEMICAL USE AREAS AT THE ESADA RFI SITE AND SOIL SAMPLING RESULTS SUMMARY

Map Key <sup>1</sup>	Chemical Use Area Name Status, How Used and Physical Characteristics (see text for Site History)	Potential Chemicals Used / Stored <sup>2</sup>	Sampling Scope and Rationale <sup>2</sup> [See Figure C.2-2 for sampling locations]	Sampling Results <sup>3</sup> Chemical concentrations detected greater than background and/or risk screening levels? <sup>4</sup>	Potential concentration gradients sufficiently evaluated for risk assessment? <sup>5</sup>	Is delineation sufficient to estimate soil volume in CMS? <sup>6,7</sup> [see Figure C.5-1 for CMS areas]
4	<b>ESADA Pistol Range</b>  The former ESADA Pistol Range at ESADA operated from 1980 to 1995 as a practice shooting range for security personnel. It consisted of Buildings 317 and 318, which were used as shelters while firing at downrange targets located at the southern end of the practice range. Earthen berms were located downrange to capture the lead shot.  Prior to its use as a practice shooting range, the former ESADA Pistol Range was used for the testing of zirconium hydride (ZrH <sub>2</sub> ) fuel from approximately 1966 to 1973. Testing was conducted at the isotope impact system test device at Building 820, while the controls were housed at Building 730, the impact test control building.  All buildings at the former ESADA Pistol Range have been demolished. The concrete foundations for the buildings are still in place.  Surface water flow at the ESADA RFI Site is described in Chemical Use 1 above.	<b>VOCs</b>  No documented use of VOCs.	The former ESADA Pistol Range was screened for VOCs.  Two soil vapor samples (ESSV0007 at 3.5 and 7.5 feet bgs) were collected from a representative location in the area between former Buildings 317 and 318.	VOC sample locations are shown on Figure C.2-2.  VOCs were not detected at the representative location. No further characterization is warranted..	<b>Yes.</b>  Potential VOC presence adequately assessed by representative sample location.	<b>Yes.</b>  Area is recommended for further evaluation during the CMS based on metals. VOCs were not detected and do not drive CMS recommendation.
		<b>SVOCs</b>  No documented use of SVOCs.	Screen Building 820 area for SVOCs.  One shallow soil sample (ESBS0012 at 0.5 feet bgs) was collected at one representative location near the southeast corner of Building 820.	SVOC results are shown on Figure C.3-1.  PAHs were detected up to 36 µg/kg pyrene; benzo(a)pyrene was detected at 15 µg/kg. Detected PAH concentrations were below RBSLs. Based on low concentrations at representative location, no further characterization is warranted.	<b>Yes.</b>  Based on low concentrations, SVOC presence and distribution adequately assessed by representative sample locations.	<b>Yes.</b>  Area is recommended for further evaluation during the CMS based on metals. SVOCs do not drive CMS recommendations.
		<b>TPH</b>  No documented use of TPH.	Screen Building 820 area for TPH  One shallow soil sample (ESBS0012 at 0.5 feet bgs) was collected at one representative location near the southeast corner of Building 820.	TPH results are shown on Figure C.3-1.  Lubricant oil range hydrocarbons were detected at representative location at trace level. The detected concentration was less than the residential RBSL for diesel range hydrocarbons. No further delineation necessary.	<b>Yes.</b>  Based on low TPH concentrations, TPH presence and distribution adequately delineated by representative sample locations.	<b>Yes.</b>  Area is recommended for further evaluation during the CMS based on metals. TPH does not drive CMS recommendations.
		<b>PCBs</b>  Site documentation does not indicate use or storage of PCBs.	Screen Building 820 area for PCBs.  One shallow soil sample (ESBS0012 at 0.5 feet bgs) was collected at one representative location near the southeast corner of Building 820.	PCBs results are shown on Figure C.3-1.  PCBs were not detected at the representative sample location. No further characterization needed.	<b>Yes.</b>  Potential PCB presence adequately assessed by representative sample location.	<b>Yes.</b>  Area is recommended for further evaluation during the CMS based on metals. PCBs were not detected and do not drive CMS recommendation
		<b>Metals</b>  Deposition of lead shot associated with firing range activities is likely. Site documentation does not indicate the use or storage of other metals.	Screen the former ESADA Pistol Range for metals associated with firing range activities.  Soil samples were collected from representative and targeted locations: <ul style="list-style-type: none"><li>• ESBS01 at 0.5 feet bgs,</li><li>• ESBS02 at 0.5 feet bgs,</li><li>• ESBS03 at 0.5 feet bgs</li><li>• ESBS04 at 0.5 feet bgs</li><li>• ESBS0012 at 0.5 and 5 feet bgs,</li><li>• ESBS0013 at 1 foot bgs for lead only,</li><li>• ESBS0014 at 3 feet bgs for lead only,</li><li>• ESBS0019 at 4 feet bgs, just below the depth of visible deposits of bullets, lead shot, shot gun shell wadding, and wad cutters).</li></ul> Based on elevated detections of antimony, arsenic, and lead, collect and analyze soil samples at six step-out boring	Metals results are shown on Figure C.3-2.  Antimony, arsenic, boron, lead, selenium, and sodium were detected above background ranges:: <ul style="list-style-type: none"><li>• Antimony up to 870 mg/kg (background 8.7 mg/kg),</li><li>• Arsenic up to 350 mg/kg (background 15 mg/kg)</li><li>• Boron up to 14 mg/kg (background 9.7),</li><li>• lead up to 27,000 mg/kg (background 34 mg/kg)</li><li>• Selenium up to 1.2 mg/kg (background 0.655 mg/kg)</li><li>• Sodium up to 132 mg/kg (background 110 mg/kg);</li></ul> Selenium concentrations were not above RBSLs. Maximum antimony, arsenic, and lead concentrations were detected in target area samples (i.e., southern) of the former ESADA Pistol Range. Concentrations of these metals were above RBSLs in this area, but were generally lower in lateral, upslope, and down-slope sample locations, and were below background in step out samples.	<b>Yes.</b>  Based on sampling and risk assessment results, the area is recommended for further evaluation during the CMS.	<b>Yes.</b>  Soil volume is based on laterally decreasing concentrations (step-out data) and depth to bedrock.

TABLE C.3-2A (PAGE 8 OF 8)

DESCRIPTION OF CHEMICAL USE AREAS AT THE ESADA RFI SITE AND SOIL SAMPLING RESULTS SUMMARY

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			locations. ESBS0031 – ESBS0034 (5.5 feet bgs) in the earthen berm area. Collect and analyze samples at down-slope locations ESBS0035 (5.5 feet bgs) and ESBS0036 (1 foot bgs).	pH ranges from 7.5 to 8.1 indicated normal pH conditions.  The area of highest impacts has been delineated; therefore, no additional characterization is warranted.		
5	<b>Transformer Pole X-35</b>  Three pole-mounted transformers northwest of the former ESADA Pistol Range surrounded by sand and gravel road.  The transformers have been removed. The pole is still in place.	<b>PCBs</b>  Oils potentially containing PCBs.	Three soil samples were collected adjacent to the transformer pole and combined for composite analysis (SRBS69).	PCBs results are shown on Figure C.3-1.  PCBs were not detected in composite sample from targeted locations. No further characterization warranted.	<b>Yes.</b>  PCBs not detected in targeted composite sample.	<b>Yes.</b>  Area is not recommended for further evaluation in CMS.

**Sources:**  
AI, 1964a, 1965; Boeing 1999a, 1999b; Dibblee, 1992; GRC, 1989; ICF, 1993; MWH, 2002; Rockwell, 1983a, 1983b, 1989b; SAIC, 1994; Ogden, 1996; and facility reference photographs and documents (Boeing, 2007a).

- Notes:**
1. Map Key refers to numbered chemical use area as shown on Figures C.2-1, C.2-2, C.3-1, and C.3-2.
  2. Where historical records and physical characteristics do not suggest the presence of a chemical group, that chemical group was not analyzed in samples from the respective chemical use area and is not reflected in this table.
  3. Complete sample analytical results are presented in Attachment C-3.
  4. The use of the SRAM-based screening levels for comparison purposes does not serve as a risk assessment. These screening levels are not used to determine if a chemical use area will be recommended for further consideration in the CMS, but only as a tool to evaluate the characterization data. The SRAM-based screening levels represent conservative concentrations that pose a low level of risk.
  5. Concentration gradients must be defined such that the risk assessment reflects the approximate maximum analyte concentration OR a concentration sufficiently high to result in risk requiring a recommendation for evaluation during CMS. .
  6. Chemicals listed as a basis for CMS recommendations include both chemical drivers (above 1 x 10<sup>-6</sup> risk and HI of 1.0) and significant chemical contributors to overall risk.
  7. Volumes for CMS evaluation must be estimable within a factor of ten for comparison of remedial alternatives.

ACRONYMS

AST = aboveground storage tank  
bgs = below ground surface  
CMS = Corrective Measures Study  
CHCF = Component Handling Cleaning Facility  
EcoRBSL = Ecological Risk Based Screening Level  
ESADA = Empire State Atomic Development Authority  
ETEC = Energy Technology and Engineering Center  
FSDF = Former Sodium Disposal Facility

ICF = ICF Kaiser  
J = trace concentration detected above MDL but below MRL  
LLID = large leak injector devise  
mg/kg = milligrams per kilogram  
MDL = method detection limit  
MRL = method reporting limit  
MSG = modular steam generator  
ng/kg = nanograms per kilogram

PAH = Polynuclear Aromatic Hydrocarbon  
PCBs = Polychlorinated Biphenyls  
PDU = Process Development Unit  
ResRBSL = Residential Risk Based Screening Level  
RFI = Resource Conservation and Recovery Act (RCRA) Facility Investigation  
RBSL = Risk Based Screening Level  
SRE = Sodium Reactor Experiment

SVOC = Semivolatile Organic Compound  
TEQ = Total Equivalency Quotient (normalized to 2,3,7,8 TCDD)  
TPH = Total Petroleum Hydrocarbons  
µg/kg = micrograms per kilogram  
VOC = Volatile Organic Compound  
ZrH = zirconium hydride

**TABLE C3-2B**  
**ESADA RFI SITE SUMMARY AND EVALUATION OF GROUNDWATER SAMPLING RESULTS**  
**(PAGE 1 OF 3)**

Analytical Group	Site Soil Impacts? (Summary of Relevant Impacts) <sup>1</sup>	Monitored in Groundwater? (Number of Samples/Date Range) <sup>2</sup>	Constituents Detected in Groundwater? (Above GWCC or Regulatory Criteria?) <sup>3</sup>	RFI Site Related?	Groundwater Characterized Sufficiently for Risk Assessment?
VOCs	VOCs were not detected in soil matrix or soil vapor samples at ESADA.	<p>YES</p> <p>33 samples have been collected and analyzed for VOCs between 1993 and 2007 in perched well RS-23 and Chatsworth formation well RD-50.</p>	<p>YES</p> <p>Two VOCs, benzene and toluene, were detected above regulatory criteria at RD-50. Benzene was detected at a maximum concentration of 1.2 µg/L and toluene was detected at a maximum concentration of 180 µg/L. Benzene and toluene were first detected in February 2003. [Note: toluene was detected at 0.27 µg/L in August 2001, but was identified as a laboratory contaminant; Trichloroethene (TCE) was detected at 4.7 µg/L in July 2002 in a split sample (primary sample was ND)].</p> <p>Five VOCs were detected below screening levels in samples from discrete interval monitoring at RD-50:</p> <ul style="list-style-type: none"> <li>Acetone at up to 19 µg/L</li> <li>Bromodichloromethane at up to 0.88 µg/L</li> <li>Chloroform at up to 0.58 µg/L</li> <li>cis-1,2-Dichloroethene at up to 0.43 µg/L</li> <li>TCE at up to 2.2 µg/L</li> </ul> <p>Dibromochloromethane (up to 0.94 µg/L), methyl ethyl ketone (up to 6.9 µg/L), and methyl isobutyl ketone (up to 3.6 µg/L) were detected but do not have screening levels.</p> <p>VOCs were not detected in RS-23.</p>	<p>NO</p> <p>VOCs were not detected in extensive soil or soil vapor.</p> <p>RD-50 benzene and toluene detections are related to the FLUTe multi-level groundwater sampling system in that well (first detected in February 2003 following FLUTe installation; BTEX constituents detected at other SSFL FLUTe locations).</p> <p>Other groundwater VOCs are considered related to historical, incidental, small spills in the area. Current soil sample data at ESADA do not indicate a significant release; however, historical releases may have occurred within the sampling area from which no mass remains in surficial media.</p>	<p>NSGW – YES</p> <p>Perched NSGW very infrequently present at site.</p> <p>CFGW - YES</p>
SVOCs	<p>SVOCs were detected at several areas within the ESADA RFI Site.</p> <p>PAHs were detected up to 140 µg/kg 2-methylnaphthalene and benzo(a)pyrene was detected up to 32 µg/kg. Phthalates were detected up to 720 µg/kg (bis(2-Ethylhexyl) phthalate), but most results were less than 100 µg/kg.</p> <p>Benzoic acid and bis(2-chloroethyl)ether (detected in groundwater) were not detected in soil.</p>	<p>YES</p> <p>1 sample has been collected and analyzed for SVOCs in 1993 in Chatsworth formation well RD-50.</p>	<p>YES</p> <p>Two SVOCs were detected at one ESADA monitoring location (RD-50).</p> <ul style="list-style-type: none"> <li>Benzoic acid up to 140 µg/L. (No established MCL)</li> <li>bis(2-chloroethyl)ether up to 30 µg/L. (No established MCL)</li> </ul>	<p>NO</p> <p>Benzoic acid and bis(2-chloroethyl)ether were not detected in soil.</p> <p>PAHs not detected in groundwater and detected soil concentrations for other SVOCs were low.</p>	<p>NSGW – YES</p> <p>Perched NSGW very infrequently present at site.</p> <p>CFGW - –YES</p>
TPH	Diesel range TPH (C21-C30) was detected in 5 or 13 samples at ESADA up to 11 mg/kg. No other TPH ranges were detected.	<p>YES</p> <p>Five samples have been collected and analyzed for Gasoline Range Organics (C6-C12) between 1999 and 2005 in Chatsworth formation well RD-50.</p>	<p>YES</p> <p>Gasoline Range Organics (C6-C12) were detected beginning in February 2003 (150 µg/L) from discrete interval (FLUTe) monitoring at RD-50. TPH was not detected prior to FLUTe installation [Note: TPH was detected in February 2002, but was identified as laboratory contamination and was below the reporting limit]</p>	<p>UNLIKELY</p> <p>Gasoline range organics in RD-50 are considered related to historical, incidental, small spills in the area. Current soil sample data at ESADA do not indicate a significant release; however, historical releases may have occurred within the sampling area from which no mass remains in surficial media.</p>	<p>NSGW – YES</p> <p>Perched NSGW very infrequently present at site.</p> <p>CFGW - YES</p>

**TABLE C3-2B**  
**ESADA RFI SITE SUMMARY AND EVALUATION OF GROUNDWATER SAMPLING RESULTS**  
**(PAGE 2 OF 3)**

Analytical Group	Site Soil Impacts? (Summary of Relevant Impacts) <sup>1</sup>	Monitored in Groundwater? (Number of Samples/Date Range) <sup>2</sup>	Constituents Detected in Groundwater? (Above GWCC or Regulatory Criteria?) <sup>3</sup>	RFI Site Related?	Groundwater Characterized Sufficiently for Risk Assessment?
PCBs	PCBs were detected up to 30 µg/kg at ESADA.	NO  Based on low mobility of PCBs and low detected concentrations at ESADA, the potential for migration to groundwater has been considered low and PCB groundwater analysis has not been conducted. However, PCBs were analyzed in groundwater from other SSFL RFI sites, targeting soil containing high PCB concentrations in recharge areas (see MWH, 2006b), and PCBs not been detected in groundwater.	PCBs not analyzed	NO  Although groundwater samples have not been analyzed for PCBs, detected concentrations in soil were low and PCBs do not readily migrate to groundwater based on low solubility.	NSGW – YES  Perched NSGW very infrequently present at site.  CFGW - YES
Dioxins	Dioxins are not considered related to ESADA operations and not analyzed.	NO	NO	NO  Although groundwater samples have not been analyzed for dioxins, dioxins are not suspected in soil and do not readily migrate to groundwater based on low solubility.	NSGW – YES Perched NSGW very infrequently present at site.  CFGW - YES
Metals	Aluminum, antimony, arsenic, boron, lead, selenium, sodium, and vanadium were detected above background at ESADA. <u>Former ESADA Storage Yard (Chemical Use Number 1)</u> <ul style="list-style-type: none"> <li>Aluminum up to 31,100 mg/kg (background 20,000 mg/kg) in 12 samples</li> <li>Antimony up to 870 mg/kg (background 8.7) in two samples</li> <li>Arsenic up to 350 mg/kg (background 15) in two samples</li> <li>Boron at 14 J mg/kg (background 9.7) in two samples</li> <li>Sodium up to 732 mg/kg (background 100 mg/kg), in 26 samples</li> <li>Lead up to 27,000 mg/kg (background 34) in four samples</li> <li>Mercury at 0.27 mg/kg (background 0.09) in one sample</li> <li>Selenium up to 1.2 J mg/kg (background 0.655) in three samples</li> <li>Vanadium at 64.8 mg/kg (background 62) in one sample</li> </ul>	YES  One sample has been collected and analyzed for metals in 1993 from Chatsworth formation well RD-50. Metals have been analyzed regularly since 1989 in downslope/downgradient well RD-21.  Metals have not been analyzed at RS-23.	YES  Lead was detected at 18 µg/L in a filtered RD-50 sample, above the Groundwater Comparison Concentration (GWCC) of 11 µg/L. Lead was below GWCCs in RD-21.  No other metals were detected above GWCCs in RD-50.  Sodium was detected in RD-50 at 73,000 µg/L and in RD-21 at 56,000 µg/L, below the GWCC.	POSSIBLY  Based on lead concentrations in soil, this metal is potentially site related in groundwater. However, the analysis date (1993) may indicate elevated results are related to analytical laboratory methods. Sodium does not appear to have impacted groundwater based on RD-50 data.  A detailed evaluation of metals in groundwater is contained in Table E23	NSGW – YES Perched NSGW very infrequently present at site.  However, additional groundwater sampling will be conducted at RS-23 to assess potential metals impacts, including those not previously analyzed.  CFGW - YES
Inorganic Compounds	Inorganics are not considered related to ESADA operations and therefore no soil samples were collected and analyzed.	YES  One sample has been collected and analyzed for inorganics in 1993 in Chatsworth formation well RD-50.	YES  Nitrate-NO3 was detected at RD-50 at 27 mg/L	NO  Although soil samples have not been analyzed for inorganics, no documentation exists of inorganics use at ESADA. Additionally, inorganics were not detected in groundwater.	NSGW – YES Perched NSGW very infrequently present at site.  CFGW- YES
Perchlorate	Perchlorate is not considered related to ESADA operations and therefore no soil samples were collected and analyzed.	YES  One sample has been collected and analyzed for perchlorate in 1998 in Chatsworth formation well RD-50.	NO  Perchlorate was not detected (< 4 µg/L)	NO  Perchlorate was not detected in groundwater..	NSGW – YES Perched NSGW very infrequently present at site.  CFGW - YES

TABLE C3-2B  
ESADA RFI SITE SUMMARY AND EVALUATION OF GROUNDWATER SAMPLING RESULTS  
(PAGE 3 OF 3)

Analytical Group	Site Soil Impacts? (Summary of Relevant Impacts) <sup>1</sup>	Monitored in Groundwater? (Number of Samples/Date Range) <sup>2</sup>	Constituents Detected in Groundwater? (Above GWCC or Regulatory Criteria?) <sup>3</sup>	RFI Site Related?	Groundwater Characterized Sufficiently for Risk Assessment?
NDMA and formaldehyde (hydrazine breakdown products)	NDMA was not detected in soil at ESADA.	YES  One sample has been collected and analyzed for NDMA in 1993 in Chatsworth formation well RD-50.	NO  NDMA was not detected (< 6 µg/L)	NO  NDMA was not detected in soil or groundwater. No documentation exists of NDMA use at ESADA.	NSGW – YES Perched NSGW very infrequently present at site.  CFGW - YES
1,4-Dioxane	1,4-Dioxane is not considered related to ESADA operations and 1,1,1-TCA has not been detected in soil or soil vapor; therefore no soil samples were collected and analyzed for .1,4-dioxane.	YES  Nine samples have been analyzed for 1,4-Dioxane between 1995 and 2001 in perched well RS-23 and Chatsworth formation well RD-50.	NO  1,4-Dioxane was not detected in groundwater	NO  1,4-Dioxane was not detected in groundwater. No documentation exists of 1,4-Dioxane use at ESADA.	NSGW – YES Perched NSGW very infrequently present at site.  CFGW - YES

**Notes:**

- <sup>1</sup> See Table C.3-2A for a complete summary of soil impacts.
- <sup>2</sup> Groundwater data are compared to Groundwater Comparison Concentrations and/or drinking water standards (e.g., Maximum Contaminant Levels [MCLs]).
- <sup>3</sup> See Tables E-8 through E-27 for Groundwater Results.
- 4. All ESADA RFI Site groundwater monitoring locations are shown on Figure E-4 in Appendix E.
- 5. Groundwater comparison concentrations (GWCCs) were developed through a conservative process and approved by DTSC to be equal to or below naturally occurring background levels.

**Abbreviations**

AOC = Area of Concern  
CMS = Corrective Measures Study  
GWCC = Groundwater Comparison Concentrations  
NDMA = N-nitrosodimethylamine  
NFA = No further action  
PAH = polynuclear aromatic hydrocarbons  
PCB = polychlorinated biphenyls  
SRE = Sodium Reactor Experiment  
SVOC = semivolatile organic compound  
TPH = total petroleum hydrocarbons



TABLE C.3-3A  
ESADA RFI SITE ANALYTICAL DATA SCREENING SUMMARY AND DATA QUALITY (SOIL)  
(Page 1 of 3)

TABLE C.3-3A

Analyte Group	Constituent	Units	Screening Levels (1)			Total Number Samples Analyzed	Detect Data Summary						Non-Detect Data Summary						Data Issue (5)	Issue Resolution (6)
			Residential (ResRBSL)	Ecological (EcoRBSL)	Background (2)		Total Samples w/ Detections	Minimum Detected Concentration	Maximum Detected Concentration	Number of Detected Concentrations > Res RBSL	Number of Detected Concentrations > Eco RBSL	Number of Detected Concentrations > Background	Total Samples ND	Minimum Detection Limit	Maximum Detection Limit	Number DLs > ResRBSL	NumberDL > EcoRBSL	Number DL > Background		
Inorganics																				
	pH	pH Units	NA (4)	NA (4)	NA (3)	50	50	7.48	9.6	NA (4)	NA (4)	NA (3)	0						--	--
METALS (mg/kg)																				
	Aluminum	mg/kg	75000	14	20000	41	41	8130	31100	0	41	13	0						--	--
	Antimony	mg/kg	30	0.096	8.7	20	13	0.0468	870	2	12	3	7	0.109	10	0	7	1	Elevated DLs	a,b
	Arsenic	mg/kg	0.095	0.26	15	24	23	2.4	350	23	23	2	1	5	5	1	1	0	Elevated DLs	b
	Barium	mg/kg	15000	15	140	16	16	58.7	130	0	16	0	0						--	--
	Beryllium	mg/kg	150	5.9	1.1	16	16	0.47	1	0	0	0	0						--	--
	Boron	mg/kg	15000	9.3	9.7	16	8	6.1	14	0	1	1	8	5.6	10	0	1	1	Elevated DLs	a
	Cadmium	mg/kg	2.6	0.0026	1	16	11	0.14	0.32	0	11	0	5	0.02	1	0	5	0	Elevated DLs	b
	Calcium	mg/kg	NA (4)	NA (4)	NA (3)	4	4	9130	38300	NA (4)	NA (4)	NA (3)	0						--	--
	Chromium	mg/kg	3400	940	36.8	16	16	13.5	32.9	0	0	0	0						--	--
	Cobalt	mg/kg	1500	10	21	16	16	5.8	11	0	1	0	0						--	--
	Copper	mg/kg	3000	1.1	29	16	16	8.3	14	0	16	0	0						--	--
	Iron	mg/kg	NA (4)	NA (4)	NA (3)	4	4	13700	22800	NA (4)	NA (4)	NA (3)	0						--	--
	Lead	mg/kg	150	0.063	34	27	26	1.4	27000	5	26	5	1	5	5	0	1	0	Elevated DLs	b
	Lithium	mg/kg	1522	43	37	10	6	17	30	0	0	0	4	28	33	0	0	0	--	--
	Magnesium	mg/kg	NA (4)	NA (4)	NA (3)	4	4	4760	12300	NA (4)	NA (4)	NA (3)	0						--	--
	Manganese	mg/kg	9500	79	495	4	4	248	394	0	4	0	0						--	--
	Mercury	mg/kg	23	0.88	0.09	24	16	0.01	0.27	0	0	1	8	0.00075	0.2	0	0	1	--	--
	Molybdenum	mg/kg	380	0.11	5.3	16	9	0.23	0.97	0	9	0	7	0.51	10	0	7	1	Elevated DLs	a, b
	Nickel	mg/kg	1500	0.1	29	16	16	9.3	19	0	16	0	0						--	--
	Potassium	mg/kg	NA (4)	NA (4)	6400	21	21	1640	5600	NA (4)	NA (4)	0	0						--	--
	Selenium	mg/kg	380	0.18	0.655	16	13	0.24	1.2	0	13	3	3	0.22	5	0	3	1	Elevated DLs	a, b
	Silver	mg/kg	380	0.55	0.79	16	7	0.075	0.53	0	0	0	9	0.055	1	0	1	1	Elevated DLs	a, b
	Sodium	mg/kg	NA (4)	NA (4)	110	44	44	61	732	NA (4)	NA (4)	25	0						--	--
	Thallium	mg/kg	6.1	3.2	0.46	12	9	0.23	0.31	0	0	0	3	0.58	5	0	1	3	Elevated DLs	a
	Vanadium	mg/kg	76	1.6	62	16	16	26.9	64.8	0	16	1	0						--	--
	Zinc	mg/kg	23000	22	110	16	16	38	75.6	0	16	0	0						--	--
	Zirconium	mg/kg	NA (4)	NA (4)	8.6	10	9	3.3	5.8	NA (4)	NA (4)	0	1	1.8	1.8	NA (4)	NA (4)	0	--	--
PCB (ug/kg)																				
	Aroclor 1016	ug/kg	3900	1600	NA (3)	11	0						11	20	110	0	0	NA (3)	--	--
	Aroclor 1221	ug/kg	350	1600	NA (3)	11	0						11	20	110	0	0	NA (3)	--	--
	Aroclor 1232	ug/kg	350	79	NA (3)	11	0						11	20	110	0	1	NA (3)	Elevated DLs	a
	Aroclor 1242	ug/kg	350	80	NA (3)	11	0						11	20	110	0	1	NA (3)	Elevated DLs	a
	Aroclor 1248	ug/kg	350	16	NA (3)	11	0						11	20	110	0	11	NA (3)	Elevated DLs	a, c
	Aroclor 1254	ug/kg	350	79	NA (3)	11	4	12	30	0	0	NA (3)	7	20	110	0	1	NA (3)	Elevated DLs	a
	Aroclor 1260	ug/kg	350	79	NA (3)	11	3	5.3	21	0	0	NA (3)	8	54	110	0	1	NA (3)	Elevated DLs	a
SVOC (ug/kg)																				
	1,2,4-Trichlorobenzene	ug/kg	120	68000	NA (3)	6	0						6	170	170	6	0	NA (3)	Elevated DLs	a
	1,2-Dichlorobenzene	ug/kg	1800	390000	NA (3)	6	0						6	170	170	0	0	NA (3)	--	--
	1,3-Dichlorobenzene	ug/kg	1700	350000	NA (3)	6	0						6	170	170	0	0	NA (3)	--	--
	1,4-Dichlorobenzene	ug/kg	10	170000	NA (3)	6	0						6	170	170	6	0	NA (3)	Elevated DLs	a
	1-Methyl naphthalene	ug/kg	230000	230000	NA (3)	9	0						9	4	26	0	0	NA (3)	--	--
	2,4,5-Trichlorophenol	ug/kg	5700000	230000	NA (3)	6	0						6	850	850	0	0	NA (3)	--	--
	2,4,6-Trichlorophenol	ug/kg	10000	460000	NA (3)	6	0						6	170	170	0	0	NA (3)	--	--
	2,4-Dichlorophenol	ug/kg	170000	1400	NA (3)	6	0						6	170	170	0	0	NA (3)	--	--
	2,4-Dimethylphenol	ug/kg	1100000	120000	NA (3)	6	0						6	170	170	0	0	NA (3)	--	--
	2,4-Dinitrophenol	ug/kg	110000	590	NA (3)	6	0						6	850	850	0	6	NA (3)	Elevated DLs	a
	2,4-Dinitrotoluene	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	170	170	NA (4)	NA (4)	NA (3)	--	--
	2,6-Dinitrotoluene	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	170	170	NA (4)	NA (4)	NA (3)	--	--
	2-Chloronaphthalene	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	170	170	NA (4)	NA (4)	NA (3)	--	--
	2-Chlorophenol	ug/kg	290000	23000	NA (3)	6	0						6	170	170	0	0	NA (3)	--	--
	2-Methylnaphthalene	ug/kg	230000	230000	NA (3)	15	1	140	140	0	0	NA (3)	14	2	170	0	0	NA (3)	--	--
	2-Nitroaniline	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	850	850	NA (4)	NA (4)	NA (3)	--	--
	2-Nitrophenol	ug/kg	NA (4)	25000	NA (3)	6	0						6	170	170	NA (4)	0	NA (3)	--	--
	3,3'-Dichlorobenzidine	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	340	340	NA (4)	NA (4)	NA (3)	--	--
	3-Nitroaniline	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	850	850	NA (4)	NA (4)	NA (3)	--	--
	4,6-Dinitro-o-cresol	ug/kg	5700	25000	NA (3)	6	0						6	850	850	0	0	NA (3)	--	--
	4-Bromophenyl phenyl ether	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	170	170	NA (4)	NA (4)	NA (3)	--	--
	4-Chlorophenylphenyl ether	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	170	170	NA (4)	NA (4)	NA (3)	--	--
	4-Nitrophenol	ug/kg	NA (4)	25000	NA (3)	6	0						6	850	850	NA (4)	0	NA (3)	--	--
	Acenaphthene	ug/kg	3400000	2500	NA (3)	15	0						15	2	170	0	0	NA (3)	--	--
	Acenaphthylene	ug/kg	1700000	810000	NA (3)	15	0						15	2	170	0	0	NA (3)	--	--
	Aniline	ug/kg	130000	58000	NA (3)	6	0						6	170	170	0	0	NA (3)	--	--
	Anthracene	ug/kg	17000000	2400	NA (3)	15	0						15	2	170	0	0	NA (3)	--	--
	Benzidine	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	1700	1700	NA (4)	NA (4)	NA (3)	--	--
	Benzo(a)anthracene	ug/kg	600	1400	NA (3)	15	4	0.99	44	0	0	NA (3)	11	23	170	0	0	NA (3)	--	--
	Benzo(a)pyrene	ug/kg	60	4700	NA (3)	15	4	0.98	32	0	0	NA (3)	11	23	170	6	0	NA (3)	Elevated DLs	a
	Benzo(b)fluoranthene	ug/kg	600	4600	NA (3)	15	4	1.8	45	0	0	NA (3)	11	23	170	0	0	NA (3)	--	--
	Benzo(ghi)perylene	ug/kg	NA (4)	6200	NA (3)	15	3	8.2	17	NA (4)	0	NA (3)	12	2	170	NA (4)	0	NA (3)	--	--

TABLE C.3-3A  
ESADA RFI SITE ANALYTICAL DATA SCREENING SUMMARY AND DATA QUALITY (SOIL)  
(Page 2 of 3)

TABLE C.3-3A

Analyte Group	Constituent	Units	Screening Levels (1)			Total Number Samples Analyzed	Detect Data Summary						Non-Detect Data Summary						Data Issue (5)	Issue Resolution (6)	
			Residential (ResRBSL)	Ecological (EcoRBSL)	Background (2)		Total Samples w/ Detections	Minimum Detected Concentration	Maximum Detected Concentration	Number of Detected Concentrations > Res RBSL	Number of Detected Concentrations > Eco RBSL	Number of Detected Concentrations > Background	Total Samples ND	Minimum Detection Limit	Maximum Detection Limit	Number DLs > ResRBSL	NumberDL > EcoRBSL	Number DL > Background			
	Benzo(k)fluoranthene	ug/kg	600	3600	NA (3)	15	3	8.3	19	0	0	NA (3)	12	2	170	0	0	NA (3)	--	--	
	Benzoic acid	ug/kg	230000000	4400	NA (3)	6	0					6	850	850	0	0	NA (3)	--	--		
	Benzyl alcohol	ug/kg	17000000	4400	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	bis(2-Chloroethoxy)methane	ug/kg	NA (4)	160000	NA (3)	6	0					6	170	170	NA (4)	0	NA (3)	--	--		
	bis(2-Chloroethyl) ether	ug/kg	290	160000	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	bis(2-Chloroisopropyl) ether	ug/kg	2300000	160000	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	bis(2-Ethylhexyl) phthalate	ug/kg	250000	4900	NA (3)	14	8	11	720	0	0	NA (3)	6	170	170	0	0	NA (3)	--	--	
	Butyl benzyl phthalate	ug/kg	11000000	370000	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	Chrysene	ug/kg	6000	2400	NA (3)	15	4	2.2	56	0	0	NA (3)	11	23	170	0	0	NA (3)	--	--	
	Dibenzo(a,h)anthracene	ug/kg	170	1700	NA (3)	15	0					15	2	170	0	0	NA (3)	--	--		
	Dibenzofuran	ug/kg	110000	4600000	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	Diethyl phthalate	ug/kg	46000000	5200000	NA (3)	14	3	6.9	9.4	0	0	NA (3)	11	23	170	0	0	NA (3)	--	--	
	Dimethyl phthalate	ug/kg	570000000	7500000	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	Di-n-butyl phthalate	ug/kg	5700000	490	NA (3)	14	8	13	110	0	0	NA (3)	6	170	170	0	0	NA (3)	--	--	
	Di-n-octyl phthalate	ug/kg	2300000	1600000	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	Fluoranthene	ug/kg	2300000	130000	NA (3)	15	5	2.1	96	0	0	NA (3)	10	23	170	0	0	NA (3)	--	--	
	Fluorene	ug/kg	2300000	1600	NA (3)	15	0					15	2	170	0	0	NA (3)	--	--		
	Hexachlorobenzene	ug/kg	400	370	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	Hexachlorobutadiene	ug/kg	9200	920	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	Hexachlorocyclopentadiene	ug/kg	340000	14000	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	Hexachloroethane	ug/kg	18000	2300	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	Indeno(1,2,3-cd)pyrene	ug/kg	600	3900	NA (3)	15	4	7.5	17	0	0	NA (3)	11	2	170	0	0	NA (3)	--	--	
	Isophorone	ug/kg	750000	520000	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	Naphthalene	ug/kg	6000	230000	NA (3)	15	1	120	120	0	0	NA (3)	14	4	170	0	0	NA (3)	--	--	
	Nitrobenzene	ug/kg	29000	2100	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	n-Nitrosodimethylamine	ug/kg	45	60000	NA (3)	14	0					14	23	170	6	0	NA (3)	Elevated DLs	a		
	n-Nitrosodi-n-propylamine	ug/kg	100	60000	NA (3)	6	0					6	170	170	6	0	NA (3)	Elevated DLs	a		
	n-Nitrosodiphenylamine	ug/kg	80000	60000	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	o-Cresol	ug/kg	2867000	120000	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	p-Chloroaniline	ug/kg	NA (4)	NA (4)	NA (3)	6	0					6	170	170	NA (4)	NA (4)	NA (3)	--	--		
	p-Chloro-m-cresol	ug/kg	NA (4)	23000	NA (3)	6	0					6	170	170	NA (4)	0	NA (3)	--	--		
	p-Cresol	ug/kg	290000	4300	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	Pentachlorophenol	ug/kg	8800	14000	NA (3)	6	0					6	850	850	0	0	NA (3)	--	--		
	Phenanthrene	ug/kg	1700000	1300	NA (3)	15	4	1	54	0	0	NA (3)	11	23	170	0	0	NA (3)	--	--	
	Phenol	ug/kg	18000000	5000	NA (3)	6	0					6	170	170	0	0	NA (3)	--	--		
	p-Nitroaniline	ug/kg	NA (4)	NA (4)	NA (3)	6	0					6	850	850	NA (4)	NA (4)	NA (3)	--	--		
	Pyrene	ug/kg	1700000	79000	NA (3)	15	6	1.9	130	0	0	NA (3)	9	23	170	0	0	NA (3)	--	--	
	SVOC (ug/kg) -TICs																				
		906 Branched Hydrocarbon C6	ug/kg	NA (4)	NA (4)	NA (3)	1	1	900	900	NA (4)	NA (4)	NA (3)	0						--	--
	TPH (mg/kg)																				
	Diesel Range Organics (C14-C20)	mg/kg	1400	NA (4)	NA (3)	1	0						1	11	11	0	NA (4)	NA (3)	--	--	
	Diesel Range Organics (C15-C20)	mg/kg	1400	NA (4)	NA (3)	9	0						9	5.6	14	0	NA (4)	NA (3)	--	--	
	Gasoline Range Organics (C8-C11)	mg/kg	1.1	NA (4)	NA (3)	10	0						10	5.6	14	10	NA (4)	NA (3)	Elevated DLs	a	
	Kerosene Range Organics (C11-C14)	mg/kg	1400	NA (4)	NA (3)	1	0						1	11	11	0	NA (4)	NA (3)	--	--	
	Kerosene Range Organics (C12-C14)	mg/kg	1400	NA (4)	NA (3)	9	0						9	5.6	14	0	NA (4)	NA (3)	--	--	
	Lubricant Oil Range Organics (C20-C30)	mg/kg	1400	NA (4)	NA (3)	1	0						1	11	11	0	NA (4)	NA (3)	--	--	
	Lubricant Oil Range Organics (C21-C30)	mg/kg	1400	NA (4)	NA (3)	9	5	4.3	11	0	NA (4)	NA (3)	4	5.6	14	0	NA (4)	NA (3)	--	--	
	Total Petroleum Hydrocarbons	mg/kg	1400	NA (4)	NA (3)	6	0						6	5	5	0	NA (4)	NA (3)	--	--	
VOC (ug/kg)																					
	1,1,1-Trichloroethane	ug/kg	490	2100000	NA (3)	6	0						6	50	50	0	0	NA (3)	--	--	
	1,1,2,2-Tetrachloroethane	ug/kg	1.4	6400	NA (3)	6	0						6	50	50	6	0	NA (3)	Elevated DLs	a	
	1,1,2-Trichloroethane	ug/kg	1.2	9000	NA (3)	6	0						6	50	50	6	0	NA (3)	Elevated DLs	a	
	1,1-Dichloroethane	ug/kg	1.6	230000	NA (3)	6	0						6	50	50	6	0	NA (3)	Elevated DLs	a	
	1,1-Dichloroethene	ug/kg	23	320	NA (3)	6	0						6	50	50	6	0	NA (3)	Elevated DLs	a	
	1,2-Dichloroethane	ug/kg	0.5	76000	NA (3)	6	0						6	50	50	6	0	NA (3)	Elevated DLs	a	
	1,2-Dichloropropane	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	50	50	NA (4)	NA (4)	NA (3)	--	--	
	2-Chloroethylvinyl ether	ug/kg	0.0096	780	NA (3)	6	0						6	500	500	6	0	NA (3)	Elevated DLs	a	
	2-Hexanone	ug/kg	NA (4)	2600000	NA (3)	6	0						6	500	500	NA (4)	0	NA (3)	--	--	
	Acetone	ug/kg	51000	46000	NA (3)	6	0						6	500	500	0	0	NA (3)	--	--	
	Benzene	ug/kg	0.13	4600	NA (3)	6	0						6	50	50	6	0	NA (3)	Elevated DLs	a	
	Bromodichloromethane	ug/kg	0.31	16000	NA (3)	6	0						6	50	50	6	0	NA (3)	Elevated DLs	a	
	Bromoform	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	300	300	NA (4)	NA (4)	NA (3)	--	--	
	Bromomethane	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	500	500	NA (4)	NA (4)	NA (3)	--	--	
	Carbon Disulfide	ug/kg	68	51000	NA (3)	6	0						6	50	50	0	0	NA (3)	--	--	
	Carbon Tetrachloride	ug/kg	0.042	1600	NA (3)	6	0						6	50	50	6	0	NA (3)	Elevated DLs	a	
	Chlorobenzene	ug/kg	97	94000	NA (3)	6	0						6	50	50	0	0	NA (3)	--	--	
	Chloroethane	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	50	50	NA (4)	NA (4)	NA (3)	--	--	
	Chloroform	ug/kg	0.77	260	NA (3)	6	0						6	50	50	6	0	NA (3)	Elevated DLs	a	
	Chloromethane	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	500	500	NA (4)	NA (4)	NA (3)	--	--	
	cis-1,3-Dichloropropene	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	50	50	NA (4)	NA (4)	NA (3)	--	--	
	Dibromochloromethane	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	50	50	NA (4)	NA (4)	NA (3)	--	--	

TABLE C.3-3A  
ESADA RFI SITE ANALYTICAL DATA SCREENING SUMMARY AND DATA QUALITY (SOIL)  
(Page 3 of 3)

TABLE C.3-3A

Analyte Group	ConstituentUnits		Screening Levels (1)			Total Number Samples Analyzed	Detect Data Summary						Non-Detect Data Summary						Data Issue (5)	Issue Resolution (6)
			Residential (ResRBSL)	Ecological (EcoRBSL)	Background (2)		Total Samples w/ Detections	Minimum Detected Concentration	Maximum Detected Concentration	Number of Detected Concentrations > Res RBSL	Number of Detected Concentrations > Eco RBSL	Number of Detected Concentrations > Background	Total Samples ND	Minimum Detection Limit	Maximum Detection Limit	Number DLs > ResRBSL	NumberDL > EcoRBSL	Number DL > Background		
	Dichlorobenzenes	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	50	50	NA (4)	NA (4)	NA (3)	--	--
	Ethylbenzene	ug/kg	1200	220000	NA (3)	6	0						6	50	50	0	0	NA (3)	--	--
	Methyl ethyl ketone	ug/kg	62000	8200000	NA (3)	6	0						6	500	500	0	0	NA (3)	--	--
	Methyl isobutyl ketone (MIBK)	ug/kg	20000	2625000	NA (3)	6	0						6	500	500	0	0	NA (3)	--	--
	Methylene chloride	ug/kg	4	27000	NA (3)	6	0						6	300	300	6	0	NA (3)	Elevated DLs	a
	Styrene	ug/kg	7200	690000	NA (3)	6	0						6	50	50	0	0	NA (3)	--	--
	Tetrachloroethene	ug/kg	0.43	2300	NA (3)	6	0						6	50	50	6	0	NA (3)	Elevated DLs	a
	Toluene	ug/kg	300	2700	NA (3)	6	0						6	50	50	0	0	NA (3)	--	--
	trans-1,2-Dichloroethene	ug/kg	16	1000000	NA (3)	6	0						6	50	50	6	0	NA (3)	Elevated DLs	a
	trans-1,3-Dichloropropene	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	50	50	NA (4)	NA (4)	NA (3)	--	--
	Trichloroethene	ug/kg	2.2	3200	NA (3)	6	0						6	50	50	6	0	NA (3)	Elevated DLs	a
	Vinyl acetate	ug/kg	NA (4)	NA (4)	NA (3)	6	0						6	500	500	NA (4)	NA (4)	NA (3)	--	--
	Vinyl chloride	ug/kg	0.0096	780	NA (3)	6	0						6	50	50	6	0	NA (3)	Elevated DLs	a
	Xylenes, Total	ug/kg	150	140000	NA (3)	6	0						6	50	50	0	0	NA (3)	--	--

- Notes:**
- (1) Risk-based screening levels for human health (ResRBSL) and Ecological (EcoRBSL) receptors are provided as reference points for assessing adequacy of data quality. ResRBSL is based on residential receptor for a risk level of 1 x 10<sup>-6</sup> cancer risk or noncancer Hazard Index.
  - (2) Reference: Soil Background Report (MWH 2005)
  - (3) Not applicable - Background values only established for naturally occurring constituents.
  - (4) RBSL not available for this constituent.
  - (5) Elevated DLs are DLs that are above one or both of the RBSLs. For metals and dioxins, elevated DLs are DLs that are above background, EcoRBSL, or ResRBSL. In cases that DLs are below background but above an RBSL, the DL is not considered to be elevated.
  - (6) The following statements indicate standard DL issue resolutions throughout the group. Each issue resolution note listed for each analyte do not apply to all elevated DLs for that analyte. Instead, each issue resolution note may only apply to a subset of samples with elevated DLs for the analyte, but taken as a whole, the list of issue resolutions addresses all of the elevated DLs.

**Data Issue Resolution Notes:**

- Indicates that the constituent does not have elevated detection limits.
- (a) DL concentrations achieved were within practicable laboratory reporting limits at the time the sample was collected. The adequacy assessment of sample results for characterization decisions was made based on surrounding sampling results, potential for laboratory interference, data trends, and reporting limits with respect to screening levels.
- (b) DL are below background levels.
- (c) The MDL is less than the RBSL, so if the compound was present at concentrations greater than the RBSL but less than the DL, it would have been reported.
- (d) Elevated DL for sodium is not significant because there is no RBSL associated with this metal.
- (e) Sample diluted due to matrix effect
- (f) Sample diluted due to high concentrations of other constituents
- (g) Sample contains high TPH levels which may have caused elevated DLs
- (h) Compound is a commonly used laboratory solvent and often has elevated DLs due to laboratory contamination.
- (i) Duplicate samples and recollected samples at representative locations had adequate DLs; Results do not indicate that elevated DLs in earlier samples are an issue.
- (j) DLs are elevated for SVOCs analyzed by method 8270C rather than 8270CSIM, which was used to target the presence of tentatively identified compounds (TICs). Elevated detection limits are typical for this method.
- (k) Elevated DLs are located within an area recommended for further evaluation in CMS.
- (l) Elevated DLs were observed group-wide in areas with no indications of a source.
- (m) Site history does not indicate a source; results of other analytes in the same area suggest low concentrations.

**Acronyms**

- DL - detection limit
- EcoRBSL - ecological screening level
- ResRBSL - residential screening level
- NA - not applicable

TABLE C.3-3B  
ESADA RFI SITE ANALYTICAL DATA SCREENING SUMMARY AND DATA QUALITY (SOIL VAPOR)  
(Page 1 of 1)

Table C.3-3B

Analyte Group	Constituent	Units	Screening Levels (1)		Total Number Samples Analyzed	Detect Data Summary					Non-Detect Data Summary					Data Issue (3)	Issue Resolution (4)
			Residential (ResRBSL)	Ecological (EcoRBSL)		Total Samples w/ Detections	Minimum Detected Concentration	Maximum Detected Concentration	Number of Detected Concentrations > Res RBSL	Number of Detected Concentrations > Eco RBSL	Total Samples ND	Minimum Detection Limit	Maximum Detection Limit	Number DLs > ResRBSL	Number DLs > EcoRBSL		
VOC (ug/L)																	
	1,1,1,2-Tetrachloroethane	ug/L	0.048	NA (2)	16	0					16	1	1	16	NA (2)	Elevated DLs	a
	1,1,1-Trichloroethane	ug/L	640	38	16	0					16	1	1	0	0	--	--
	1,1,2,2-Tetrachloroethane	ug/L	0.048	NA (2)	16	0					16	1	2	16	NA (2)	Elevated DLs	a
	1,1,2-Trichloro-1,2,2-trifluoroethane	ug/L	8800	NA (2)	16	0					16	1	5	0	NA (2)	--	--
	1,1,2-Trichloroethane	ug/L	0.17	0.057	16	0					16	1	1	16	16	Elevated DLs	a
	1,1-Dichloroethane	ug/L	1.7	36	16	0					16	1	1	0	0	--	--
	1,1-Dichloroethene	ug/L	58	0.6	16	0					16	1	1	0	16	Elevated DLs	a
	1,2-Dichloroethane	ug/L	0.13	42	16	0					16	1	1	16	0	--	--
	Benzene	ug/L	0.095	0.57	16	0					16	1	1	16	16	Elevated DLs	a
	Carbon Tetrachloride	ug/L	0.063	0.63	16	0					16	1	1	16	16	Elevated DLs	a
	Chloroethane	ug/L	NA (2)	NA (2)	16	0					16	1	1	NA (2)	NA (2)	--	--
	Chloroform	ug/L	0.5	0.24	16	0					16	1	1	16	16	Elevated DLs	a
	cis-1,2-Dichloroethene	ug/L	10	1.9	16	0					16	1	1	0	0	--	--
	Dichlorodifluoromethane	ug/L	58	91	16	0					16	1	1	0	0	--	--
	Ethylbenzene	ug/L	290	23	16	0					16	1	1	0	0	--	--
	Methylene chloride	ug/L	2.7	0.87	16	0					16	5	50	16	16	Elevated DLs	a
	m-Xylene & p-Xylene	ug/L	NA (2)	NA (2)	16	0					16	2	2	NA (2)	NA (2)	--	--
	o-Xylene	ug/L	29	15	16	0					16	1	1	0	0	--	--
	Tetrachloroethene	ug/L	0.45232	24	16	0					16	1	1	16	0	Elevated DLs	a
	Toluene	ug/L	110	0.084	16	0					16	1	1	0	16	Elevated DLs	a
	trans-1,2-Dichloroethene	ug/L	20	1.9	16	0					16	1	1	0	0	--	--
	Trichloroethene	ug/L	1.4	6.4	16	0					16	1	1	0	0	--	--
	Trichlorofluoromethane	ug/L	200	91	16	0					16	1	1	0	0	--	--
	Vinyl chloride	ug/L	0.035	0.56	16	0					16	1	2	16	16	Elevated DLs	a

Notes:

- (1) Risk-based screening levels for human health (ResRBSL) and Ecological (EcoRBSL) receptors are provided as reference points for assessing adequacy of data quality. ResRBSL is based on residential receptor for a risk level of 1 x 10<sup>-6</sup> cancer risk or noncancer Hazard Index.
- (2) RBSL not available for this constituent.
- (3) Elevated DLs are DLs that are above one or both of the RBSLs. For metals and dioxins, elevated DLs are DLs that are above background, EcoRBSL, or ResRBSL. In cases that DLs are below background but above an RBSL, the DL is not considered to be elevated.
- (4) The following statements indicate standard DL issue resolutions throughout the group. Each issue resolution note listed for each analyte do not apply to all elevated DLs for that analyte. Instead, each issue resolution note may only apply to a subset of samples with elevated DLs for the analyte, but taken as a whole, the list of issue resolutions addresses all of the elevated DLs.

Data Issue Resolution Notes:

- Indicates that the constituent does not have elevated detection limits.
- (a) DL concentrations achieved were within practicable laboratory reporting limits at the time the sample was collected. The adequacy assessment of sample results for characterization decisions was made based on surrounding sampling results, potential for laboratory interference, data trends, and reporting limits with respect to screening levels.

Table C.4-1 (1 of 2)

**Chemicals of Potential Concern for Human Health  
ESADA RFI Site**

Chemical	Soil (0 to 2 feet bgs)	Soil (0 to 10 feet bgs)	ESADA Chatsworth Groundwater (Indirect Pathway)	Group 8 Perched Groundwater (Direct Pathway)	Soil Vapor
<b>Inorganic Compounds</b>					
Aluminum	X	X			
Antimony	X	X			
Arsenic	X	X			
Beryllium	X	X			
Boron	X	X			
Cadmium				X	
Chromium	X	X			
Cobalt	X	X		X	
Copper				X	
Lead	X	X			
Mercury	X	X			
Molybdenum				X	
Nickel				X	
Perchlorate				X	
Selenium	X	X			
Vanadium	X	X			
Zirconium		X			
<b>VOCs</b>					
1,1,1-Trichloroethane				X	
1,1,2-Trichloro-1,2,2-trifluoroethane				X	
1,1-Dichloroethane				X	
1,1-Dichloroethene				X	
1,2-Dichloroethane				X	
Acetone			X		
Benzene			X		
Chloromethane			X		
cis-1,2-Dichloroethene			X	X	
Methylene chloride				X	
o-Xylene				X	
Tetrachloroethene				X	
Toluene			X		
Trichloroethene			X	X	
<b>SVOCs</b>					
2-Methylnaphthalene	X	X			
Acenaphthene	X	X			
Acenaphthylene	X	X			
Anthracene	X	X			
Benzo(a)anthracene	X	X			
Benzo(a)pyrene	X	X			
Benzo(b)fluoranthene	X	X			
Benzo(e)pyrene	X	X			
Benzo(g,h,i)perylene	X	X			
Benzo(k)fluoranthene	X	X			
bis(2-Ethylhexyl)phthalate	X	X			
Chrysene	X	X			
Dibenz(a,h)anthracene	X	X			
Diethylphthalate	X	X			
Di-n-butylphthalate	X	X			
Fluoranthene	X	X			
Fluorene	X	X			
Indeno(1,2,3-cd)pyrene	X	X			
Naphthalene	X	X			
Perylene	X	X			
Phenanthrene	X	X			
Pyrene	X	X			

**Table C.4-1 (2 of 2)**  
**Chemicals of Potential Concern for Human Health**  
**ESADA RFI Site**

Chemical	Soil (0 to 2 feet bgs)	Soil (0 to 10 feet bgs)	ESADA Chatsworth Groundwater (Indirect Pathway)	Group 8 Perched Groundwater (Direct Pathway)	Soil Vapor
<b>Total Petroleum Hydrocarbons</b>					
C20-C30(Lubricant Oil Range)	X	X			
<b>PCBs</b>					
Aroclor-1254	X	X			
Aroclor-1260	X	X			
PCB-105	X	X			
PCB-114	X	X			
PCB-118	X	X			
PCB-123	X	X			
PCB-126	X	X			
PCB-156	X	X			
PCB-157	X	X			
PCB-167	X	X			
PCB-169	X	X			
PCB-189	X	X			
PCB-77	X	X			
PCB-81	X	X			

Notes:

X - selected as a chemical of potential concern

VOC - volatile organic compound

SVOC - semi-volatile organic compound

PCBs - polychlorinated biphenyls

bgs - below ground surface

**Table C.4-2 (1 of 1)**

**Human Health Risk Estimates<sup>1</sup>  
ESADA RFI Site**

Receptor	Soil Media <sup>2</sup>				Groundwater <sup>3</sup>				Total for Site Media			
	HI Range	CD <sup>4</sup>	Risk Range	CD	HI Range	CD	Risk Range	CD	HI Range	CD	Risk Range	CD
Adult Worker	0.1 - 3	a,b	2E-05 - 9E-04	c	<0.001 - <0.001		2E-10 - 2E-09		0.1 - 3	a,b	2E-05 - 9E-04	c
Future Adult Recreator	0.02 - 0.5	b	2E-06 - 2E-04	c	<0.001 - <0.001		2E-13 - 8E-13		0.02 - 0.5	b	2E-06 - 2E-04	c
Future Child Recreator	0.3 - 0.3	b	2E-05 - 2E-05	c	<0.001 - <0.001		8E-13 - 3E-12		0.3 - 0.3	b	2E-05 - 2E-05	c
Future Adult Resident	0.2 - 2	a,b	2E-05 - 6E-04	c	<0.001 - <0.001		7E-10 - 5E-09		0.2 - 2	a,b	2E-05 - 6E-04	c
Future Child Resident	2 - 20	a,b,c	2E-04 - 1E-03	c	<0.001 - <0.001		3E-09 - 4E-09		2 - 20	a,b,c	2E-04 - 1E-03	c

Notes:

1. Risk estimates shown are a sum of all exposure pathways per media; the range reported is for the central tendency and reasonable maximum exposures, respectively.
2. Soil media risk estimates are a sum of all direct and indirect exposure, so site soil and soil vapor.
3. Groundwater media risk estimates are for indirect exposure only and assume no domestic use of groundwater.
4. Chemical risk drivers are those COPCs detected onsite with an HI > 1, risk >  $1 \times 10^{-6}$ , or blood lead concentration > 10 µg/dl. Only major risk contributors listed if cumulative HI >> 1 or cancer risk >>  $1 \times 10^{-6}$ .
5. Total risk estimates do not include aluminum or vanadium since these chemicals are considered to be naturally-occurring.

a = Antimony  
b = Lead  
c = Arsenic

CD = Chemical risk driver  
COPC = Chemical of potential concern  
HI = Hazard index  
NA = Not Applicable  
µg/dl - micrograms per deciliter

Table C.4-3 (1 of 1)

**Human Health Risk Assessment Uncertainty Analysis  
ESADA RFI Site**

Assessment Element	Uncertainty	Magnitude of Impact	Direction of Impact
COPC Selection	A number of inorganics (e.g., antimony, lead, mercury) that were demonstrated to be consistent with background concentrations through Wilcoxon Rank Sum test were included as COPCs because the maximum detected concentrations were substantially above the maximum detected background concentration, and were located in areas of suspected metals impacts.	Moderate	Conservative
	Chromium was selected as soil COPC; however, hexavalent chromium data were not available. The lack of hexavalent chromium data is not expected to affect the HRA results. Hexavalent chromium typically makes up only a small percentage of the total chromium detected in soil, and although chromium was demonstrated to be different from background concentrations in soil through the Wilcoxon Rank Sum test, the maximum detected chromium concentration was less than the maximum background concentration.	Low	Not Conservative
Exposure Pathways	Risks associated with drinking of groundwater are not realistic because the groundwater beneath the SSFL is not currently used as a drinking water source and the presence of the contamination will likely require a restriction on its future use as well.	High	Conservative
	Future land use of the site is currently undecided but may be commercial or recreational, which have lower risks than residential.	Moderate	Uncertain
EPC Calculations	The extrapolation of soil TPH concentrations to individual petroleum constituent (i.e., PAHs) concentrations introduces some uncertainty into the EPC estimates for petroleum constituents.	Low	Conservative
	The 95% UCL concentration of some chemicals is greater than the maximum concentration therefore the maximum was used as the EPC. This is considered to be a likely overestimation of the representative exposure point concentration because samples were collected in areas with the highest likelihood to detect the highest concentrations at the site.	Moderate	Conservative
	The mean concentration for some chemicals exceeded the selected RME concentrations, therefore the RME concentration was also used as the CTE concentration under some circumstances. The mean could be biased high by higher detection limits.	Moderate	Conservative
	The maximum detected concentration of each COPC detected in groundwater was used as the EPC.	Moderate	Conservative
	The evaluation of metals concentrations in groundwater was based on both filtered and unfiltered samples. Additional unfiltered groundwater data is being collected per DTSC direction that might affect this evaluation.	Moderate	Conservative
	Vapor migration into indoor air has been estimated using a model which is being validated for the site. Preliminary findings show that the model conservatively over-predicts air concentrations when compared to flux measurements.	Moderate	Conservative
Cancer Slope Factor	Extrapolation of dose-response data from laboratory animals to humans.	High	Conservative
	Assumes that all carcinogens do not have a threshold below which carcinogenic response occurs, and therefore, any dose, no matter how small, results in some potential risk.	Moderate	Conservative
	Cancer slope factors derived from animal studies are the upper-bound maximum likelihood estimates based on a linear dose-response curve, and therefore, overstate carcinogenic potency.	Moderate	Conservative
Reference Dose	High degree of uncertainty in extrapolation of dose-response data from laboratory animals to humans.	High	Conservative

## Notes:

COPC - chemical of potential concern  
PAH - polycyclic aromatic hydrocarbon  
TPH - total petroleum hydrocarbons

EPC - exposure point concentration  
UCL - upper confidence limit  
HRA - human health risk assessment



Table C.4-4 (1 of 2)

**Summary of Chemicals of Potential Ecological Concern  
ESADA RFI Site**

Chemical	Soil (0 to 2 feet bgs)	Soil (0 to 4 feet bgs)	Soil (0 to 6 feet bgs)	Soil Vapor <sup>a</sup> (0 to 6 feet bgs)
<b>Inorganic Compounds</b>				
Aluminum	X	X	X	
Antimony	X	X	X	
Arsenic	X	X	X	
Beryllium	X	X	X	
Boron	X	X	X	
Chromium	X	X	X	
Cobalt	X	X	X	
Lead	X	X	X	
Mercury	X	X	X	
Selenium	X	X	X	
Vanadium	X	X	X	
Zirconium			X	
<b>VOCs</b>				
Acetone				X
Benzene				X
Chloromethane				X
cis-1,2-Dichloroethene				X
Toluene				X
Trichloroethene				X
<b>SVOCs</b>				
2-Methylnaphthalene	X	X	X	
Acenaphthene	X	X	X	
Acenaphthylene	X	X	X	
Anthracene	X	X	X	
Benzo(a)anthracene	X	X	X	
Benzo(a)pyrene	X	X	X	
Benzo(b)fluoranthene	X	X	X	
Benzo(e)pyrene	X	X	X	
Benzo(g,h,i)perylene	X	X	X	
Benzo(k)fluoranthene	X	X	X	
bis(2-Ethylhexyl)phthalate	X	X	X	
Chrysene	X	X	X	
Dibenz(a,h)anthracene	X	X	X	
Diethylphthalate	X	X	X	
Di-n-butylphthalate	X	X	X	
Fluoranthene	X	X	X	
Fluorene	X	X	X	
Indeno(1,2,3-cd)pyrene	X	X	X	
Naphthalene	X	X	X	
Perylene	X	X	X	
Phenanthrene	X	X	X	
Pyrene	X	X	X	
<b>Total Petroleum Hydrocarbons</b>				
C20-C30(Lubricant Oil Range)	X	X	X	

Table C.4-4 (2 of 2)

**Summary of Chemicals of Potential Ecological Concern  
ESADA RFI Site**

Chemical	Soil (0 to 2 feet bgs)	Soil (0 to 4 feet bgs)	Soil (0 to 6 feet bgs)	Soil Vapor <sup>a</sup> (0 to 6 feet bgs)
<b>PCBs</b>				
Aroclor-1254	X	X	X	
Aroclor-1260	X	X	X	
PCB-105	X	X	X	
PCB-114	X	X	X	
PCB-118	X	X	X	
PCB-123	X	X	X	
PCB-126	X	X	X	
PCB-156	X	X	X	
PCB-157	X	X	X	
PCB-167	X	X	X	
PCB-169	X	X	X	
PCB-189	X	X	X	
PCB-77	X	X	X	
PCB-81	X	X	X	

## Notes:

a. Chemical selected as a CPEC since it was selected as a COPC in groundwater

X - selected as a chemical of potential ecological concern

VOC - volatile organic compound

SVOC - semi-volatile organic compound

PCB - polychlorinated biphenyl

COPC - chemical of potential concern

CPEC - chemical of potential ecological concern

bgs - below ground surface

**Table C.4-5 (1 of 1)**

**Risk Estimates for Ecological Receptors  
ESADA RFI Site**

Receptor	Total for Site Media (Soil Only)	
	HI Range <sup>1</sup>	CD <sup>2</sup>
Deer Mouse	>100 - >1000	Antimony, arsenic, lead, selenium
without inhalation pathway	>100 - >1000	Antimony, arsenic, lead, selenium
Thrush	>1000 - >1000	Arsenic, lead
Hawk	>1000 - >1000	Arsenic, lead
Using Large Home Range Factor <sup>3</sup>	73 - >100	Lead
Bobcat	>100 - >100	Antimony, arsenic, lead, selenium
Using Large Home Range Factor <sup>3</sup>	0.2 - 0.7	None
Mule Deer	>100 - >1000	Antimony, arsenic, lead
Using Large Home Range Factor <sup>3</sup>	3 - 13	Antimony, arsenic, lead

**Notes:**

1. HI Range is the sum of the hazard quotients for all exposure pathways; the range reported is for the mean and 95% upper confidence limit estimates, respectively.
  2. Chemical risk drivers are those CPECs detected onsite with an HQ > 1, or major risk contributors if cumulative HIs >> 1. "None" indicates that no chemical's HQs > 1.
  3. The HIs for hawk, mule deer, and bobcat assume that their home ranges are equal to the RFI site acreage. This is an extremely conservative assumption; RFI site acreage is typically only a small fraction of a large animal's home range. The estimated HIs decrease to the values indicated above if an adjustment is made to reflect a more realistic home range for these receptors.
  4. Total risk estimates do not include aluminum or vanadium since these chemicals are considered to be naturally occurring. Vanadium slightly exceeded its comparison level in one sample. Aluminum exposure risks based on soluble aluminum. Since soil pH at the ESADA RFI Site is between 7.48 and 9.6, soluble aluminum not likely present (see Section C.4).
- CD = Chemical risk driver  
CPEC = Chemical of potential ecological concern  
HI = Hazard index  
HQ = Hazard Quotient

Table C.4-6 (1 of 2)

**Ecological Risk Assessment Uncertainty Analysis  
ESADA RFI Site**

<b>Assessment Element</b>	<b>Uncertainty</b>	<b>Magnitude of Impact</b>	<b>Direction of Impact</b>
CPEC Selection	A number of inorganics (e.g., antimony, lead, mercury) that were demonstrated to be consistent with background concentrations through Wilcoxon Rank Sum test were included as CPECs because the maximum detected concentrations were substantially above the maximum detected background concentration, were located in suspected areas of metals impacts and in some cases SQLs were above ESLs.	Moderate	Conservative
	Chromium was selected as soil CPEC; however, hexavalent chromium data were not available. The lack of hexavalent chromium data is not expected to affect the HRA results. Hexavalent chromium typically makes up only a small percentage of the total chromium detected in soil, and although chromium was demonstrated to be different from background concentrations in soil through the Wilcoxon Rank Sum test, the maximum detected chromium concentration was less than the maximum background concentration.	Low	Not Conservative
EPC Calculations	The extrapolation of soil TPH concentrations to individual petroleum constituent (i.e., PAHs) concentrations introduces some uncertainty into the EPC estimates for petroleum constituents. Because several samples collected for SVOCs did not detect PAHs, the uncertainty associated with this procedure is low.	Low	Conservative
	The extrapolation of soil TPH concentrations to individual petroleum constituent (i.e., PAHs) concentrations introduces some uncertainty into the EPC estimates for petroleum constituents. Because several samples collected for SVOCs did not detect PAHs, the uncertainty associated with this procedure is low.	Moderate	Conservative
	The mean concentration for some chemicals exceeded the selected RME concentrations, therefore the RME concentration was also used as the CTE concentration under some circumstances. The mean could be biased high by higher detection limits.	Moderate	Conservative
	For Chatsworth Groundwater matrix COPCs benzene, cis-1,2,-dichloroethene, toluene, and trichloroethene, burrow-air inhalation risks are estimated using soil vapor concentrations related to 1/2 the DL, though the chemical was not detected in soil or soil vapor.	Low	Conservative
	For Chatsworth Groundwater matrix COPCs acetone and chloromethane, burrow-air inhalation risks are estimated using groundwater to soil vapor partitioning, though the chemicals were not detected in soil or soil vapor.	Low	Conservative
	Estimation of soil vapor concentrations overstates actual burrow concentrations:  1. Model is conservative 2. Model does not account for attenuation between 91.5 feet bgs depth to groundwater and 0 to 6 feet bgs interval for burrows 3. Air flow in burrows is not accounted for	Low	Conservative
Wildlife Exposure Factors		Low	Conservative
Exposure Pathways	Dermal and inhalation (for surface-dwelling animals) exposure pathway not quantified	Low	Not Conservative

Table C.4-6 (2 of 2)

**Ecological Risk Assessment Uncertainty Analysis  
ESADA RFI Site**

<b>Assessment Element</b>	<b>Uncertainty</b>	<b>Magnitude of Impact</b>	<b>Direction of Impact</b>
	Although risks were estimated for aluminum, these risks may represent the risk from naturally-occurring concentrations rather than site-related concentrations. The distribution of elevated aluminum concentrations in soil is not consistent with the presence of an on-site source, and high concentrations of aluminum are common in clayey soil, which is common at the ESADA RFI Site.	High	Conservative
	Although risks were estimated for vanadium, the concentrations detected in the ESADA samples are believed to be naturally-occurring.	High	Conservative
	Although risks were estimated for selenium, both the CTE and RME EPC concentrations were less than the maximum background concentrations.	Moderate	Conservative
Toxicity Reference Value	Lead exposures are based upon toxicity values derived from lead acetate, which is a form of lead that is significantly more bioavailable than weathered lead expected to be present in RFI site soils.	High	Conservative
	Aluminum exposures are based upon toxicity values derived from soluble aluminum. However, the soluble and toxic forms of aluminum are only present in soil under soil pH values of less than 5.5 (USEPA, 2003) and pH for the soils at ESADA ranged from 7.4 to 9.6.	High	Conservative
	High degree of uncertainty in extrapolation of dose-response data from laboratory animals to representative receptors.	High	Uncertain
	Avian toxicity values are only available for a limited number of chemicals. For the types of chemicals observed at the ESADA RFI site, there is likely little difference in the degree of toxicity between mammals and avian species.	Moderate	Not conservative
	Use of acute/subchronic-to-chronic and endpoint-to-NOAEL uncertainty factors to estimate chronic NOAEL-equivalent TRVs.	Moderate	Conservative
	Lack of TRVs for amphibians and reptiles -- note that no threatened or endangered amphibians or reptiles are known to reside at SSFL	Moderate	Not conservative
	Use of chronic NOAEL-equivalent TRVs	High	Conservative

## Notes:

CPEC - chemical of potential ecological concern

UCL - upper confidence limit

PAH - polycyclic aromatic hydrocarbon

EPC - exposure point concentration

bgs - below ground surface

TPH - total petroleum hydrocarbons

SVOC - semivolatile organic chemicals

SQL - sample quantitation limit

ESL - ecological screening level

TABLE C.5-1  
ESADA RFI SITE SURFICIAL MEDIA SITE ACTION RECOMMENDATIONS  
(Page 1 of 1)

Area	Associated Chemical Use Area Number	CMS Areas (1) (Figure C.5-1)	Recommended for Further Consideration in CMS Based On:			
			Residential Receptor	Industrial Receptor	Recreational Receptor	Ecological Receptor
ESADA Former Storage Yard	1	--	--	--	--	(3)
Sodium Test Area, Building 814	2	--	--	--	--	--
Former PDU Tank Area	3	--	--	--	--	(3)
ESADA Pistol Range	4	ESADA-1	Lead, arsenic, antimony	Lead, arsenic, antimony	Lead, arsenic, antimony	Lead, arsenic, antimony, selenium
Transformer	5	--	--	--	--	--

**General Notes:**

- '--' Indicates area is recommended for No Further Action (NFA) for respective receptor, or parameter not applicable; Not recommended for CMS evaluation.

**Notes:**

- (1) CMS Areas are numbered in sequence (e.g. ESADA-1). Extent of CMS Areas shown on Figures C.5-1 and are approximate and reflect site action recommendations based on characterization and risk assessment results inclusive for all receptors (See Section A.5).
- (2) CMS recommendations are based on compounds considered risk drivers (excess cancer risk > 1 x 10<sup>-6</sup> or hazard index > 1) and/or significant risk contributors.
- (3) Aluminum present in site soils at concentrations exceeding its background comparison level, and included in risk assessment. Estimated aluminum exposure risks for ecological receptors are based on toxicity factors derived from soluble aluminum. Since site soil pH is greater than 5.5, soluble aluminum is unlikely (see Section C.4).

**Acronyms:**

AOC = Area of Concern  
CMS = Corrective Measures Study

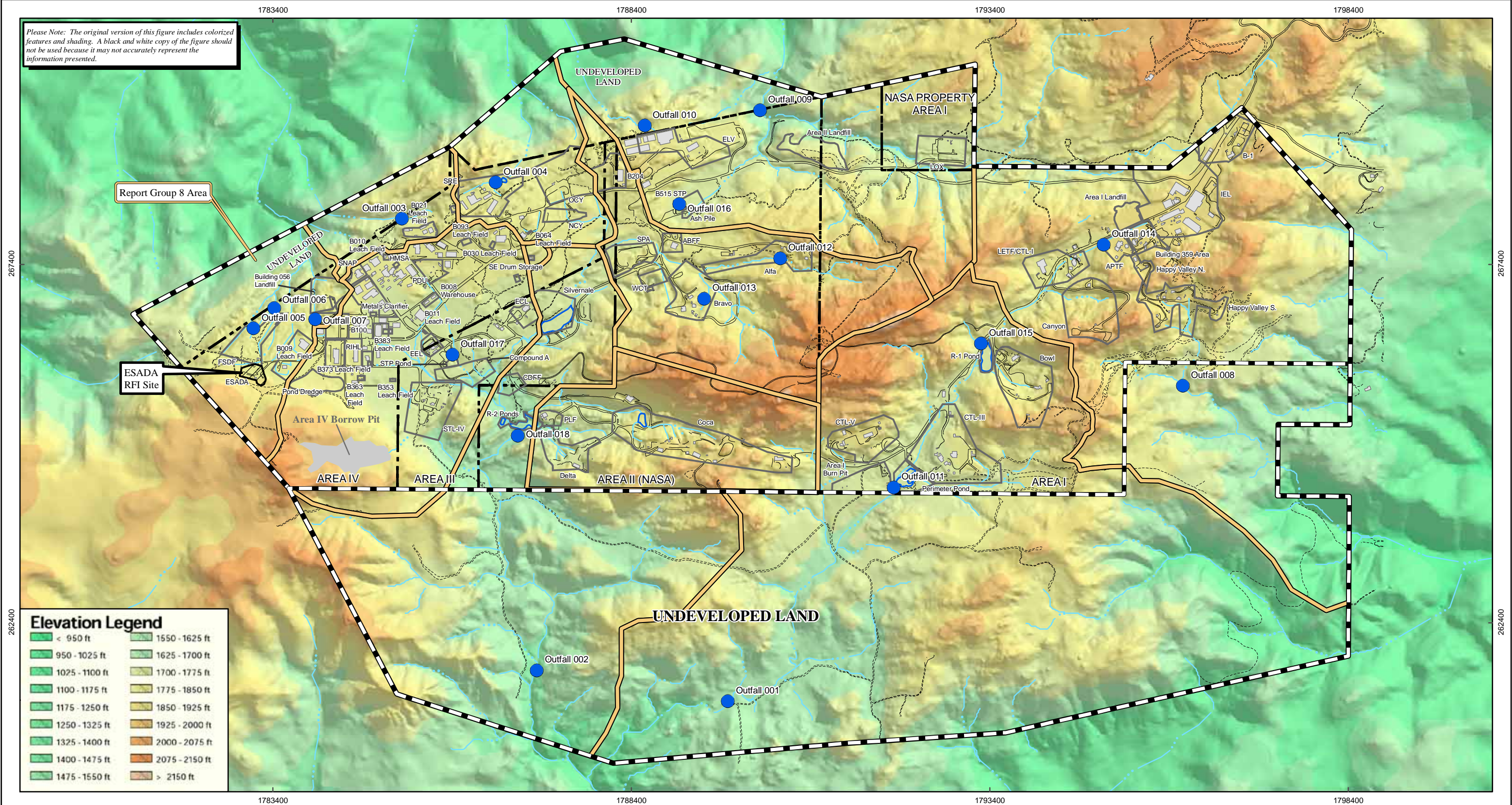
**TABLE C.5-2 (1 of 1)**  
**SUMMARY OF ESADA RFI SITE SURFICIAL MEDIA CMS RECOMMENDATIONS**

CMS Area	Description	Chemical Risk Drivers and Contributors	Rationale
ESADA-1	ESADA Pistol Range (Chemical Use Area 4)	Antimony, arsenic, lead, and selenium	Pistol range area with visible lead shot and elevated metals detected in soil. Highest concentrations detected in southern hill slope soils in target area. Extent delineated based on extent of visible shot and step-out sampling data.

## FIGURES



Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.



**AREA II**

- SWMU 5.1 - Area II Landfill
- SWMU 5.2 - ELV Final Assembly, Building 206
- SWMU 5.5 and AOC - Building 204 Area
- SWMU 5.6 - Former Incinerator Ash Pile
- SWMU 5.7 - Hazardous Waste Storage Area Waste Coolant Tank (WCT)
- SWMU 5.9, 5.10, 5.11 - Alfa Area
- SWMU 5.12, 5.13, 5.14, 5.15 - Alfa/Bravo Skim Pond and Bravo Area
- SWMU 5.18, 5.19 - Coca Area
- SWMU 5.20, 5.21, 5.22 - Propellant Load Facility (PLF)
- SWMU 5.23 - Delta Area
- SWMU 5.26 - R-2A and R-2B Ponds
- AOC - Building 515 Sewage Treatment Plant
- AOC - Storable Propellant Area (SPA)
- AOC - Alfa/Bravo Fuel Farm
- AOC - Coca/Delta Fuel Farm
- AOC - Building 224 Leach Field

**AREA III**

- SWMUs 6.1, 6.3, AOC - Engineering Chemistry Laboratory (ECL) Area
- SWMU 6.4 Compound A Facility
- SWMU 6.5 Systems Test Laboratory IV (STL-IV) Area
- SWMU 6.8 - Silvernale Reservoir
- SWMU 6.9 - Environmental Effects Laboratory (EEL)
- AOC - Sewage Treatment Plant (STP) Pond Area

**AREA IV**

- SWMU 7.1 - Building 56 Landfill
- SWMU 7.3 - Former Sodium Disposal Facility (FSDF)
- SWMU 7.4 - Old Conservation Yard (OCY)
- SWMU 7.5 - Building 100 Trench
- SWMU 7.6 - Radioactive Materials Handling Facility (RMHF)

**AREA IV (cont)**

- SWMU 7.7 - Rockwell International Hot Laboratory (RIHL)
- SWMU 7.8 - New Conservation Yard (NCY)
- SWMU 7.9 - ESADA Chemical Storage Area
- SWMU 7.10 - Former Coal Gasification PDU
- AOC - Former Hazardous Materials Storage Area (HMSA)
- AOC - Chemistry Laboratory Metals Clarifier
- AOC - Pond Dredge Area
- AOC - Sodium Reactor Experiment (SRE) Area
- AOC - SE Drum Storage Yard
- AOC - SNAP Facility
- AOC - Boeing Area IV Leach Fields
- AOC - DOE Area IV Leach Fields

**Legend**

- SSFL Property Boundary
- Report Group Boundary
- Administrative Boundary
- RFI Site Boundary
- ESADA RFI Site
- Building
- Pond
- Drainage
- Dirt Road
- Road
- NPDES Outfall

## Site Location Map ESADA RFI Site

SANTA SUSANA FIELD LABORATORY

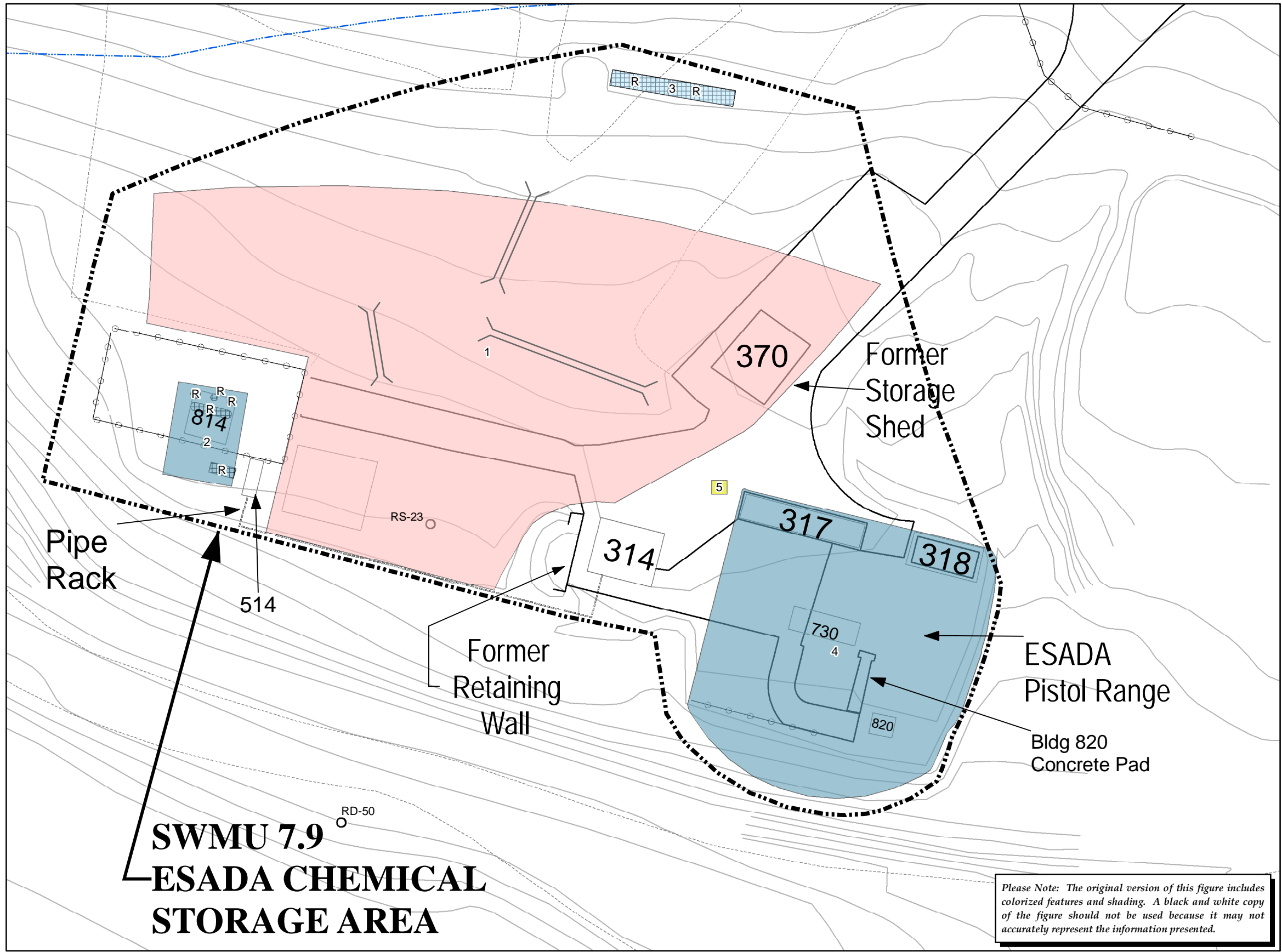
Date: Sep 25, 2007

Document: RFI-Report-Group8\_ESADA\_RFI.mxd

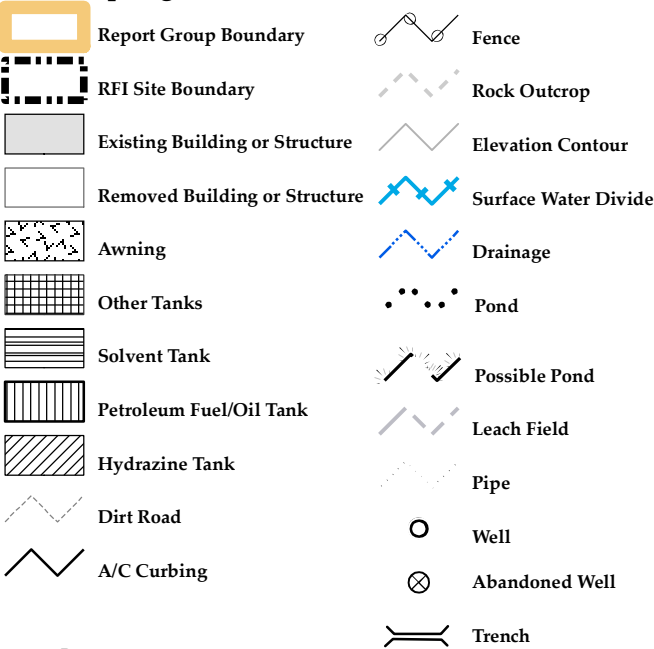


FIGURE  
C.1-1



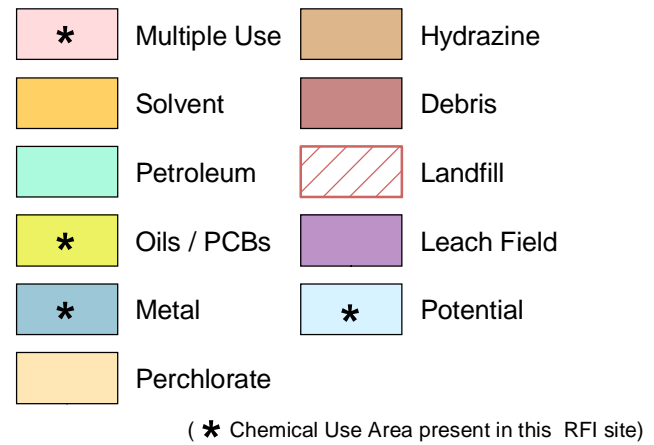


Base Map Legend



Note: R = Removed Tank

Chemical Use Areas



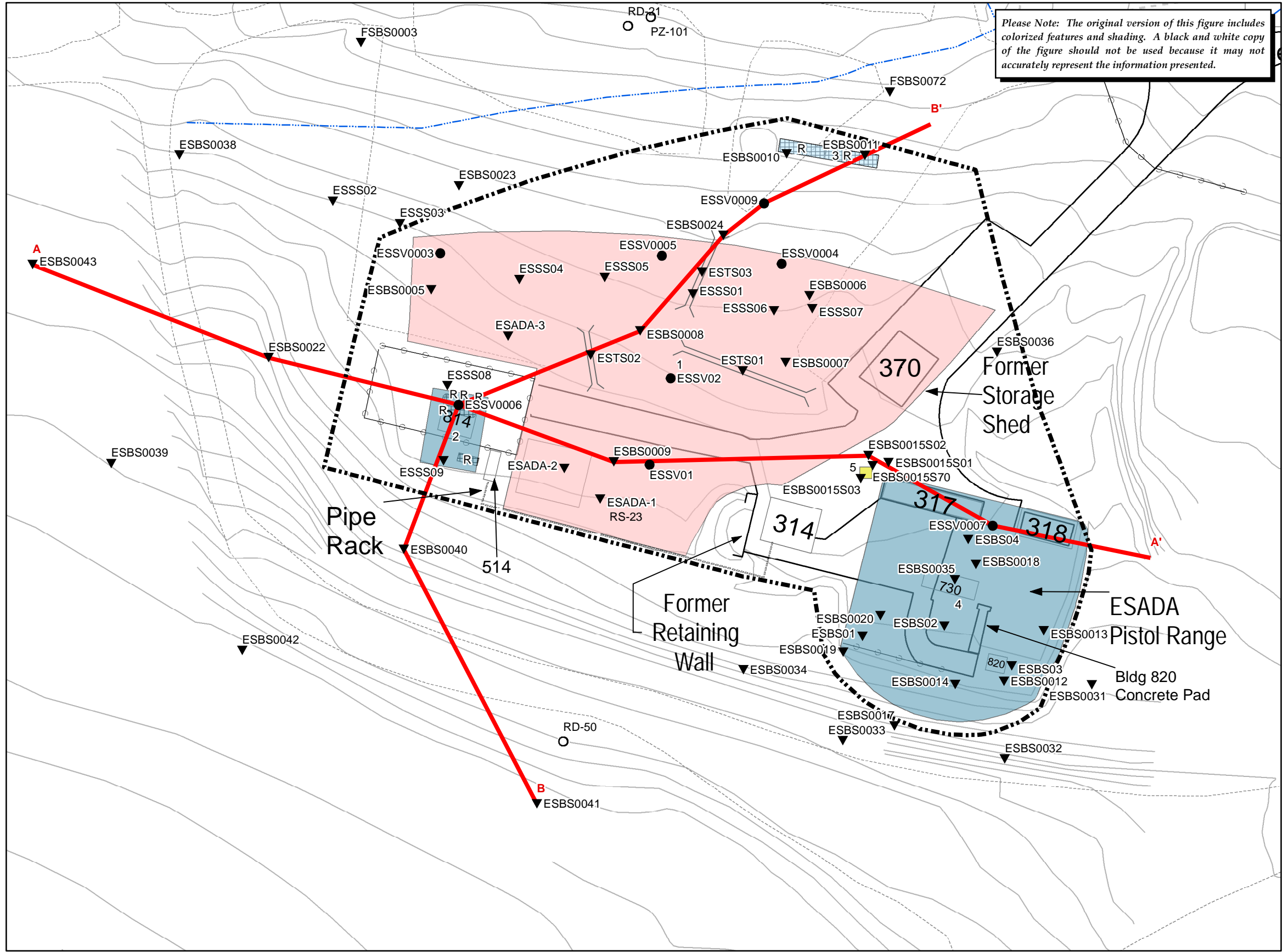
CODE	CATEGORY	Chemical Use Area Name
1	Multiple Use	ESADA Former Storage Yard
2	Metal	ESADA Sodium Testing Area
3	Potential	PDU AST Area
4	Metal	ESADA Pistol Range
5	Oils/PCBs	Transformer Pole X-35

Chemical Use Areas  
ESADA RFI Site



FIGURE  
C.2-1





Sample Location

- ▼ Soil Matrix Sample ● Soil Vapor Sample

Base Map Legend

- Report Group Boundary  
RFI Site Boundary  
Existing Building or Structure  
Removed Building or Structure  
Awning  
Other Tanks  
Solvent Tank  
Petroleum Fuel/Oil Tank  
Hydrazine Tank  
Dirt Road  
A/C Curbing  
Fence  
Rock Outcrop  
Elevation Contour  
Surface Water Divide  
Drainage  
Pond  
Possible Pond  
Leach Field  
Pipe  
Well  
Abandoned Well  
Cross Section  
Trench

Note: R = Removed Tank

Chemical Use Areas

- \* Multiple Use  
Solvent  
Petroleum  
\* Oils / PCBs  
Metal  
Perchlorate  
Hydrazine  
Debris  
Landfill  
Leach Field  
Potential

( \* Chemical Use Area present in this RFI site)

CODE	CATEGORY	Chemical Use Area Name
1	Multiple Use	ESADA Former Storage Yard
2	Metal	ESADA Sodium Testing Area
3	Potential	PDU AST Area
4	Metal	ESADA Pistol Range
5	Oils/PCBs	Transformer Pole X-35

Sample and Trench Locations  
ESADA RFI Site

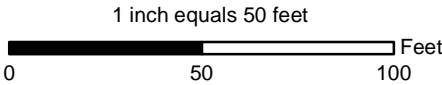


MWH

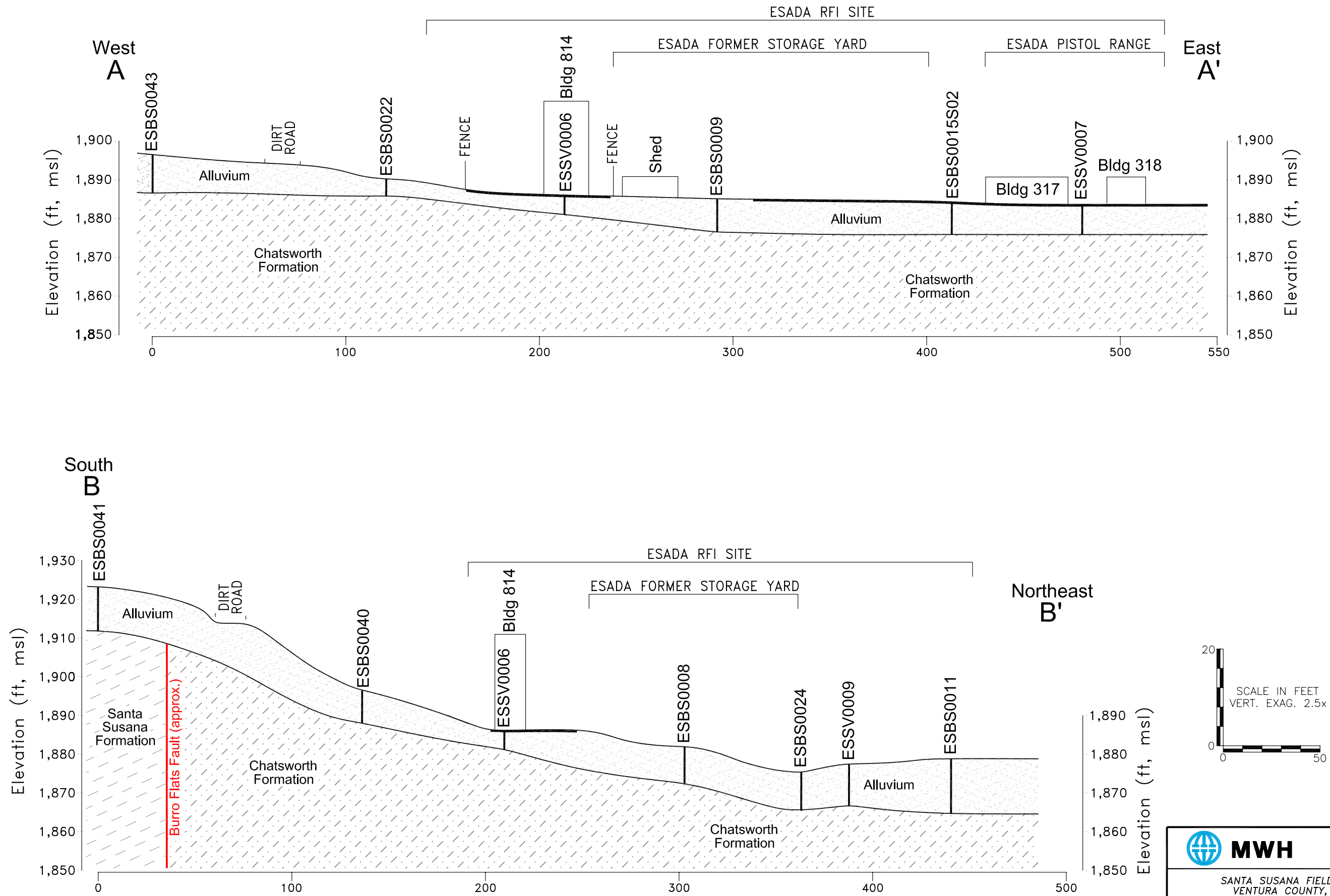
FIGURE  
C.2-2

Date: Sep 27, 2007

Document: RFI-Report-Group8\_ESADA\_Samples\_11x17.mxd



SANTA SUSANA FIELD LABORATORY



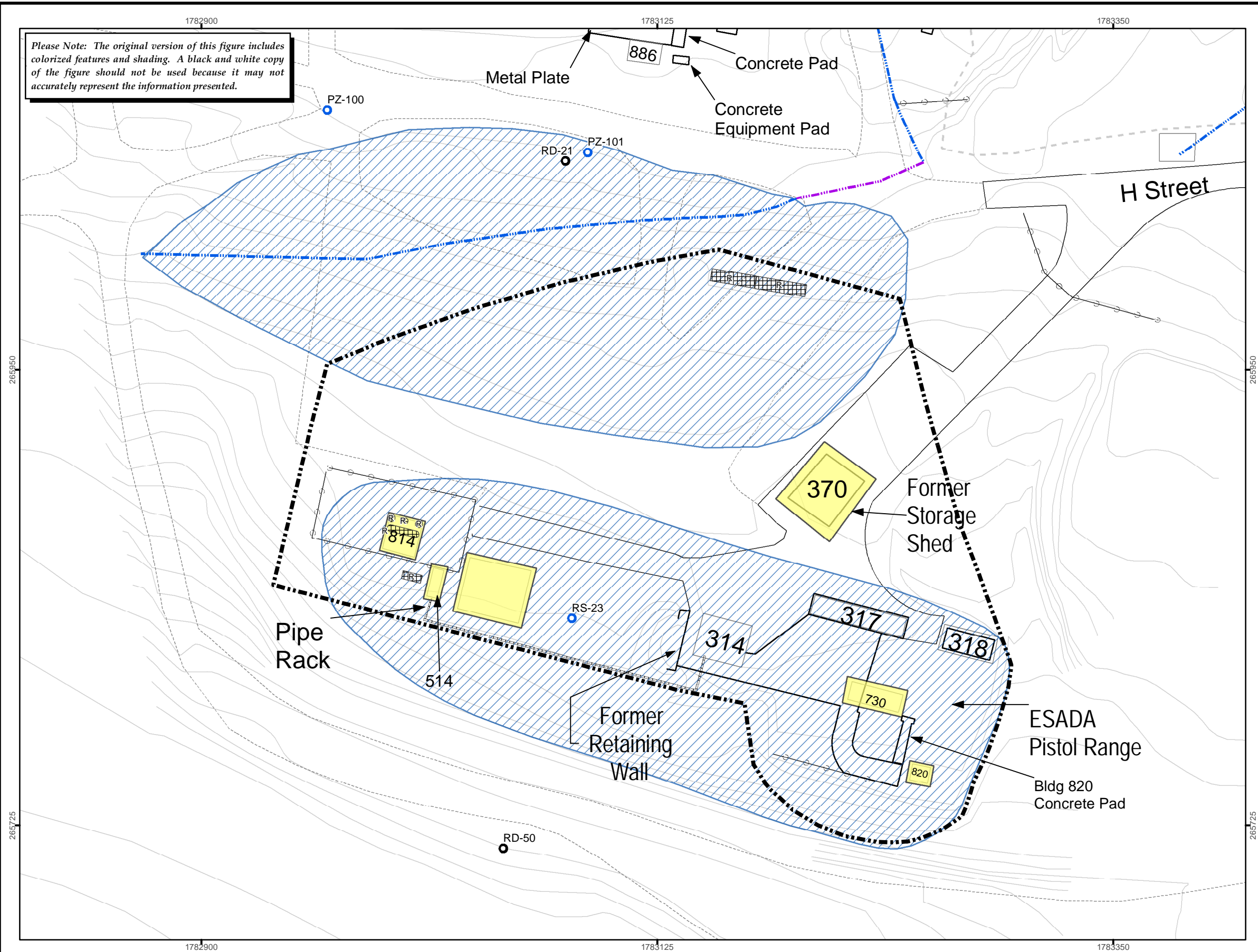
Note: Dip and orientation of the Burro Flats fault is approximate due to limited fault exposures.



SANTA SUSANA FIELD LABORATORY  
VENTURA COUNTY, CALIFORNIA  
SEPTEMBER 2007  
**SURFICIAL CROSS SECTIONS**  
**A-A' & B-B'**  
**ESADA RFI SITE**  
FIGURE C.2-3



Please Note: The original version of this figure includes colored features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.



#### Base Map Legend

	Administrative Area Boundary		Rock Outcrop
	RFI Site Boundary		Elevation Contour
	Report Group Boundary		Surface Water Divide
	Existing Building or Structure		Drainage
	Removed Building or Structure		Lined Drainage
	Other Tanks		Pond
	Solvent Tank		Possible Pond
	Petroleum Fuel/Oil Tank		Leach Field
	Hydrazine Tank		Pipe
	Dirt Road		NPDES Outfall
	A/C Curbing		Groundwater Wells
	Fence		Near Surface
			Chatsworth
			Abandoned Well

Note: R = Removed Tank

#### Approximate Areas of Soil Disturbance

	Grading
	Other Soil Disturbance Area

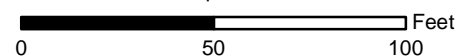
Note: Disturbed soils around buildings and/or structures are approximate and are assumed to extend 2 feet around edges of the pad.

### Soil Disturbance Areas ESADA RFI Site

Date: Sep 27, 2007

Document: RFI-Report-Group8\_ESADA\_Dist.mxd

1 inch equals 50 feet



SANTA SUSANA FIELD LABORATORY



MWH

FIGURE  
C.2-4



Soil Sample Location Symbol Legend

- ▲ Soil sample location with detected Organic Chemical Data  
▲ Soil sample location with no detected Organic Chemical Data  
△ Soil sample location not analyzed for Organic Chemical Data  
△ Contained unit soil sample  
△ Refused sample (refusal depth < 1' below ground surface)  
△ Soil sample not analyzed by any sample method

Comparison Levels

SVOCs	Background (µg/kg)	Res RBSL (µg/kg)	Eco RBSL (µg/kg)
2-Methylnaphthalene	--	230000	230000
Benzo(a)anthracene	--	600	1400
Benzo(a)pyrene	--	60	4700
Benzo(b)fluoranthene	--	600	4600
Benzo(ghi)perylene	--	--	6200
Benzo(k)fluoranthene	--	600	3600
bis(2-Ethylhexyl) phthalate	--	250000	4900
Chrysene	--	6000	2400
Diethyl phthalate	--	4600000	5200000
Di-n-butyl phthalate	--	5700000	490
Fluoranthene	--	2300000	130000
Indeno(1,2,3-cd)pyrene	--	600	3900
Naphthalene	--	6000	230000
Phenanthrene	--	1700000	1300
Pyrene	--	1700000	75000
TPH	Background (mg/kg)	Res RBSL (mg/kg)	Eco RBSL (mg/kg)
Lubricant Oil Range Organics (C20-C30)	--	1400	--
Lubricant Oil Range Organics (C21-C30)	--	1400	--

Data Date: 20070919

Note: (mg/kg) = milligrams per kilogram  
(µg/kg) = micrograms per kilogram

Background Res RBSL  
Background Level Res RBSL  
Ecological Risk-Based Screening Level

Data Box Information

Sample Location ID: ESB001

1.00 Primary ESB001501 7/10/2005

12.05 Detect with sample concentration shown  
0.06 Non-Detect with lab detection limit shown  
J Analyte positively identified; Associated numerical value is considered estimated  
- Data validation not performed  
NA Analysis not conducted  
[#] If more than one result per sample depth, the maximum is presented, with number of results in brackets.

Detect: 12.05, 12.05, 12.05, 12.05  
Non-Detect: <0.06, <0.06, <0.06, <0.06

Exceeds Background  
Exceeds Background + Res RBSL  
Exceeds Background + Eco RBSL  
Exceeds Background + Res RBSL + Eco RBSL

Chemical Use Areas

- (\* Chemical Use Area present in this RFI site)
- Multiple Use
  - Solvent
  - Petroleum
  - Oils / PCBs
  - Metal
  - Perchlorate
  - Hydrazine
  - Debris
  - Landfill
  - Leach Field
  - Potential

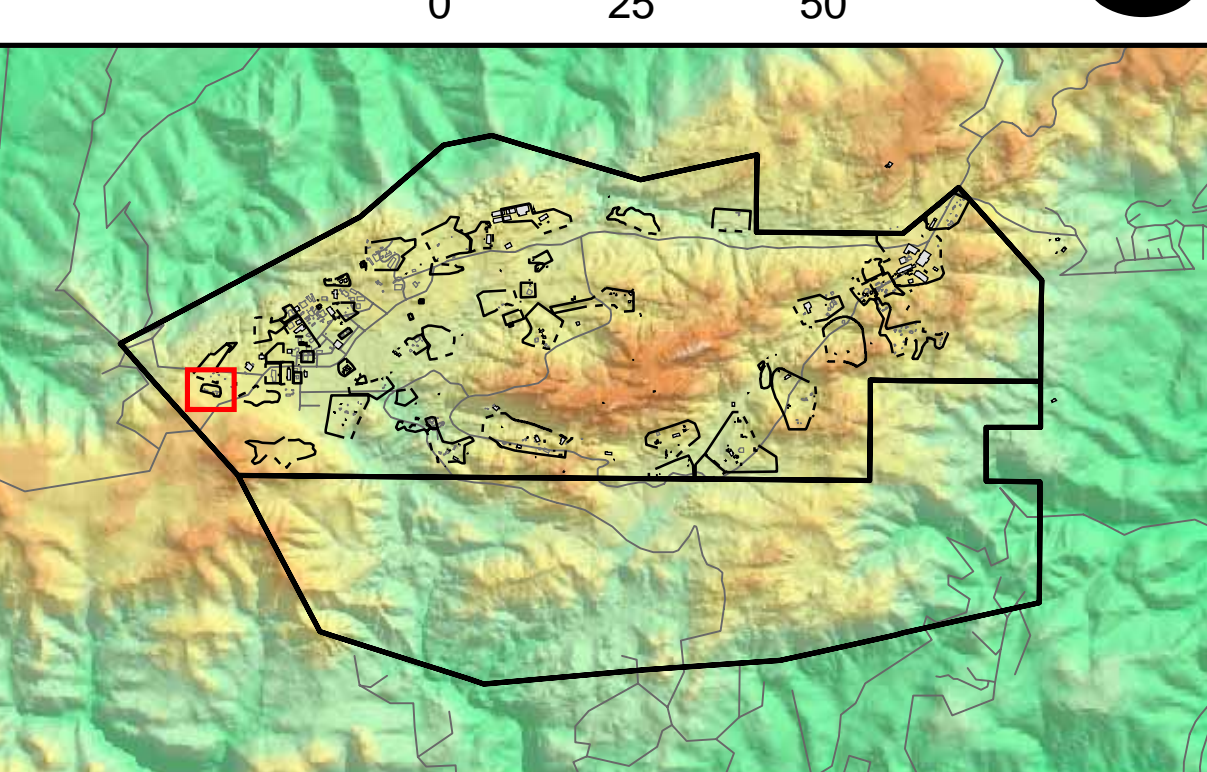
Base Map Legend

- Administrative Area Boundary
  - RFI Site Boundary
  - Report Group Boundary
  - Existing Building or Structure
  - Removed Building or Structure
  - Other Tanks
  - Solvent Tank
  - Petroleum Fuel/Oil Tank
  - Hydrazine Tank
  - Awning
  - Dirt Road
  - A/C Curbing
  - Fence
  - Pipe
  - Leach Field
  - NPDES Outfall
  - Well
  - Abandoned Well
  - Pond
  - Possible Pond
  - Drainage
  - Surface Water Divide
  - Elevation Contour
  - Rock Outcrop
  - Trench
- Note: R = Removed Tank

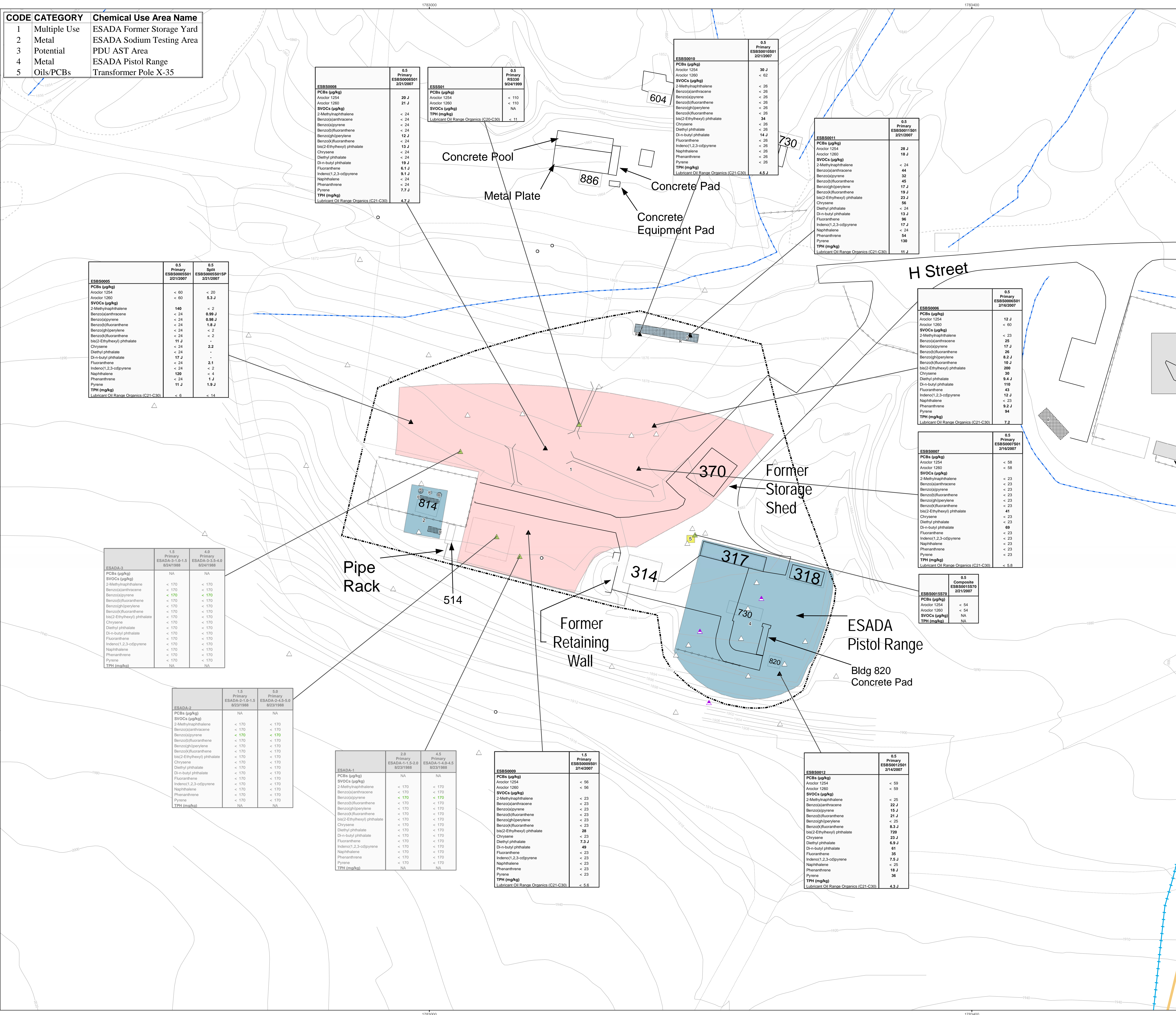
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ANSI E 44x34

1 inch equals 25 feet



CODE	CATEGORY	Chemical Use Area Name
1	Multiple Use	ESADA Former Storage Yard
2	Metal	ESADA Sodium Testing Area
3	Potential	PDU AST Area
4	Metal	ESADA Pistol Range
5	Oils/PCBs	Transformer Pole X-35





Soil Sample Location Symbol Legend

- ▲ Soil sample location with detected Inorganic Chemical Data
- ▲ Soil sample location with no detected Inorganic Chemical Data
- ▲ Soil sample location not analyzed for Inorganic Chemical Data
- ▲ Contained unit soil sample
- ▲ Refused sample (refusal depth < 1' below ground surface)
- ▲ Soil sample not analyzed by any sample method

Comparison Levels

SVOCS	Background (µg/kg)	Res RBSL (µg/kg)	Eco RBSL (µg/kg)
2-Methylnaphthalene	--	230000	230000
Benzo(a)anthracene	--	600	1400
Benzo(a)pyrene	--	60	4700
Benzo(b)fluoranthene	--	600	4600
Benzo(g,h,i)perylene	--	600	6200
Benzo(k)fluoranthene	--	600	3600
bio(2-Ethylhexyl) phthalate	--	250000	4900
Chrysene	--	6000	2400
Diethyl phthalate	--	46000000	5200000
D,n-butyl phthalate	--	5700000	490
Fluoranthene	--	2300000	130000
Indeno(1,2,3-cd)pyrene	--	600	3900
Naphthalene	--	6000	230000
Phenanthrene	--	1700000	1300
Pyrene	--	1700000	79000
TPH	Background (mg/kg)	Res RBSL (mg/kg)	Eco RBSL (mg/kg)
Lubricant Oil Range Organics (C20-C30)	--	1400	--
Lubricant Oil Range Organics (C21-C30)	--	1400	--

Data Date: 2007/09/19

Background Res RBSL	Background Level
12.05	12.05
12.05	12.05
12.05	12.05
12.05	12.05

Sample Location ID	1.00 Primary	Sample Depth	Sample Type	Unique Sample Identifier	(Historical Sample)
ESBS001	7/10/2005	1.00	Depth in Feet	Sample Type	Unique Sample Identifier

Note: "12.05" and "0.06" are for reference only and may not represent actual sample results.

12.05 Detect with sample concentration shown

0.06 Non-Detect with lab detection limit shown

J Analyte positively identified; Associated numerical value is considered estimated

NA Data validation not performed

[#] Analysis not conducted

If more than one result per sample depth, the maximum is presented, with number of results in brackets.

Detect	Non-Detect
12.05	0.06
12.05	0.06
12.05	0.06
12.05	0.06

Chemical Use Areas

- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metal
- Perchlorate
- Hydrazine
- Debris
- Landfill
- Leach Field
- Potential

Base Map Legend

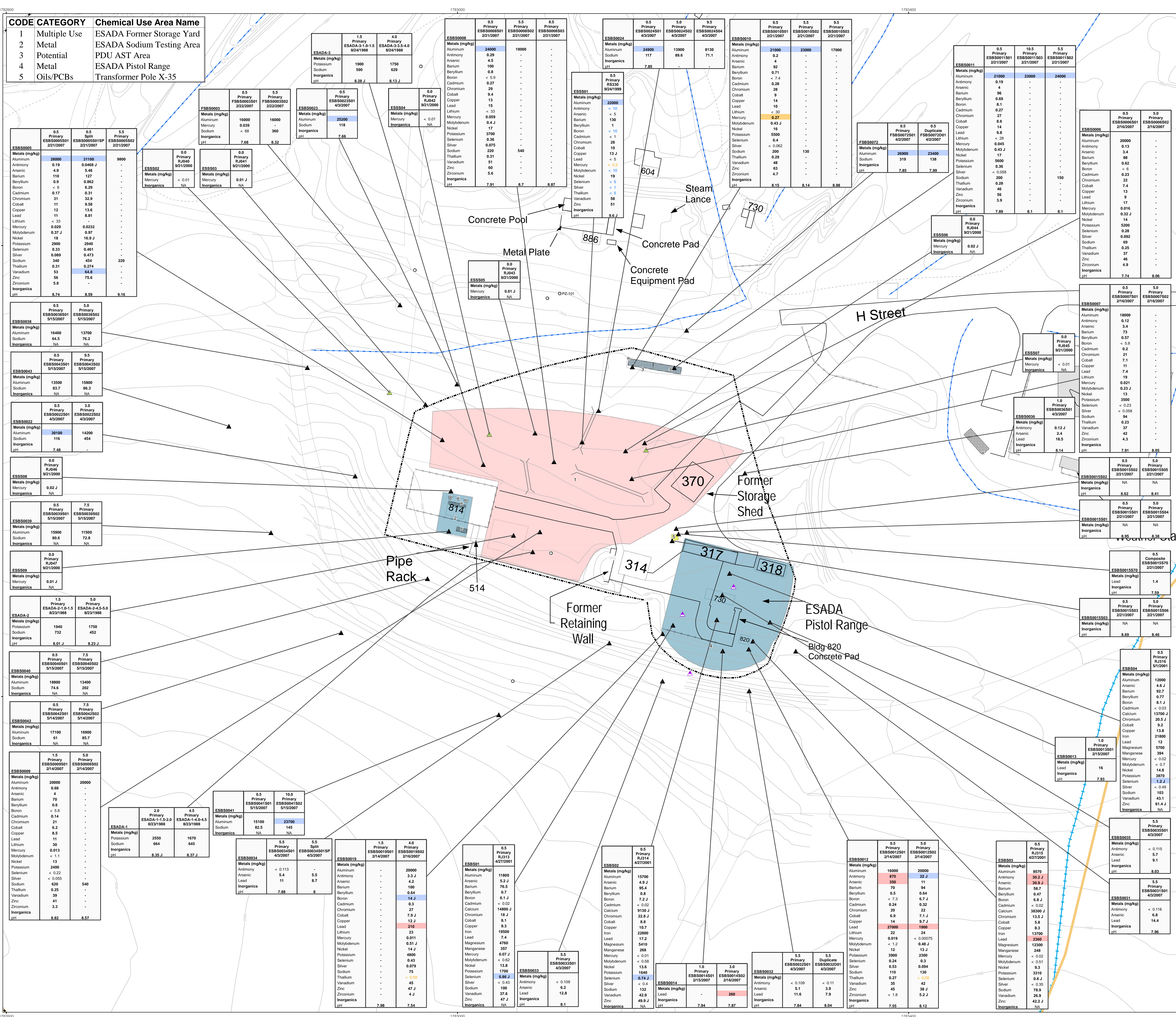
- Administrative Area Boundary
- RFI Site Boundary
- Report Group Boundary
- Existing Building or Structure
- Removed Building or Structure
- Other Tanks
- Solvent Tank
- Petroleum Fuel/Oil Tank
- Hydrazine Tank
- Awning
- Dirt Road
- A/C Curbing
- Fence
- Pipe
- Leach Field
- NPDES Outfall
- Well
- Abandoned Well
- Pond
- Possible Pond
- Drainage
- Surface Water Divide
- Elevation Contour
- Rock Outcrop
- Trench

Note: R = Removed Tank

Date: Sep 27, 2007 Document: RFI-Report-Group8\_ESADA\_Inorganics\_E.mxd

ANSI E 44x34

1 inch equals 30 feet



Santa Susana Field Laboratory

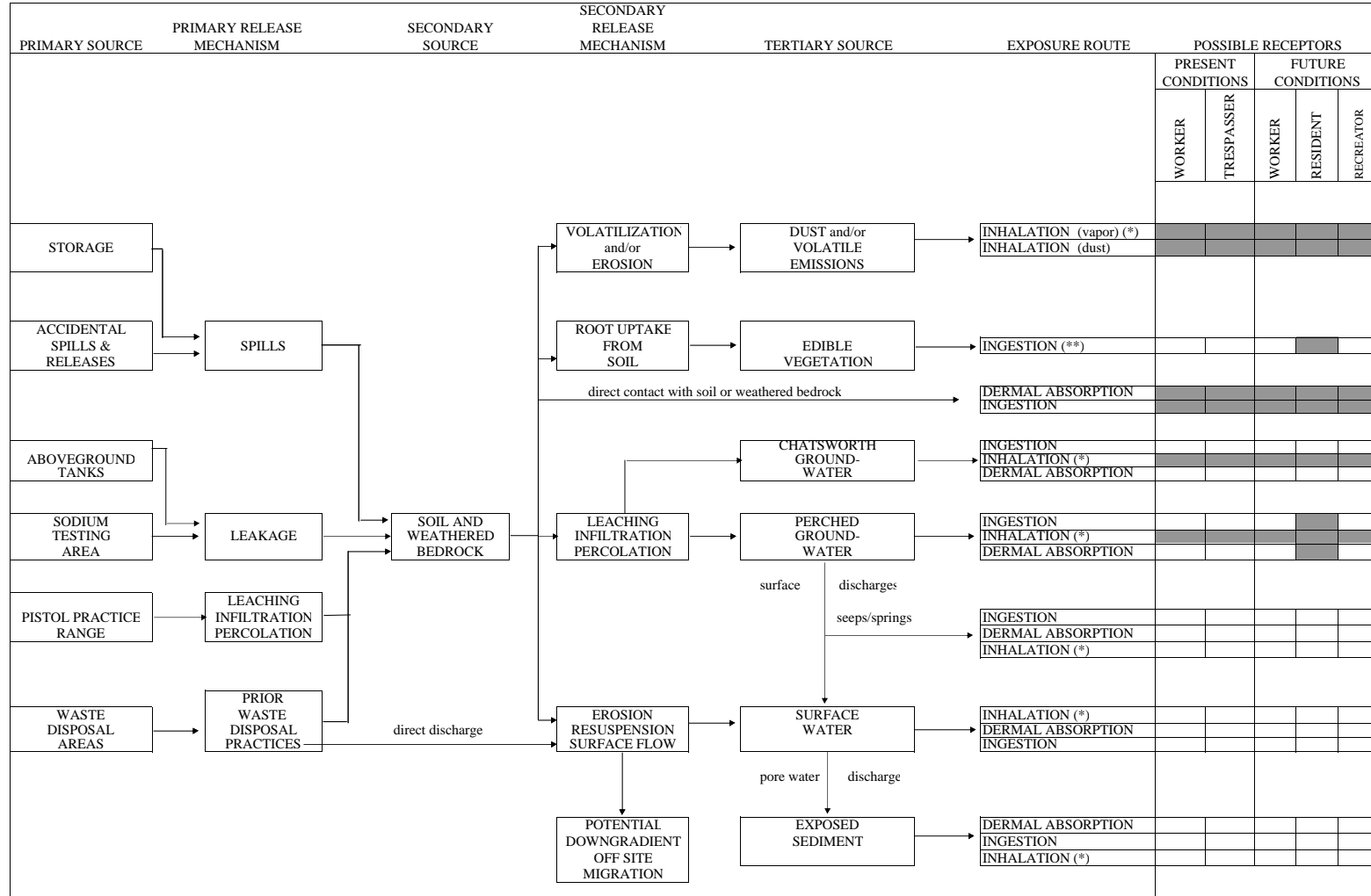
Inorganics Chemical Data Results  
ESADA RFI Site

FIGURE  
C.3-2



Figure C.4-1 (1 of 1)

Human Health Risk Assessment Conceptual Site Model  
ESADA RFI Site




NOTES:

As described in the SRAM (MWH 2005), note that risk estimates for the potential future recreational user (recreator) are used as surrogate risk estimates for the trespasser

(\*) Exposure limited to volatile compounds as defined in the text; residential and worker receptors include both indoor and outdoor air exposure to volatiles; non-residential and non-worker receptors include only outdoor air exposure. For workers, inhalation of volatiles from groundwater beneath the RFI site includes pathways associated with both migration to indoor air and ambient air (domestic groundwater use is an incomplete exposure pathway). For residents, exposures to reporting area Chatsworth formation groundwater includes pathways associated with both migration to indoor air and ambient air, as well as domestic use. Exposure to fugitive dust is limited to non-VOC compounds. For residents, exposures to near surface groundwater includes pathways associated with migration to indoor and outdoor air.

(\*\*) Exposure limited to bioaccumulatable compounds as described in the text.

 - complete and potentially complete exposure pathways evaluated in this risk assessment


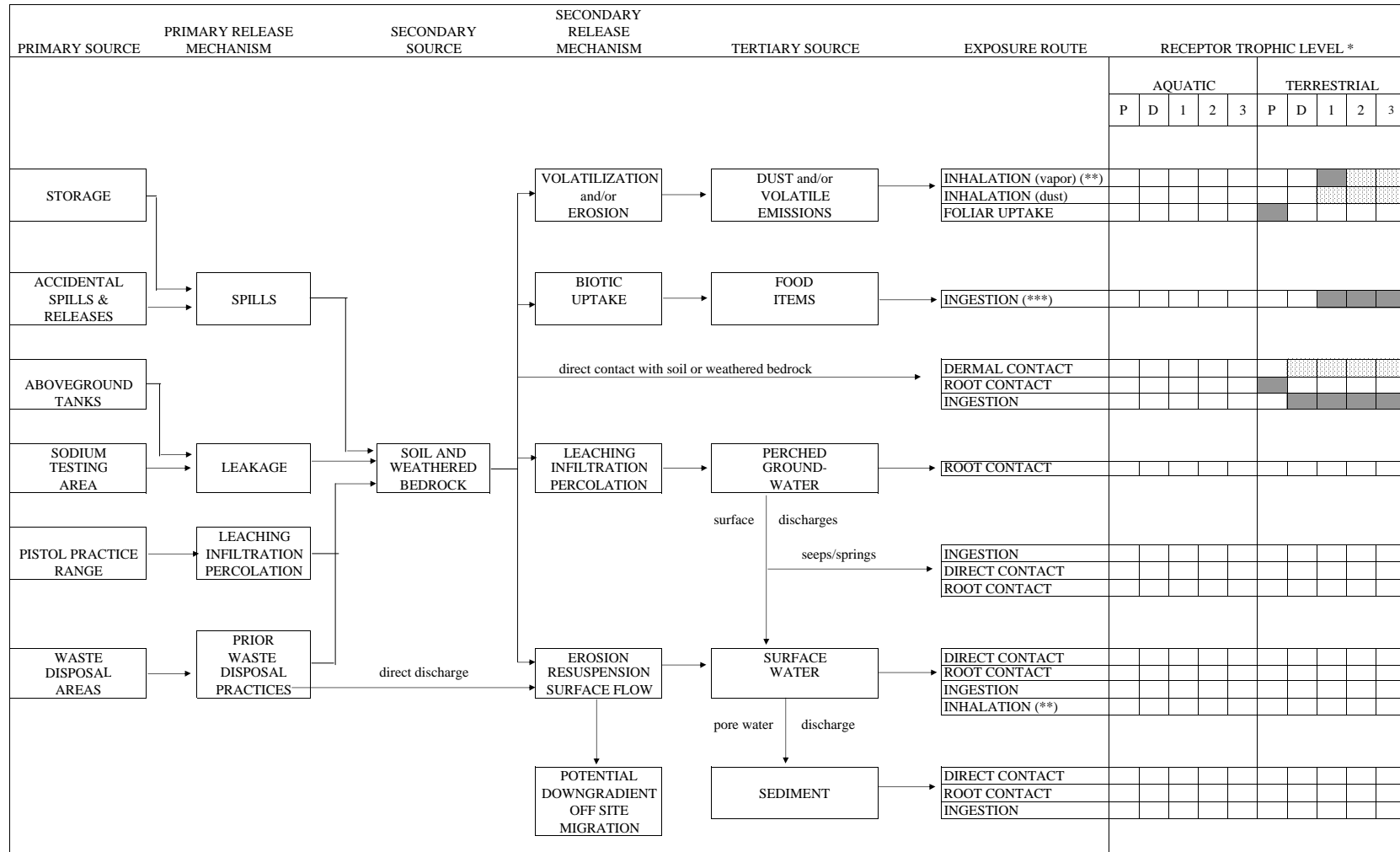
 - incomplete exposure pathways not evaluated in this risk assessment



Figure C.4-2 (1 of 1)

Ecological Risk Assessment Conceptual Site Model  
ESADA RFI Site





NOTES:


(\*) Trophic Level: P = primary producers (e.g., plants); D = detritivores (e.g., invertebrates); 1 = 1st consumer (e.g., mule deer); 2 = 2nd consumer (e.g., deer mouse); 3 = 3rd consumer (e.g., red-tailed hawk).

(\*\*) Exposure limited to volatile compounds as defined in the text.

(\*\*\*) Exposures limited to bioaccumulative compounds as defined in the text.

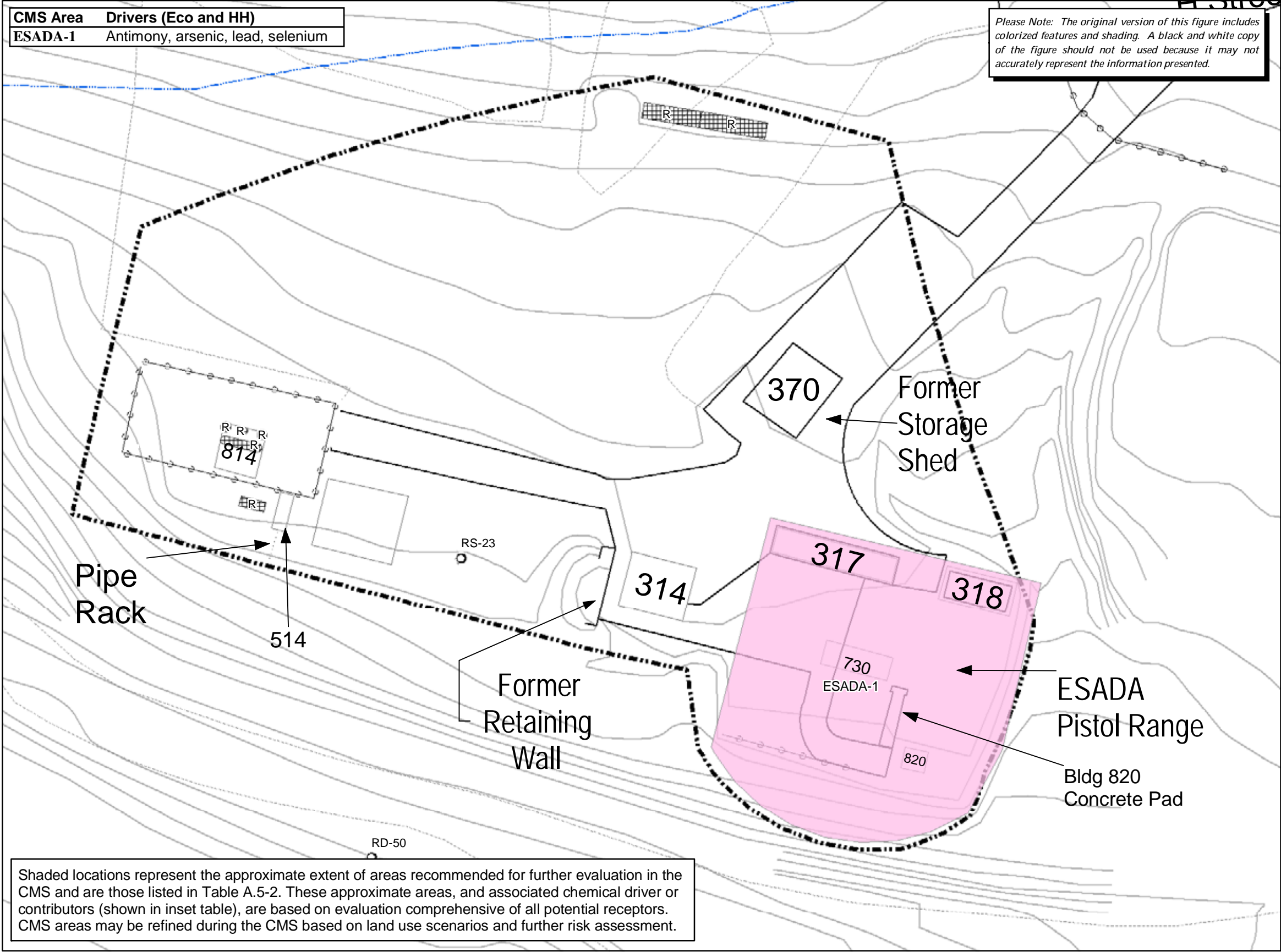
 - complete and potentially complete exposure pathways evaluated in this risk assessment

 - incomplete exposure pathways not evaluated in this risk assessment

 - minor exposure pathway not evaluated in this risk assessment

CMS Area	Drivers (Eco and HH)
ESADA-1	Antimony, arsenic, lead, selenium

Please Note: The original version of this figure includes colorized features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.



### Base Map Legend

	Report Group Boundary		A/C Curbing
	RFI Site Boundary		Fence
	Existing Building or Structure		Rock Outcrop
	Removed Building or Structure		Elevation Contour
	Awning		Surface Water Divide
	Other Tanks		Drainage
	Solvent Tank		Pond
	Petroleum Fuel/Oil Tank		Possible Pond
	Hydrazine Tank		Leach Field
	Dirt Road		Pipe
			Well
			Abandoned Well

Note: R = Removed Tank

### CMS Areas

CMS Area

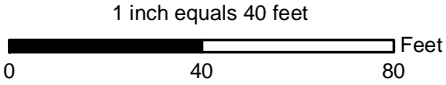
CMS Areas recommended for further evaluation in Corrective Measures Study (CMS)

CMS Areas Designations described in Table A.5-2

Surficial Media Site Action Recommendations  
ESADA RFI Site



FIGURE  
C.5-1



## **APPENDIX C**

### **ATTACHMENT C-1 Through C-3 (Electronic Copy)**

**C-1: REGULATORY AGENCY CORRESPONDENCE (None To Report)**

**C-2: SUBSURFACE INFORMATION**

**C-3: DATA QUALITY, VALIDATION AND LABORATORY REPORTS**

**APPENDIX C**

**ATTACHMENT C-1**

**REGULATORY AGENCY CORRESPONDENCE**

**None to Report**

**APPENDIX C**

**ATTACHMENT C-2**

**SUBSURFACE INFORMATION  
(Electronic Copy)**

## **SOIL BORING LOGS**

**■ ■ ■ ■ ■**

## FIELD LOG OF BORING

BORING NUMBER *ESBSØ1*

SHEET \_\_\_\_ OF \_\_\_\_

PROJECT NAME <i>Rocketdyne</i>		PROJECT NUMBER		ELEVATION AND DATUM		LOCATION <i>ESADA</i>	
DRILLING COMPANY		DRILLER <i>Joe Dougherty</i>		DATE AND TIME STARTED <i>4/27/01 1533</i>		DATE AND TIME COMPLETED <i>4/27/01 1602</i>	
DRILLING EQUIPMENT		DRILLING METHOD <i>hand auger</i>		COMPLETION DEPTH <i>3.3 ft</i>		TOTAL NO. OF SAMPLES <i>1</i>	
SIZE AND TYPE OF BIT		HOLE DIAMETER		NO. OF SAMPLES		BULK	
						SS	
						DRIVE	
						PITCHER	
DRILLING FLUID		DRILLING ANGLE		WATER LEVEL		FIRST	
						AFTER _____ HOURS	
SAMPLE HAMMER							

SAMPLE HAMMER			HYDROGEOLOGIST / DATE	CHECKED BY / DATE
TYPE	DRIVING WT.	DROP		

[illegible]





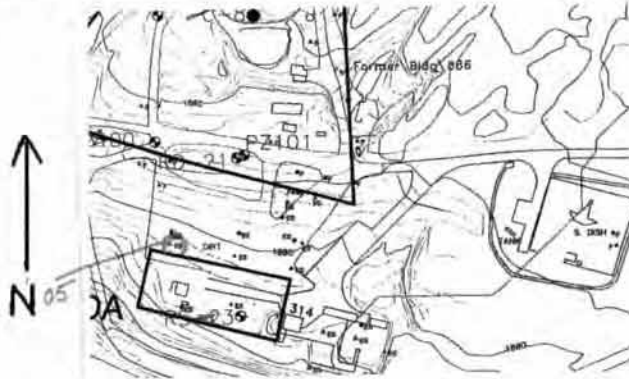




Date: 2-21-07



MONTGOMERY WATSON

Boring #: ESB50005 Sheet 1 of 1Project: Group 8 RFI Data Gap Sampling

1891263.0111811/

Job #: 1891264.0111811Site: SSFLLogged By: Nevison Reviewed By: SRVDrilling Contractor: HydroGeoSpectrumDrill Rig Type/Method: GeoprobeDrillers Name: Rob

Borehole Diam./Drill Bit Type:

Total Depth

7'

Ref. Elev.

Sampler Type: GeoprobeDepth to 1st Water (V): N/A Time/Date: N/ADrill Start Time/Date: 2-21-07 1005 Drill Finish Time/Date: 2-21-07 1023Depth to Water After Drilling (V): N/A Time/Date: N/AWell Completion Time/Date: N/ADepth to other Water Bearing Zones: N/ASoil Boring Backfill Time/Date: 2-21-07 1025

1010

1020

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
	X						1	CL	Clay/silt, brown (10yr 4/3) rootlets, soft, moist.			4R	10	90
							2		Sm. silty sand, brown (10yr 4/3) Fg, med dense, moist.				70	30
							3							
							4							
	X						5							
							6	SP	SAND, yellowish brown (10yr 5/4) F-g, med dense, moist.				100	4r
							7		Refusal @ 7' Bedrock					
							8							
							9							
							10							
							11							
							12							

Date: 02/16/07



MONTGOMERY WATSON



Boring #: ESBS0006

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

Job #: 1891263.0111811/

Site: SSFL

Job #: 1891264.0111811

Logged By: M Downs

Reviewed By: SRV

Drilling Contractor: N/A

Drill Rig Type/Method: 1st Age

Drillers Name: M/O

Borehole Diam./Drill Bit Type:

2"φ

Total Depth

10.5

Ref. Elev.

Sampler Type: 1st Age

Depth to 1st Water (V): N/A

Time/Date: N/A

Drill Start Time/Date: 1120 Drill Finish Time/Date: 1205

Depth to Water After Drilling (V):

Time/Date: N/A

Well Completion Time/Date: N/A

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: 02/16/07 1210

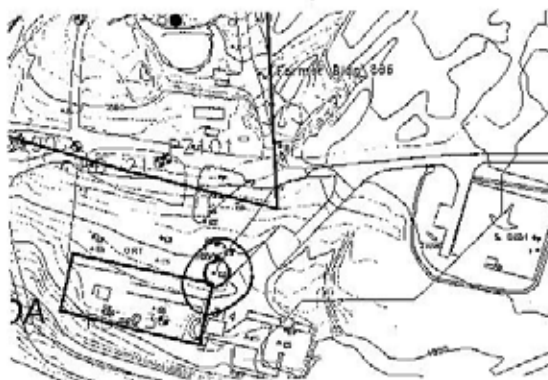
PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
1125	0.8		0.0 0.5	X			1		Surface - mod to minor growth of weeds & grasses.				35	65
							2		DK yellowish brown (10YR 3/4) clayey SILT w/ fine sand & minor organics in upper 6" (moist, stiff)					
							3		DK yellowish brown (10YR 3/4) fine sandy SILT w/ minor clay (moist, stiff)				35	65
1140	0.4		4.5 5.0	X			5		Dark yellowish brown (10YR 4/6) fine sandy SILT w/ minor clay (moist, stiff) minor white (10YR 8/1) veils.				35	65
							6		Minor calcium carbonate nodules from 4.0					
							7		mottled yellowish brown (10YR 5/6) & white (10YR 8/1) very sandy SILT w/ minor clay				40	60
							8							
							9							
							10							
							10.25							
							10.5							
							11		White (10YR 8/1) silty fine SANDSTONE moist, highly weathered.				70	30
							12							

TO 10.5 Soil suspended in bedrock

Date: 02/16/07



MONTGOMERY WATSON



Boring #: ESBS 0007

Sheet 1 of 2

Project: Group 8 RFI Data Gap Sampling

Job #: 1891263.0111811/

Site: SSFL

Logged By: M DAVIS

Reviewed By: SRV

Drilling Contractor: N/A

Drill Rig Type/Method: Hand Auger

Drillers Name: N/A

Borehole Diam./Drill Bit Type:

2" Ø

Total Depth

10'

Ref. Elev.

Sampler Type: Hand Auger

Drill Start Time/Date: 10:15 02/16/07

Drill Finish Time/Date: 11:15 02/16/07

Well Completion Time/Date: N/A

Depth to 1st Water (V): N/A

Time/Date: N/A

Depth to Water After Drilling (V):

Time/Date: N/A

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: 02/16/07 11:20

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filter	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
1020	0.1		0.0 0.5	X			1	2	Dark yellowish brown (10YR 4/4) fine - med sandy SILT w/ clay. (moist, soft)				35	65
							2		Dark yellowish brown (10YR 4/6) clayey SILT w/ fine sand + med calcareous nodules + veinlets (V. pale brown 10YR 7/3) (slightly moist, stiff)				30	70
1050	0.0		4.5 5.0	X			4.5		Dark yellowish brown (10YR 4/6) fine sandy SILT w/ med calcium carbonate nodules + veinlets (slightly moist, stiff)					
							6		Mottled Light gray (10YR 7/2) + yellowish brown streaks (10YR 5/6) very sandy SILT, (slightly moist, stiff)				45	55
							11		Mottling decreasing w/ depth					

cont.

04/00

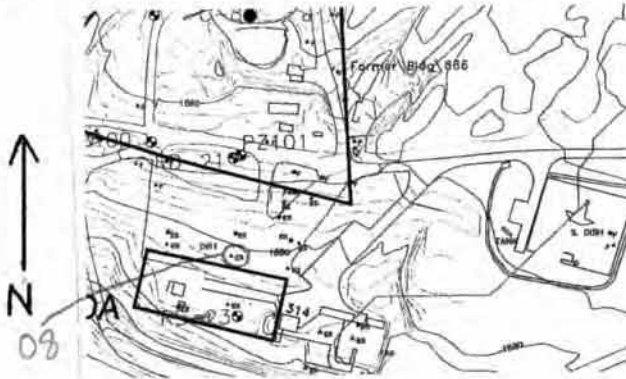
Boring #:		MW#:		Project:		Sheet 2 of 2								
P/O/V	Sample Interval	Recovered (in.)	Blow Count's / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Gravel	Estimated % of Sand			Silt/Clay
											Coarse	Med.	Fine	
							21.2		9.5' Description:			30.60		10
							23		White (10YR 8/1)					
							24		fine-med SANDSTONE					
							25		(clastic), (slightly					
							26		moist, med-highly					
							27		weathered)					
							28		BEDROCK (SANTA SUSANNA FORMATION)					
							29	10						
							30		TD = 10.0'					
							1							
							2							
							3							
							4							
							5							
							6							
							7							
							8							
							9							
							0							
							1							
							2							



Date: 2-21-07



MONTGOMERY WATSON



Boring #: ESBS0008 Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

1891263.0111811/

Job #: 1891264.0111811

Site: SSFL

Logged By: NEVISON

Reviewed By: SRV

Drilling Contractor: Hydro Geospectrum

Drill Rig Type/Method: Geoprobe

Drillers Name: Rob

Borehole Diam./Drill Bit Type:

2 1/2

Total Depth

9

Ref. Elev.

Sampler Type: Geoprobe

Depth to 1st Water (V): N/A

Time/Date: N/A

Drill Start Time/Date: 2-21-07 1047

Drill Finish Time/Date: 2-21-07 1045

Depth to Water After Drilling (V):

Time/Date: N/A

Well Completion Time/Date: N/A

Depth to other Water Bearing Zones: N/A

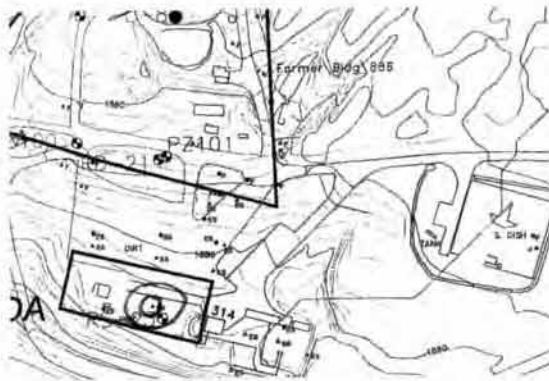
Soil Boring Backfill Time/Date: 2-21-07 1047

1031

1040

1044

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
	X						SO1	CL	Surface: vegetation Clay/silt, brown (10yr 4/13) rootlets, soft, moist		-	-	-	
							1							
							2	Sm	SAND w/silt, dark yellowish brown (10yr 4/6) Fg. med dense, moist		-	-	90	20
							3							
							4							
	X						SO2	Sm						
							5							
							6							
							7							
	X						8							
							SO3	SP	Sand, dark yellowish brown (10yr 4/6), silt, Fg. med dense moist				80	20
							9							
							10		Refusal @ 9', weathered bedrock					
							11							
							12							



Sheet 1 of 1

1891263.0111811/

Job #: 1891264.0111811

Site: SSFL

Logged By: M DAVIS

Reviewed By: SRV

Drilling Contractor: N/A

Drill Rig Type/Method: *Hand Auger*

Drillers Name: *N/A*

**Borehole Diam./Drill Bit Type:**

2"  $\phi$

Total Depth	8.5
-------------	-----

Ref. Elev.

Sampler Type: *10m Ring*

Depth to 1st Water (▽): N/A

Time/Date: N/A

Drill Start Time/Date: 1306 Drill Finish Time/Date: 1455

Depth to Water After Drilling (▼):

Time/Date: N/A

Well Completion Time/Date: <sup>2/14/87</sup> N/A

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: 14 mo 1350

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
the no PID 0.0 15th			MO	/					Surface - shr - weeds + grasses					
			1.0	X	18" DW		1		Dk yellowish brown (10YR 4/6) clayey SILT w/ common fine sand (moist. med stiff)				40	60
			1.5	X			2							
							3		Dk yellowish brown (10YR 4/6) Sandy SILT w/ clay. (moist. med stiff)				40	60
							4							
330 0.0			4.5	X			5		Minc mottling from approx 3.0' Dk yellowish brown (10YR 4/4) mo				30	70
			5.0	X			6							
							7		clay content increasing w/ depth					
							8							
							8.5		Brannish Yellow (10YR 6/6) fine - med grained SANDSTONE Mod - highly weathered				75	25
							9							
							10							
							11		TD = 8.5 (Bedrock) (S01 & S02 collected)					
							12		unit					

Note: PID readings zero - confirmed still functional by sending gas getting positive reading from sharpie pen.

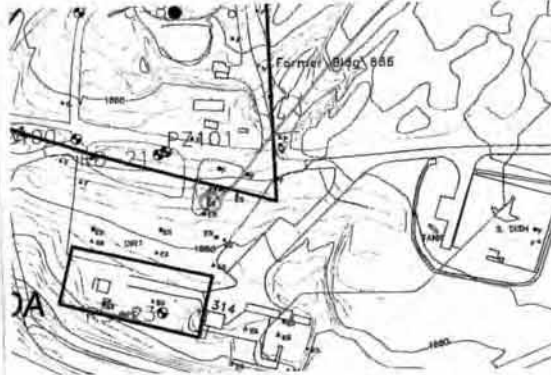
QA/QC



Date: 2-21-07



MONTGOMERY WATSON

N  
↑Boring #: ESBS0010 Sheet 1 of 1Project: Group 8 RFI Data Gap Sampling

1891263.0111811/

Job #: 1891264.0111811Site: SSFLLogged By: NEVISONReviewed By: SRVDrilling Contractor: Hydro Geo SpectrumDrill Rig Type/Method: GeoprobeDrillers Name: Rob

Borehole Diam./Drill Bit Type:

Total Depth

11.0

Ref. Elev.

2 1/2Sampler Type: GeoprobeDepth to 1st Water (▽): N/ATime/Date: N/ADrill Start Time/Date: 2-21-07 0921Drill Finish Time/Date: 2-21-07 0947

Depth to Water After Drilling (▽):

Time/Date: N/AWell Completion Time/Date: N/ADepth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date:

0951

0920

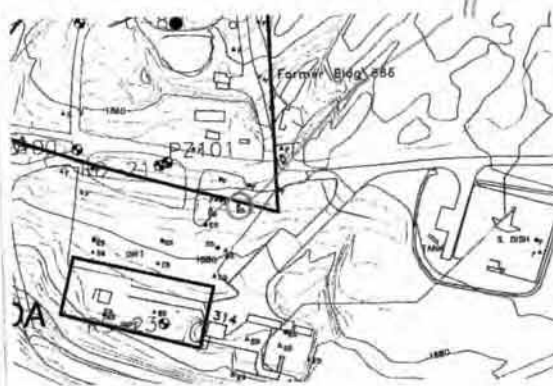
0933

0942

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
	<input checked="" type="checkbox"/>						0.1	SM	Surface Vegetation					
							1		Silty Sand, Brown (10yr 4/13)					
							2		Kodlets, loose, moist					
							3	CL	Clay, DARK grayish brown (10yr 4/2), streaks and mottling of brownish yellow and dark gray, stiff moist					
							4							
	<input checked="" type="checkbox"/>						5	SO2						
							6	CL	Clay, dark yellowish brown (10yr 4/4), very stiff, moist					
							7							
							8							
	<input checked="" type="checkbox"/>						9	SO3						
							10	SC	Clayey sand, brownish yellow (10yr 6/6), light gray weathered sandstone, dense, moist					
							11		Bedrock @ 11'. Refusal					
							12							



MONTGOMERY WATSON

N  
↑Boring #: ESBS0011 Sheet 1 of 1Project: Group 8 RFI Data Gap SamplingJob #: 1891263.0111811/Site: SSFLLogged By: Nevison Reviewed By: SRVDrilling Contractor: Hydro Geo SpectrumDrill Rig Type/Method: GeoprobeDrillers Name: Rob

Borehole Diam./Drill Bit Type:

Total Depth

13.5

Ref. Elev.

Sampler Type: GeoprobeDepth to 1st Water (V): N/ATime/Date: N/ADrill Start Time/Date: 0838 Drill Finish Time/Date: 0908

Depth to Water After Drilling (V):

Time/Date: N/AWell Completion Time/Date: N/ADepth to other Water Bearing Zones: N/ASoil Boring Backfill Time/Date: 2-21-07 0912

Estimated % Of

Sand

Gravel

Coarse

Medium

Fine

Silt/clay

Soil Description

Surface vegetationS01 SM SAND w/ Silt, Brown (10yr 4/3)Rootlets, loose, moist.70 30

1

2

3

4

5

6

7

8

9

10

11

12

S02

CL

CL

CL

S03

CL

CL

CL

CL

CL

CL

CL

Very dark grayish brown,  
(10yr 4/3) HardClay, dark yellowish brown  
(10yr 4/4) streaks mottling as  
above, bits of weathered sand  
stone <1/4". Stiff-very stiff  
moist.Hard.

Boring #:

MW#:

Project:

Sheet

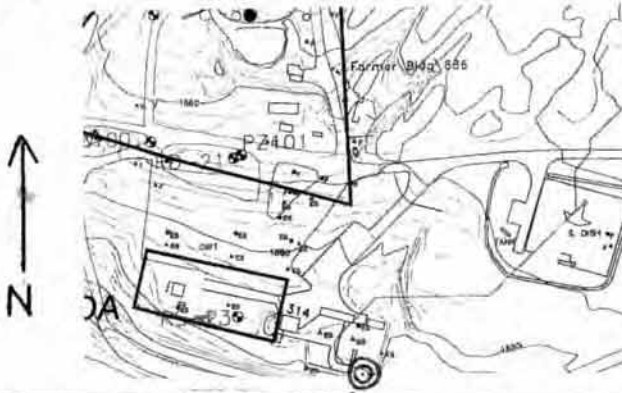
2

of 2

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of Sand				Silt/Clay
										Gravel	Coarse	Med.	Fine	
							12							
							13		NO Sample Recovered.					
									Refusal at 13.5					
							4							
							5							
							6							
							7							
							8							
							9							
							0							
							1							
							2							
							3							
							4							
							5							
							6							
							7							
							8							
							9							
							0							
							1							
							2							



MONTGOMERY WATSON



Boring #: EBS0072 MD

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

Job #: 1891263.0111811/

Site: SSFL

Logged By: M DAVIS

Reviewed By: SRV

Drilling Contractor: N/A

Drill Rig Type/Method: 16d Auger

Drillers Name:

Borehole Diam./Drill Bit Type:

2" Ø 16d Auger

Total Depth 9.5

Rel. Elev.

Sampler Type: 16d Auger

Depth to 1st Water (▽): N/A

Time/Date: N/A

Drill Start Time/Date: 2/14/07 1100 Drill Finish Time/Date: 1155

Depth to Water After Drilling (▽):

Time/Date: N/A

Well Completion Time/Date: N/A

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: 02/14/07 1200

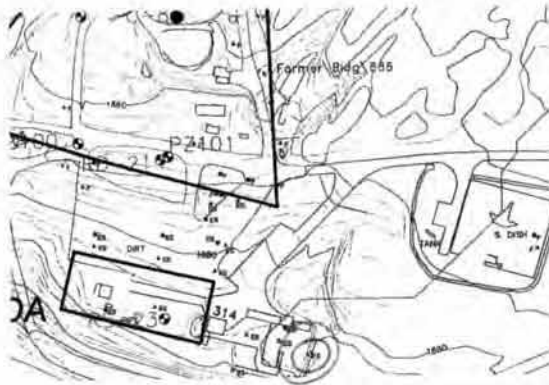
PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
0.0			0.1 0.5 (50%)	X			0.5		Brown m.d. Dk. yellowish brown (10YR 3/4) clayey silt w/ some fine sand & common organics (rootlets & root hairs) (moist, soft).				25	75
							3		Yellowish brown (10YR 5/6) Fine - med sandy SILT w/ clay (dry to slightly moist, med stiff). Minor v. pale brown (10YR 5/3) mottling				45	55
0.0			4.5 5.0 (60%)	X			5		• Mottling becoming moderate to heavy below ~ 2.5'					
							8		Pale yellow (10YR 8/3) fine sandy SILT, (moist, stiff to v. stiff) (Mod. highly weathered Bedrock.)				40	60
							12		T.D. 9.5 (S01 & S02 collected)					

Date:



MONTGOMERY WATSON

↑  
N

Boring #: ESBS 0013Sheet 1 of 1Project: Group 8 RFI Data Gap SamplingJob #: 1891263.0111811/Site: SSFLLogged By: M. DavisReviewed By: SRVDrilling Contractor: N/ADrill Rig Type/Method: Hand AugerDrillers Name: N/A

Borehole Diam./Drill Bit Type:

2" Ø

Total Depth

10

Ref. Elev.

—Sampler Type: Hand AugerDepth to 1st Water (V): N/ATime/Date: N/ADrill Start Time/Date: 02/15/07 1055Drill Finish Time/Date: 1120

Depth to Water After Drilling (V):

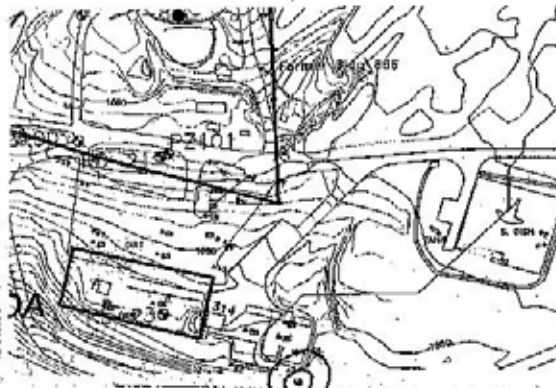
Time/Date: N/AWell Completion Time/Date: N/ADepth to other Water Bearing Zones: N/ASoil Boring Backfill Time/Date: 112002/15/07

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
<input checked="" type="checkbox"/>			0.1 1.0	<input checked="" type="checkbox"/>			1		Surface - moderate growth of weeds & grasses. Note - horizontal boring Soil Description DK (10YR 4/6) yellowish brown fine sandy SILT w/ clay (moist soft). (common organics (root hairs) in upper 0.5') Moisture content decreasing w/ depth T.D. 1.0 No lead projectiles encountered or observed, however soil collected for safe measure Note - this hand auger bored horizontally Horizontal Borehole 1.0				30	70
							2							
							3							
							4							
							5							
							6							
							7							
							8							
							9							
							10							
							11							
							12							





MONTGOMERY WATSON

Date: 02/16/07  
02/15/07

Boring #: E5850014

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

Job #: 1891263.0111811/

Site: SSFL

Job #: 1891264.0111811

Logged By: M. Doherty

Reviewed By: SRV

Drilling Contractor: N/A

Drill Rig Type/Method: Hand Auger

Drillers Name: NA

Borehole Diam./Drill Bit Type:

2" Ø

Total Depth

3.5'

Ref. Elev.

+1.0

-100

Sampler Type: Hand Auger

Depth to 1st Water (V): N/A

Time/Date: N/A

Drill Start Time/Date: 1000 02/15/07

Drill Finish Time/Date: 1040

Depth to Water After Drilling (V):

Time/Date: N/A

Well Completion Time/Date: N/A

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: 02/15/07 1045

Estimated % Of

Sand

Gravel

Coarse

Medium

Fine

Silt/clay

Soil Description

Note - Horizontal Boring

Dk yellowish brown (10YR

3/6) Fine sandy silt w/

clay (moist, silt + clay common

organic near surface (rootlets)

+ occasional lead projectiles

+ plastic shotgun shell

wadding

Borehole

Completed 02/16/07

Dk yellowish Brown 10YR 3/6 Fine

sandy TD + 0 and silt w/ clay

(Slightly moist, soft moist at top) Occasional lead

projectiles to 2.5. So2 collected 2.5-3.5'

Note - At least 3 lead

projectiles (spent) and 1 12-

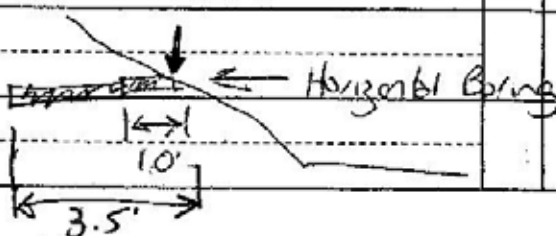
gauge shotgun shell wadding

(plastic) encountered + between surface + 2.5'

(collected) SO1 soil sample

collected @ 0.0-1.0, So2 collected @ 2.5-3.5'

TD 3.5'



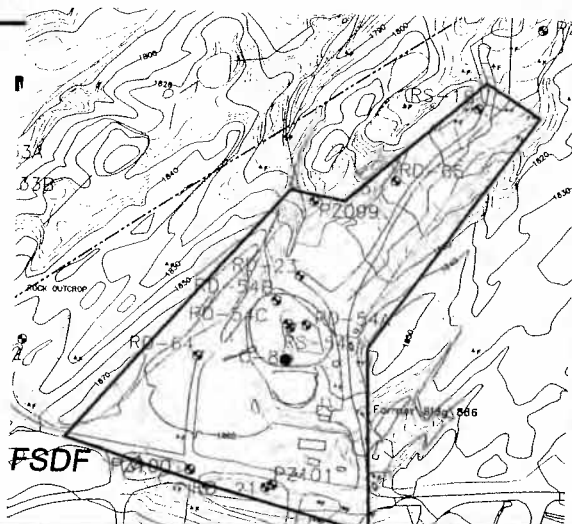
QATC

2/15/07  
10002/16/07  
100002/16/07  
Start Time 0940  
Back Time 1015

Date: 2-21-07



N



Boring #: ESBS0015 S01 Sheet 2 of 3

Project: Group 8 RFI Data Gap Sampling

1891263.0111811/

Job #: 1891264.0111811

Site: SSFL

Logged By: NEVISON

Reviewed By: SRV

Drilling Contractor: —

Drill Rig Type/Method: HAND AUGER

Drillers Name: S. Terranova

Borehole Diam./Drill Bit Type:

Total Depth

Ref. Elev.

3"

5'

Sampler Type: Sample Driver

Depth to 1st Water (▽): N/A

Time/Date: N/A

Drill Start Time/Date: 2-21-07

Drill Finish Time/Date: 2-21-07

Depth to Water After Drilling (▽):

Time/Date: N/A

Well Completion Time/Date: N/A

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: 2-21-07

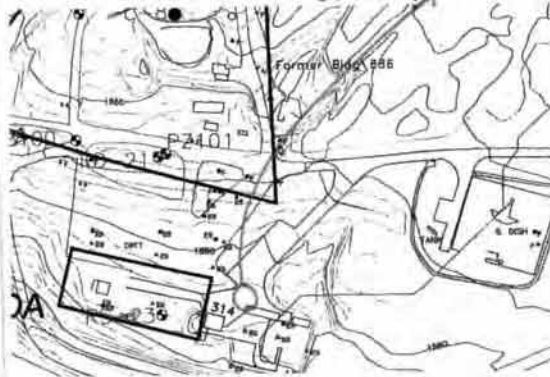
PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
1244	<input checked="" type="checkbox"/>						SO1		SAND + Gravel (ROAD BASE)					
							1		Gray moist no odor					
							2							
							3	CL	CLAY, dark grayish brown					
							4		(10 yr 4/2). streaks and mottling					
							5		of gray, stringers of sandstone					
1310	<input checked="" type="checkbox"/>						SO4		VERY STIFF to hard, DAMP.					
							6		Stop. Did not go to bedrock					
							7		(see SO2)					
							8							
							9							
							10							
							11							
							12							

Date: 2-21-07



MONTGOMERY WATSON

↑  
N



Boring #: ESBS0015 S02 Sheet 1 of 3

Project: Group 8 RFI Data Gap Sampling

1891263.0111811/

Job #: 1891264.0111811

Site: SSFL

Logged By: NEVISON

Reviewed By: SRV

Drilling Contractor: Hydro Geo Spectrum

Drill Rig Type/Method: Geoprobe

Drillers Name: Rob

Borehole Diam./Drill Bit Type:

1 1/4

Total Depth

8

Ref. Elev.

Sampler Type: Geoprobe

Depth to 1st Water (▽): N/A

Time/Date: N/A

Drill Start Time/Date: 2-21-07 1237

Drill Finish Time/Date: 2-21-07 1306

Depth to Water After Drilling (▽):

Time/Date: N/A

Well Completion Time/Date: N/A

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: 2-21-07 1307

1240

1311

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
	<input checked="" type="checkbox"/>						S02	GM	SAND + Gravel. (Road Base) Gray, moist, No odor	15	2.5	30	30	40
							1							
							2							
							3	CL	Clay, dark grayish brown (10yr 4/2) packets of Sand, very stiff to hard					
							4							
	<input checked="" type="checkbox"/>						S05							
							5							
							6							
							7							
							8		Bedrock @ 8' Refusal					
							9							
							10							
							11							
							12							





MONTGOMERY WATSON



Boring #: ESBS0015 S03 Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

1891263.0111811/

Job #: 1891264.0111811

Site: SSFL

Logged By: NEVISON

Reviewed By: SRV

Drilling Contractor: —

Drill Rig Type/Method: HAND AUGER

Drillers Name: S. Terranova

Borehole Diam./Drill Bit Type:

Total Depth

3"

Ref. Elev.

5'

Sampler Type: Sample Driver

Depth to 1st Water (▽): N/A

Time/Date: N/A

Drill Start Time/Date: 2-21-07 1247

Drill Finish Time/Date: 2-21-07 1325

Depth to Water After Drilling (▽):

Time/Date: N/A

Well Completion Time/Date: N/A

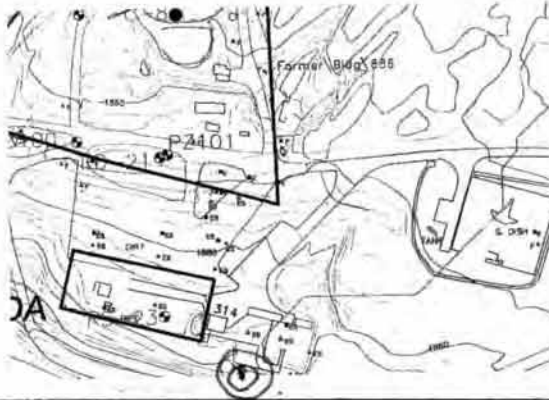
Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: 2-21-07 1327

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
1249	X						S03	Gm	SAND + Gravel - ROAD BASE Gray, moist NO odor					
							1							
							2							
							3	CL	Clay, dark grayish brown (10 yr 4 1/2 pockets of SAND) very stiff to hard					
							4							
1324	X						S06		Stop					
							5		Did not go to bedrock. (See S02)					
							6							
							7							
							8							
							9							
							10							
							11							
							12							



MONTGOMERY WATSON

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N


Boring #: ESBS 0017

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

Job #: 1891263.0111811/

Site: SSFL

Logged By: M. Davis

Reviewed By: SRV

Drilling Contractor: N/A

Drill Rig Type/Method: Hand Auger

Drillers Name: MA

Borehole Diam./Drill Bit Type:

2" φ

Total Depth

3.0'

Rel. Elev.

Sampler Type: Hand Auger

Depth to 1st Water (V): N/A

Time/Date: N/A

Drill Start Time/Date: 0850 Drill Finish Time/Date: 0950

Depth to Water After Drilling (V):

Time/Date: N/A

Well Completion Time/Date: N/A

Depth to other Water Bearing Zones: N/A

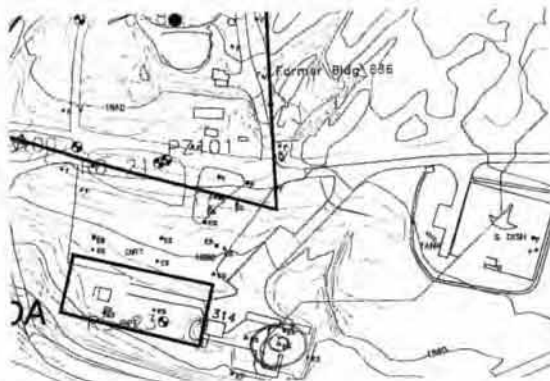
Soil Boring Backfill Time/Date: 0955

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
									Surface - moderate growth of weeds & grasses.		Coarse	Medium	Fine	
									Soil Description NOTE - horizontal boring					
							1		Dk yellowish brown (10PR 3/6) clayey SILT w/ fine - med sand. common organic (rootlets & root hairs) in 1st 0.5' (Moist, soft)			10	15	75
							2							
							3		Dk yellowish brown (10PR 3/6) fine sandy SILT w/ clay. (Moist, soft - med stiff)					
							4		minor - moderate calcareous veinlets					
							5							
							6							
							7		TD 3'					
							8		No projectiles encountered					
							9		- No sample collected					
							10		NOTE					
							11		This boring was dug out horizontally.					
							12							

Date: 02/15/07



MONTGOMERY WATSON

 ↑  
N


Boring #: ESBS0018

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

Job #: 1891263.0111811/

Site: SSFL

Logged By: M DAVIS

Reviewed By: SRV

Drilling Contractor: N/A

Drill Rig Type/Method: Hand Auger

Drillers Name: N/A

Borehole Diam./Drill Bit Type:

2" Ø

Total Depth: 1.0

Rel. Elev.: —

Sampler Type: Hand Auger

Depth to 1st Water (V): N/A

Time/Date: N/A

Drill Start Time/Date: 12:10 02/15/07 Drill Finish Time/Date: 12:50

Depth to Water After Drilling (V):

Time/Date: N/A

Well Completion Time/Date: N/A

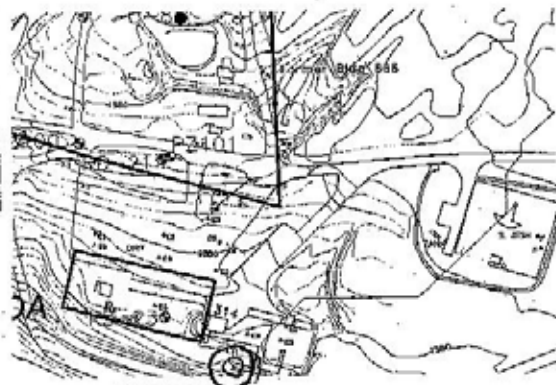
Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: 02/15/07 12:55

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
NA				NA			0.5		Surface - slight growth of grasses & weeds.					
							1		Dr. yellowish brown loam (4/6) silty CLAY w/ gravel	10			20	70
							1.0		& minor fine sand (moist soft - med stiff). Common					
							2		organics (rootlets) in upper					
							3		0.5' (NOTE - GRAVEL ENCOUNTERED IS NOT SPENT PROJECTILES)					
							4		Moisture content decreasing w/ depth					
							5		Yellowish brown (loam silt) fine sandy SILT w/ minor					
							6		silt & fine gravel (slightly moist, med stiff)	5			35	60
							7							
							8							
							9		TD 1.0'					
							10		No sample collected					
							11		No lead projectiles encountered or observed					
							12							



MONTGOMERY WATSON

N  
↑Date: 02/16/07  
02/14/07

Boring #: ESBS 0019

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

1891283.0111811/

Job #: 1891264.0111811

Site: SSFL

Logged By: M DAVIS

Reviewed By: SRV

Drilling Contractor: N/A

Drill Rig Type/Method: Hand Auger

Drillers Name: N/A

4.0

Borehole Diam./Drill Bit Type:

2" Ø

Total Depth

15'

Ref. Elev.

MO

Sampler Type: Hand Auger

Depth to 1st Water (V): N/A

Time/Date: N/A

Depth to Water After Drilling (V):

Time/Date: N/A

Depth to other Water Bearing Zones:

N/A

Drill Start Time/Date: 1430 Drill Finish Time/Date: 1510

Well Completion Time/Date: N/A

Soil Boring Backfill Time/Date: 1510

PID/DA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
										Coarse	Medium	Fine		
			0.0	X			0.0		Surface: Moderate growth of weeds & grasses					
			1.0	X			1.0		DK yellowish brown (10YR 3/6) fine-med sandy SILT w/ clay. (Moist. soft) w/ occasional discharged projectiles (bullets.)			35	65	
			3.0	X			3.0							
			4.0	X			4.0		TD 1.5' (Bored horizontally)					
							5.0		(Soil collected)					
							6.0		02/16/07 - Continued Boring from 1.5'					
							7.0		DK yellowish brown (10YR 3/4) (Moist. soft) clayey SILT w/ fine sand & occasional lead projectiles			25	75	
							8.0		DK yellowish brown (10YR 3/4) fine sandy SILT w/ clay, some occasional gravel, no lead projectiles			45	55	
							9.0		This boring excavated horizontally					
							10.0		← ESBS 0019					
							11.0		← 4.0'					
							12.0		Note: Soil collected from soil that was visually free of lead projectiles					

02/16/07

Shift time 0900

Finish time 0940

1450  
02/14/070920  
02/16/07

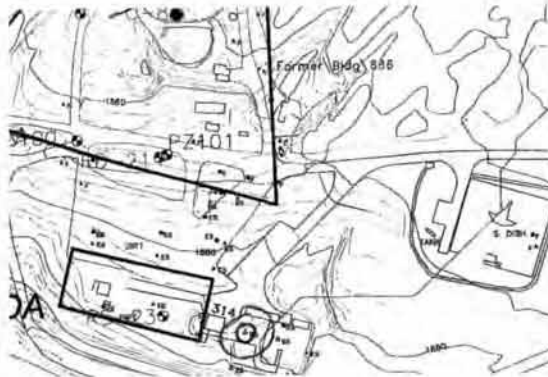
04/02



Date: 02/15/07



MONTGOMERY WATSON

  
N
Boring #: ~~EVBS~~ ESBS0020

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

1891263.0111811/

Job #: 1891264.0111811

Site: SSFL

Logged By: M DAVIS

Reviewed By: SRV

Drilling Contractor: N/A

Drill Rig Type/Method: Hand Auger

Drillers Name: N/A

Borehole Diam./Drill Bit Type:

2"  $\phi$ 

Total Depth:

1.0

Ref. Elev.:

-

Sampler Type: Hand Auger

Depth to 1st Water ( $\nabla$ ): N/A

Time/Date: N/A

Drill Start Time/Date: 02/15/07 1300

Drill Finish Time/Date: 1330

Depth to Water After Drilling ( $\nabla$ ):

Time/Date: N/A

Well Completion Time/Date: N/A

Depth to other Water Bearing Zones: N/A

SURFACE:

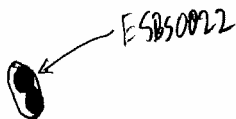
Soil Boring Backfill Time/Date: 02/15/07 1340

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
N/A				N/A					Short weeds & grasses, with common gravel. (Note - gravel is subangular to angular & is not lead projectiles)					
							1.01		Dk Yellowish brown (10YR 4/6), fine sandy SILT w/ minor clay & minor fine gravel (moist med stiff)				30	65
							2		Gravel content & moisture content decreasing with depth.					
							3		Note - gravel content is not lead projectiles					
							4							
							5							
							6		TD 1.0					
							7		Sample not collected - no lead projectiles encountered or observed.					
							8							
							9		NOTE - THIS LOCATION MARKED BY STAKE w/ ESBS0020 ON ONE SIDE & EVBS0021 ON THE OTHER. ESBS0020 MATCHES LOCATION ON MAP SO THIS ID BELIEVED TO BE CORRECT & EVBS0021 INCORRECT.					
							10							
							11							
							12							

Date: 4-3-07



MONTGOMERY WATSON



Site Sketch Map

Boring #: ESB50022

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

Job #: 1891263/1891264

Site: SSFL

Logged By: Nevison

Reviewed By: SRV

Drilling Contractor: Baumgardner

Drill Rig Type/Method: —

Drillers Name: —

Borehole Diam./Drill Bit Type:

3"

Total Depth

4.0'

Ref. Elev.

Sampler Type: slidehammer - hand auger

Drill Start Time/Date: 4-3-07 Drill Finish Time/Date: 4-3-07

Well Completion Time/Date: N/A

Soil Boring Backfill Time/Date: 4-3-07

Depth to 1st Water (▽): N/A Time/Date: N/A

Depth to Water After Drilling (▽): Time/Date: N/A

Depth to other Water Bearing Zones: N/A

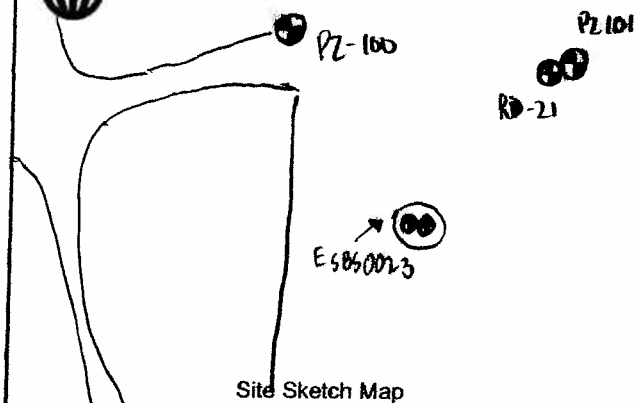
PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
1228	0	<input checked="" type="checkbox"/>					0.1	SC	Clayey Sand (SC), Brown (10 YR 4/3), fine to medium, med dense, damp			20	40	40
							1							
							2							
1250	0	<input checked="" type="checkbox"/>					2.3	SC	Some calcium carbonate nodules @ 2 feet; occasional manganese oxide staining.			15	50	35
							4		Refusal on rock (Dark reddish gray (5YR 4/2), came up as gravel.					
							5							
							6							
							7							
							8							
							9							
							10							
							11							
							12							

QAVC

Date: 4-3-07



MONTGOMERY WATSON



Boring #: ESB0023

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

Job #: 1891263/1891264

Site: SSFL

Logged By: Newison

Reviewed By: SRV

Drilling Contractor: -

Drill Rig Type/Method: -

Drillers Name: Baumgardner

Borehole Diam./Drill Bit Type:

3"

Total Depth

0.5'

Ref. Elev.

Sampler Type: slidehammer - hand auger

Depth to 1st Water (Σ): N/A

Time/Date: N/A

Depth to Water After Drilling (▼):

Time/Date: N/A

Depth to other Water Bearing Zones: N/A

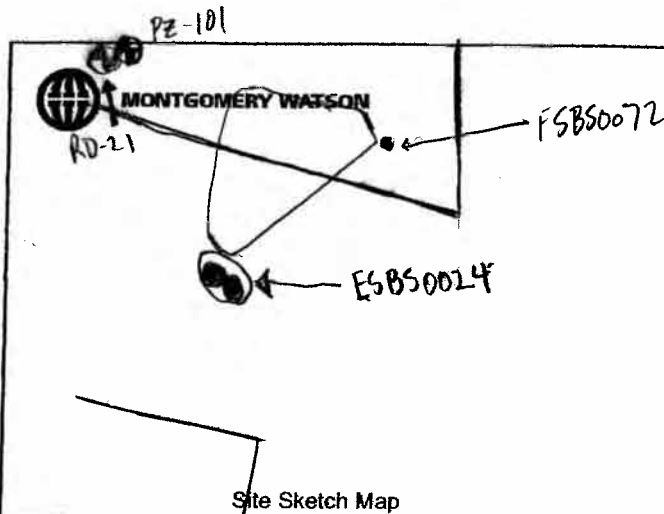
Drill Start Time/Date: 4-3-07 Drill Finish Time/Date: 4-3-07

Well Completion Time/Date: N/A

Soil Boring Backfill Time/Date: 4-3-07

PID/QVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
0	<input checked="" type="checkbox"/>						0.1	CL	Fill; Sandy Clay (CL), Dark brown (10YR 3/3), fine grained, very stiff, damp				30	70
							1							
							2		(did not advance to bedrock; instructed not to find bedrock)					
							3							
							4							
							5							
							6							
							7							
							8							
							9							
							10							
							11							
							12							

QA/QC



Date: 4-3-07

Boring #: **ESBS0024** Sheet **1** of **1**

Project: Group 8 RFI Data Gap Sampling

Job #: 1891263/1891264 Site: SSFL

Logged By: **Newton** Reviewed By: **SRV**

Drilling Contractor: —

Drill Rig Type/Method: —

Drillers Name: **Baumgardner**

Borehole Diam./Drill Bit Type: **3"** Total Depth **9.5'**  
Ref. Elev. —

Sampler Type: **slidehammer-hand auger**

Depth to 1st Water (▽): **N/A** Time/Date: **N/A**

Depth to Water After Drilling (▽): **N/A** Time/Date: **N/A**

Depth to other Water Bearing Zones: **N/A**

Drill Start Time/Date: **4-3-07** Drill Finish Time/Date: **4-3-07**

Well Completion Time/Date: **N/A**

Soil Boring Backfill Time/Date: **4-3-07**

1106

1123

1146

1201

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
0	<input checked="" type="checkbox"/>						501	CL	Fill: Sandy clay (CL), Dark brown (10YR 3/3), fine-grained, very stiff, damp.				20	80
							1							
							2	CL	Silty clay (CL), Dark brown (10YR 3/3), trace fine-grained, stiff-very stiff, moist.				5	95
							3							
							4							
0	<input checked="" type="checkbox"/>						502	CL						
							6							
0	<input checked="" type="checkbox"/>						503	CL	Alluvium: Sandy clay (CL), Yellowish brown (10YR 5/4), fine to medium, stiff, moist.				10	25 65
							8	SC	Clayey sand (SC), Yellowish brown (10YR 5/4), fine to medium, med. dense, moist.				75	25
							9	SP	Sand (SP), yellowish brown (10YR 5/4), fine grained, trace medium grained, med. dense, moist.				5	95
							10							
							11		Bedrock, sandstone @ 9.5'					
							12							

QAVOC





MONTGOMERY WATSON

Date: 04/03/07

Boring #: ESB S0031

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

Job #: 1891263/1891264

Site: SSFL

Logged By: M Davis

Reviewed By: SRV

Drilling Contractor: W/A

Drill Rig Type/Method: A Felix

Drillers Name:

Borehole Diam./Drill Bit Type:

Total Depth

5.5

3" Ø

Ref. Elev.

Sampler Type: Hand Auger

Depth to 1st Water (▽): N/A

Time/Date: N/A

Drill Start Time/Date: 0850 Drill Finish Time/Date: 0935

Depth to Water After Drilling (▽):

Time/Date: N/A

Well Completion Time/Date: N/A

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date:

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/Clay
											Coarse	Medium	Fine	
2.5							1	ML	Surface - minor growth of weeds & grasses Yellowish brown (10YR 5/4) fine sandy silt (dry, med stiff)				20	80
							1.5	ML	Dk yellowish brown (10YR 4/6) silt w/ some clay				20	80
							2		(fine sandy) (dry, med stiff)					
							2.5							
							3	ML	Dk yellowish brown (10YR 4/6) fine sandy silt (moist, med stiff)				20	80
							4							
							5	ML	Dk yellowish brown (10YR 3/6) fine sandy silt (moist, med stiff), minor calcium carbonate nodules				20	80
							6							
							7							
							8		TD 5.5'					
							9							
							10		No lead projectiles observed in soil cuttings					
							11							
							12							

Sol  
0930

QW/QC

ESBS0032

Date: 04/03/07

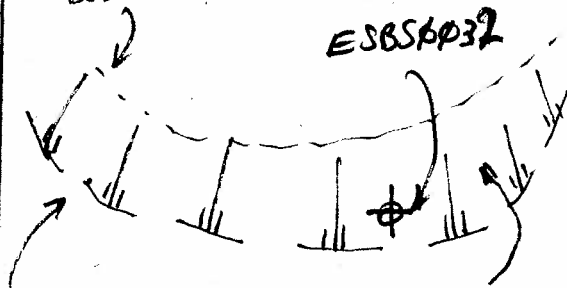


MONTGOMERY WATSON

PISTOL RANGE

Base of Berm

ESBS0032



Top of Berm

Site Sketch Map

Pistol Range

Berm

Boring #: ~~ESBS0031~~ MD Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

Job #: 1891263/1891264

Site: SSFL

Logged By: M DAVIS

Reviewed By: SRV

Drilling Contractor: N/A

Drill Rig Type/Method: Hand Auger

Drillers Name: A Felix

Borehole Diam./Drill Bit Type:

3" Ø

Total Depth

5.5

Ref. Elev.

Sampler Type: Hand Auger

Depth to 1st Water (Σ): N/A

Time/Date: N/A

Drill Start Time/Date: 1100 Drill Finish Time/Date: 1135

Depth to Water After Drilling (Σ):

Time/Date: N/A

Well Completion Time/Date: N/A

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date:

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
5.0							1	ML	Yellowish brown (10YR 4/4) clayey SILT w/ minor fine sand (moist, soft)				10	90
							2							
							3							
							4							
3.0							5		TD = 5.5'					
5.0							6							
							7							
							8		No Lead Projectiles observed in soil cuttings					
							9		This Boring excavated horizontally.					
							10		(Top of Berm)					
							11		Pistol Range					
							12							

1130  
501  
201

QAWC

Date: 04/08/07



MONTGOMERY WATSON

Boring #: **ESBS 0033**

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

Job #: 1891263/1891264

Site: SSFL

Logged By: **M DAVIS**Reviewed By: **SRV**Drilling Contractor: **N/A**Drill Rig Type/Method: **Hand Age**Drillers Name: **A FELIX**

Borehole Diam./Drill Bit Type:

**3" Ø**

Total Depth

**5.5**

Ref. Elev.

Sampler Type: **Hand Age**Depth to 1st Water (▽): **N/A**Time/Date: **N/A**Drill Start Time/Date: **1145** Drill Finish Time/Date: **1215**

Depth to Water After Drilling (▽):

Time/Date: **N/A**Well Completion Time/Date: **N/A**Depth to other Water Bearing Zones: **N/A**

Surface:

Soil Boring Backfill Time/Date: **1220**

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
									Moderate growth of weeds & grasses					
									Soil Description					
									Yellowish brown (10YR 5/4)					
2.5							1	ML	Anc sandy SILT (moist, no (dry, soft - med stiff)				30	70
							2							
							3							
							4							
							5							
2.0			5.0				5							
			5.5				6		TD = 5.5'					
							7		No lead projectiles observed in soil cuttings					
							8							
							9							
							10		This boring excavated vertically (stake placed on flat ground above berm)					
							11							
							12							

1215  
sol



MONTGOMERY WATSON

NTS



Date: 04/03/07

Boring #: ESBS 0034

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

Job #: 1891263/1891264

Site: SSFL

Logged By: m DAVI

Reviewed By: SRV

Drilling Contractor: N/A

Drill Rig Type/Method: Hard Angle

Drillers Name: A Felix

Borehole Diam./Drill Bit Type:

3"  $\phi$ 

Total Depth

5.5

Ref. Elev.

Sampler Type: Hard Angle

Drill Start Time/Date: 1330 Drill Finish Time/Date: 1400

Well Completion Time/Date: N/A

1400

Soil Boring Backfill Time/Date:

1405

Depth to 1st Water ( $\nabla$ ): N/A

Time/Date: N/A

Depth to Water After Drilling ( $\nabla$ ):

Time/Date: N/A

Depth to other Water Bearing Zones: N/A

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
									Surface: Moderate growth of weeds & grasses.					
							0.75	ML	Brown (10YR 4/3) fine sandy SILT (dry, soft)				25	75
3.0							2	ML	Dk. yellowish brown (10YR 4/4) fine sandy silt, slightly moist, soft-med stiff				25	75
3.5							4	CL	Yellowish Red 5YR 4/6 silty clay					
3.5							5	ML	clayey silt (moist, med stiff) w/ minor fine sand				10	90
							5.5	MD						
							6							
							7							
							8							
							9							
							10		TO 5.5'					
							11		NO lead projectiles observed in soil cuttings.					
							12							

Firing Line

ESBS 0034

Pistol Range

Base of slope

Site Sketch Map

Beam

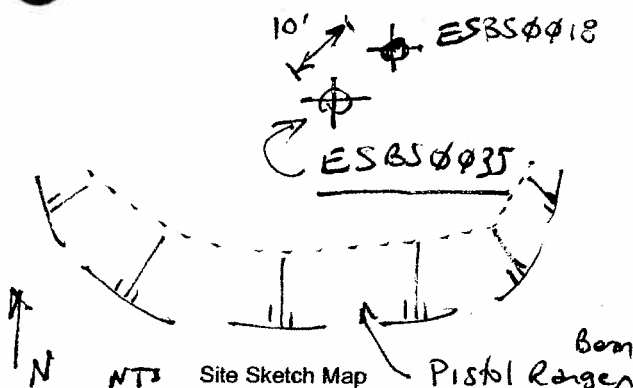
1400  
S&I  
0151

QA/QC

Date: 04/03/07



Pistol Range Firing Line  
MONTGOMERY WATSON



Boring #: ESBS0035

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

Job #: 1891263/1891264

Site: SSFL

Logged By: M DAVIS

Reviewed By: SRV

Drilling Contractor: N/A

Drill Rig Type/Method: Hand Auger

Drillers Name: A Felix

Borehole Diam./Drill Bit Type:

3" Ø

Total Depth

5.5

Ref. Elev.

Sampler Type: Hand Auger

Depth to 1st Water (▽): N/A

Time/Date: N/A

Drill Start Time/Date: 0940 Drill Finish Time/Date: 1030

Depth to Water After Drilling (▽):

Time/Date: N/A

Well Completion Time/Date: N/A

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: 1030

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Coarse	Medium	Fine	Silt/clay
5.5							0.5	GP	Surface - minor weeds + grasses, fine gravel					
							1		Brown (10YR 4/3) sandy GRNVL (dry, loose). Gravel is angular to subangular	70		15	15	
							2							
							3	ML	Dk. yellowish brown (10YR 4/6) fine sandy SILT (moist, med. comp.)				30	
6.0							4		Minor white (10YR 8/1) calcium carbonate nodules					
5.8							5							
							6		Moisture content increasing w depth. Calcium carbonate nodules increasing w/ depth.					
							7		TD = 5.5'					
							8							
							9		No lead projectiles observed in soil cuttings					
							10							
							11							
							12							

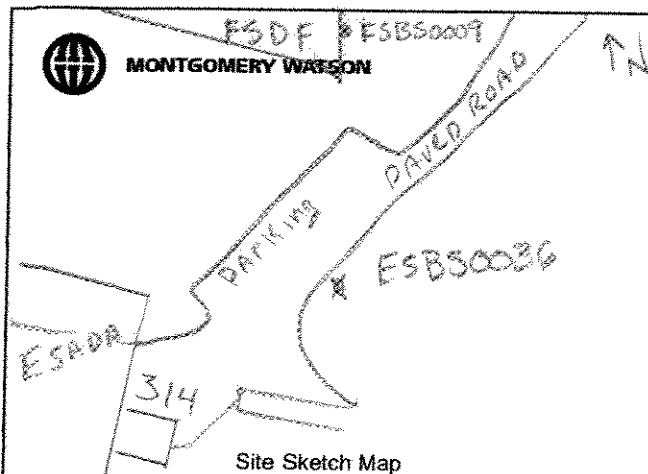
Sol 1030

QA/QC

Date: 4-3-07



MONTGOMERY WATSON



Site Sketch Map

Boring #: ESBS0036 Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

Job #: 1891263/1891264 Site: SSFL

Logged By: Newison Reviewed By: SRV

Drilling Contractor:

Drill Rig Type/Method:

Drillers Name: Baumgardner

Borehole Diam./Drill Bit Type:

Total Depth

Ref. Elev.

Sampler Type: slide hammer - hand auger

Depth to 1st Water (▽): N/A Time/Date: N/A

Drill Start Time/Date: 4-3-07 Drill Finish Time/Date: 4-3-07

Depth to Water After Drilling (▽): Time/Date: N/A

Well Completion Time/Date: N/A

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: 4-3-07

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Coarse	Medium	Fine	Silt/clay
1445	0	<input checked="" type="checkbox"/>					1	CL	Fill: Sandy clay (CL), Brown (10YR 4/3) fine-to-medium, stiff, damp.			10	20	70
							2							
	0						3		Alluvium: silty clay (CL), dark brown (10YR 3/3), very stiff, damp. Abundant calcium carbonate veinlets.				5	95
							4							
1452	0	<input checked="" type="checkbox"/>					5							
							6							
							7	CL	Sandy clay (CL), dark brown (10YR 3/3), stiff, damp. Manganese oxide staining, calcium carbonate nodules, well-sorted.	5		5	20	70
							8							
							9							
							10							
							11							
							12	SC	clayey sand (SC), yellowish brown (10YR 5/4), fine grained, med. dense, damp.			5	60	35

QVOC

ES BS0036

Boring #:

MW#:

Project:

Sheet 2 of 2

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Gravel	Estimated % Of Sand			Silt/Clay
							12	CL	Sandy clay (CL), light yellowish brown (10yr 6/4)				30	70
							13		20-30% Abundant carbonate					
							14	SC	stiff, moist, low plasticity clayey sand (SC), strong brown (7.5yr 4/4), Dense moist				Tr 60	40
							15		Bedrock at 14'. Refusal					
							16							
							17							
							18							
							19							
							20							
							1							
							2							
							3							
							4							
							5							
							6							
							7							
							8							
							9							
							0							
							1							
							2							



MONTGOMERY WATSON

Date: 5/15/07

Boring #: ESBS0038

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

1891306.0111811/

Job #: 1891307.0111811

Site: SSFL

Logged By: Ben Myardner

Reviewed By: SRV

Drilling Contractor:

Drill Rig Type/Method:

Drillers Name: Seaver

Borehole Diam./Drill Bit Type:

3"

Total Depth

5.5'

Ref. Elev.

Sampler Type: hand auger - slide hammer

Drill Start Time/Date: 5/15/07 11:29

Drill Finish Time/Date: 5/15/07 1:51

Well Completion Time/Date: N/A

Soil Boring Backfill Time/Date: 5/15/07 12:01

Depth to 1st Water (V): N/A

Time/Date: N/A

Depth to Water After Drilling (V):

Time/Date: N/A

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: 5/15/07 1201														
PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
34	1						1	ML	Clayey Silty, Brown (10YR 4/3), trace fine sand, damp, med. stiff.				5	95
	2						2	CL	Silty clay Strong Brown (7.5YR 4/2), damp, med. stiff.					100
	3						3							
8	4						4	SC	Clayey fine Sand Strong Brown (7.5YR 4/2), damp, med. dense.				70	30
	5						5							
	6						6		Refusal on bedrock @ 5.5'					
	7						7							
	8						8							
	9						9							
	10						10							
	11						11							
	12						12							

QA/QC





MONTGOMERY WATSON

Date: 5-15-07

Boring #: ESBS0039

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

1891306.0111811/

Job #: 1891307.0111811

Site: SSFL

Logged By: Baumgardner Reviewed By: SRV

Drilling Contractor:

Drill Rig Type/Method:

Drillers Name: Seaver

Borehole Diam./Drill Bit Type:

3"

Total Depth

7.75'

Ref. Elev.

Site Sketch Map

Depth to 1st Water (V): N/A

Time/Date: N/A

Depth to Water After Drilling (V):

Time/Date: N/A

Depth to other Water Bearing Zones: N/A

Sampler Type:

Drill Start Time/Date: 5/15/07 0851 Drill Finish Time/Date: 5/15/07 0942

Well Completion Time/Date: N/A

Soil Boring Backfill Time/Date: 5/15/07 0946

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
							1	ML	clayey silt, yellow (12.48' to 13'), trace fine grained sand, damp, med stiff.				5	75
							2							
							3							
							4							
							5		fine grained sand, damp, med.		20	40	40	
							6	ML	sandy silt, yellowish brown (10' to 11'), damp, med stiff.		10	25	65	
							7							
							8		Refusal on bedrock @ 7.75'					
							9							
							10							
							11							
							12							

QA/QC



MONTGOMERY WATSON

Date: 5-15-07

Boring #: E SBS0040

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

1891306.0111811/

Job #: 1891307.0111811

Site: SSFL

Logged By: Baumgardner

Reviewed By: SRV

Drilling Contractor:

Drill Rig Type/Method:

Drillers Name: Soaver

Borehole Diam./Drill Bit Type:

Total Depth

8.0'

Ref. Elev.

Sampler Type: Hand auger - Slide hammer

Drill Start Time/Date: 5/15/07 0823

Drill Finish Time/Date: 5/15/07

Well Completion Time/Date: N/A

Soil Boring Backfill Time/Date: 5/15/07 0831

Site Sketch Map

Depth to 1st Water (V): N/A

Time/Date: N/A

Depth to Water After Drilling (V):

Time/Date: N/A

Depth to other Water Bearing Zones: N/A

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
	<input checked="" type="checkbox"/>						5.0'	ML	Clayey silt, Brown (10YR 4/3), face fine sand damp, med. stiff.				5	95
							1							
							2	ML	Sandy silt, Very pale brown (10YR 7/1), fine grained, damp, med. stiff.				30	70
							3							
							4	sc	Clayey fine sand, light yellowish brown (10YR 6/6), damp, med. dense.				65	35
							5							
							6							
							7	ML	Clayey fine sand, light yellowish brown (10YR 6/6), damp, med. dense.				70	30
	<input checked="" type="checkbox"/>						8		Refused at 11.0' - 12.0'					
							9							
							10							
							11							
							12							

QA/QC

Date: 05/16/87



MONTGOMERY WATSON

Firing Line

Pistol Range

RD-50 - ~~ESBS~~ 041

Site Sketch Map N.T.S.

Boring #: ESBS ~~041~~

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

1891306.0111811/

Job #: 1891307.0111811

Site: SSFL

Logged By: M Davis

Reviewed By: SRV

Drilling Contractor: N/A

Drill Rig Type/Method: Hand Auger

Drillers Name: R Gibson

Borehole Diam./Drill Bit Type:

3' 4" Hand Auger

Total Depth

11.0

Ref. Elev.

Sampler Type: Hand Auger

Depth to 1st Water (V): N/A

Time/Date: N/A

Depth to Water After Drilling (V):

Time/Date: N/A

Depth to other Water Bearing Zones:

N/A

Drill Start Time/Date: 0730 Drill Finish Time/Date: 0830

Well Completion Time/Date: N/A

Soil Boring Backfill Time/Date: 0830

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
SO1 0740	1.2		0.3	X			1	ML	Surface: moderate weeds, shrubs Yellowish brown (10YR 5/4) clayey silt w/ fine sand, dry, med dense				15	85
							2							
							3	ML	Light yellowish brown (10YR 6/4) fine sandy silt w/ clay, (dry, med dense) w/ minor - mod calcium carbonate veinlets				30	70
3.2							4							
							5							
							5.5							
							6	ML	Light yellowish brown (10YR 6/4) clayey silt w/ fine sand, (moist, stiff - v. stiff) minor - mod calcium carbonate veinlets				15	85
							7							
							8		becoming hard w/ depth					
							9							
SO2 (0820)	1.0	9.5	10.0	X			10							
							11		TD 11.0' Ft Refusal or bedrock					
							12							

QW/QC



MONTGOMERY WATSON

Date: 5-14-07

Boring #: ESB50042

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

Job #: 1891306.0111811/

Site: SSFL

Job #: 1891307.0111811

Logged By: *Burton G. Dyer*

Reviewed By: SRV

Drilling Contractor:

Drill Rig Type/Method:

Drillers Name: *SEAN CR*

Borehole Diam./Drill Bit Type:

Total Depth

9.25

Ref. Elev.

Sampler Type: *hand auger / slide hammer*

Drill Start Time/Date: *12:51* 5-14-07 Drill Finish Time/Date: *1346* 5-14-07

Well Completion Time/Date: N/A

Soil Boring Backfill Time/Date: 5-14-07 1349

Site Sketch Map

Depth to 1st Water (V): N/A

Time/Date: N/A

Depth to Water After Drilling (V):

Time/Date: N/A

Depth to other Water Bearing Zones: N/A

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
12.59	12.6						1	SC	Sandy Clay, Brown (10YR 4/3), fine to medium grained sand, damp, med. stiff.			10	25	65
	16.0						2	ML	Clayey Sand, light Brown (10YR 4/3), fine to medium grained sand, damp, med. stiff; some calcareous carbonate concretions @ 2.5'			15	20	65
	10.6						3							
							4							
							5							
							6							
22	6.1						7	SC	Silty Clay, Yellowish Brown (10YR 5/6), trace fine sand, damp, stiff.					95
							8	SC	Clayey Sand, Yellowish Brown (10YR 5/6), damp, med. dense; some calcareous carbonate concretions and nodules			10	55	35
							9							
							10							
							11							
							12							

QA/QC



MONTGOMERY WATSON

Date: 5-5-07

Boring #: E880043

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

1891306.0111811/

Job #: 1891307.0111811

Site: SSFL

Logged By: Baumgardner

Reviewed By: SRV

Drilling Contractor:

Drill Rig Type/Method:

Drillers Name: Seaver

Borehole Diam./Drill Bit Type:

3"

Total Depth

10.5'

Ref. Elev.

Sampler Type: Hand Auger Slide Hammer

Drill Start Time/Date: 5/15/07 1112

Drill Finish Time/Date: 5/15/07

Well Completion Time/Date: N/A

Soil Boring Backfill Time/Date: 5/15/07 1120

Site Sketch Map

Depth to 1st Water (V): N/A

Time/Date: N/A

Depth to Water After Drilling (V):

Time/Date: N/A

Depth to other Water Bearing Zones: N/A

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
	<input checked="" type="checkbox"/>						1	ML	Clayey Silt, Brown (10YR 4/2), trace fine sand, dark red dirt.				5	95
							2							
							3							
							4							
							5	ML	Sandy Silt, Brown (10YR 4/2), fine to medium sand, damp and loose.		15	25	60	
							6	CL	Silty clay, Strong Brown (10YR 4/6), damp red dirt, fine to medium sand.					100
							7							
							8							
							9	SC	Clayey sand, Strong Brown (10YR 4/6), damp red dirt, fine to medium sand.				60	35
	<input checked="" type="checkbox"/>						10	SC	Refined, light brown sand.					
							11							
							12							

QA/QC

Date: 2-20-07



Boring #: ESSV0003

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

1891263.0111811/

Job #: 1891264.0111811

Site: SSFL

Logged By: NEVISON

Reviewed By: SRV

Drilling Contractor: HydroGeo Spectrum

Drill Rig Type/Method: Geo Probe

Drillers Name: Alex

Borehole Diam./Drill Bit Type:

Total Depth

7.5

Ref Elev.

Sampler Type: N/A

Depth to 1st Water (V): N/A 03 Time/Date: N/A

Drill Start Time/Date: 2-20-07 1109 Drill Finish Time/Date: 2-20-07 1116

Depth to Water After Drilling (V): Time/Date: N/A

Well Completion Time/Date: N/A 2-20-07 1120

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: 1120

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
									Surface: Vegetation					
							1		NO Samples / No logging					
									Install Vapor probes					
							2							
							3		benseal 0-2.5					
									3.5' Brown probe 2.5-3.5					
							4		benseal 3.5-6.5					
							5							
							6							
									sand 6.5-7.5					
							7		7.5' Yellow probe 6.5-7.5					
							8		Bedrock @ 7.5' Refusal					
							9							
							10							
							11							
							12							



Date: 2-20-07



Boring #: ESSV0005 Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

1891263.0111811/

Job #: 1891264.0111811

Site: SSFL

Logged By: NEVISON

Reviewed By: SRV

Drilling Contractor: Hydro Geo Spectrum

Drill Rig Type/Method: Geo probe

Drillers Name: Alex

Borehole Diam./Drill Bit Type:

1 1/4"

Total Depth:

9'

Ref. Elev.

Sampler Type: N/A

Depth to 1st Water (V): N/A 05 Time/Date: N/A

Drill Start Time/Date: 2-20-07 1048 Drill Finish Time/Date: 2-20-07 1051

Depth to Water After Drilling (V): Time/Date: N/A

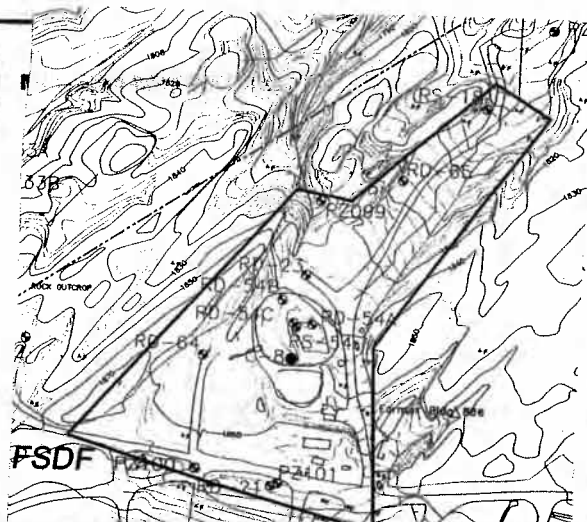
Well Completion Time/Date: N/A 2-20-07 1055

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: 1055

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
									Surface: Vegetation					
									No Samples / No logging					
							1		Install vapor probes					
							2							
							3							
							4		benseal 0-3					
							4		4' Brown Probe 3-4					
							5		Sand 3-4					
							5		benseal 4-7.5					
							6							
							7							
							7		Sand 7.5-9					
							8		8' Yellow probe 7.5 8.5					
							9							
							9		Bedrock @ 9' Refusal					
							10							
							11							
							12							

Date: 2-20-07



Project: Group 8 RFI Data Gap Sampling

1891263.0111811/

Job #: 1891264.0111811

Site: SSFL

Logged By: NEVISON

Reviewed By: SRV

Drilling Contractor: Hydro GeoSpectrum

Drill Rig Type/Method: Geoprobe

Drillers Name: Alex

Borehole Diam./Drill Bit Type:

Total Depth

10.5

Ref. Elev.

Sampler Type: N/A

Depth to 1st Water (V): N/A 04 Time/Date: N/A

Drill Start Time/Date: 2-20-07 10:39 Drill Finish Time/Date: 2-20-07 10:42

Depth to Water After Drilling (V): Time/Date: N/A

Well Completion Time/Date: N/A 2-20-07 10:45

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: 10:45

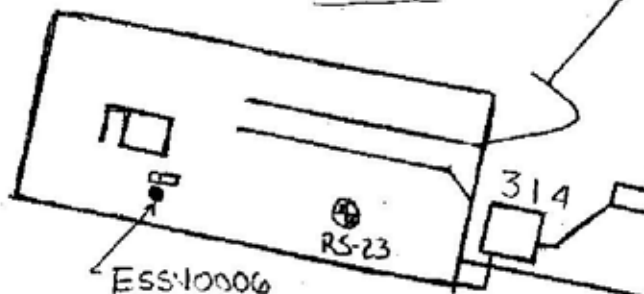
Soil Logging Worksheet										1043				
PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
									Surface : Vegetation					
									NO samples / NO Logging					
							1		Install Vapor probe					
							2							
							3							
							4		benseal 0-4					
									sand 4-5					
							5		5' brown Probe 4-5					
									benseal 5-9					
							6							
							7							
							8		SAND 9-10.5					
									10' yellow probe 9-10.0					
							9							
							10							
							11		Bedrock @ 10.5 Refusal					
							12							





MONTGOMERY WATSON

ESADA



Site Sketch Map

ESSV0006

2-20-07

Boring #: MW#: Sheet 1 of

Project: Group 8 RFI

Job #: 1891263.0111811 Site: SSFL

Logged By: Nelson Reviewed By: SRV

Drilling Contractor: HydroGeo Spectrum

Drill Rig Type/Method: Geo probe

Drillers Name: Alex

Borehole Diam./Drill Bit Type:

Total Depth

4.5

Ref. Elev.

1 1/4"

Sampler Type: N/A

Depth to 1st Water (V): Time/Date:

2-20-07 2-20-07

Drill Start Time/Date: 1123 Drill Finish Time/Date: 1150

Depth to Water After Drilling (V): Time/Date:

Well Completion Time/Date: 2-20-07 1155

Depth to other Water Bearing Zones:

Soil Boring Backfill Time/Date: 2-20-07 1156

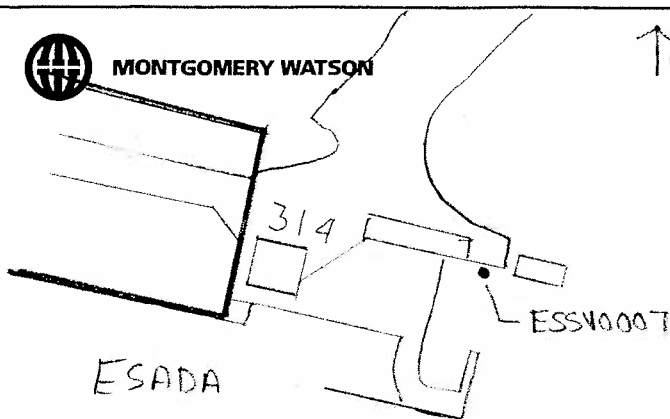
PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
									Surface: Vegetation					
									NO Samples / No Logging					
									Install Vapor probes					
							1							
							2							
							3		4 Attempts in 20' Area					
							4		Refusal at:					
									Attempt #1 6"					
									#2 6"					
									#3 2'					
									#4 4.5'					
							5							
							6		INSTALL Probe:					
									Benseal 0-3.5					
									4.5' Brown Probe 3.5-4.5					
									Sand 3.5-4.5					
							7							
							8							
									Bedrock @ 4.5'					
							9							
							10							
							11							
							12							

ESSV0007

2-20-07



MONTGOMERY WATSON



Site Sketch Map

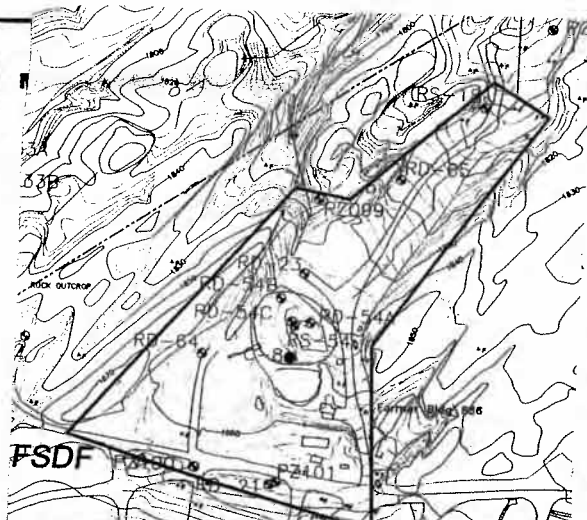
Boring #:	MW#:	Sheet	1	of	1
Project: Group 8 RFI					
Job #: 1891263.0111811 Site: SSFL					
Logged By: NEVISON Reviewed By: SRV					
Drilling Contractor: Hydro GeoSpectrum					
Drill Rig Type/Method: Geoprobe					
Drillers Name: ALO					
Borehole Diam./Drill Bit Type:				Total Depth	7.5
				Ref. Elev.	

Sampler Type: N/A

Depth to 1st Water (Σ):	Time/Date:	Drill Start Time/Date: 2-20-07	Drill Finish Time/Date: 2-20-07
Depth to Water After Drilling (Σ):	Time/Date:	Well Completion Time/Date: 2-20-07	
Depth to other Water Bearing Zones:		Soil Boring Backfill Time/Date: 2-20-07	

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
									Surface: Vegetation					
									NO Samples / NO Logging					
									Install vapor probes					
							1							
							2							
							3		benseal 0-2.5					
									3.5' BROWN Probe 2.5-3.5					
									benseal 3.5-6.5					
							4							
							5							
							6							
							7		Sand 6.5-7.5					
									7.5' Yellow Probe 6.5-7.5					
							8		Bedrock @ 7.5. Refusal					
							9							
							10							
							11							
							12							

Date: 2-20-07



Boring #: ESSV0009

Sheet 1 of 1

Project: Group 8 RFI Data Gap Sampling

1891263.0111811/

Job #: 1891264.0111811

Site: SSFL

Logged By: Nevison Reviewed By: SRV

Drilling Contractor: Hydro GeoSpectrum

Drill Rig Type/Method: Geoprobe

Drillers Name: Alex

Borehole Diam./Drill Bit Type:

1 1/4"

Total Depth

10.5

Ref. Elev.

Sampler Type: N/A

Depth to 1st Water (V): N/A

Time/Date: N/A

Drill Start Time/Date: 2-20-07 1101

Drill Finish Time/Date: 2-20-07 1105

Depth to Water After Drilling (V):

Time/Date: N/A

Well Completion Time/Date: N/A

2-20-07

1108

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date:

1108

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of				
										Gravel	Sand			Silt/clay
											Coarse	Medium	Fine	
									Surface: Vegetation					
							1		No Samples / No Logging					
									Install Vapor probes					
							2							
							3							
							4		benseal 0-4					
							5		5' Brown probe 4-5					
									Sand 4-5					
							6		benseal 5-9					
							7							
							8							
							9		sand 9-10.5					
									10' yellow probe 9-10					
							10							
							11		Bedrock @ 10.5, Refusal					
							12							

## **TRENCH LOGS**

Project Name <b>DE</b>		Project Number <b>313150004</b>		Elevation <b>1600</b>		FIELD TRENCH Location <b>ESADA</b>		Sheet <b>1</b> of <b>1</b>	
Trench Number <b>EST501</b>		Operator <b>MRD</b>		Date and Time Started <b>9/24/99;</b>		Date and Time Completed <b>9/24/99; 1600</b>		Refusal? (Circle One) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If Yes Depth =	
Equipment Supplier <b>TYPE</b>		Trench Orientation <b>N45W &amp; N70W</b>		Total Depth <b>6'</b>		Total Number of Samples <b>0</b>		Photo (Circle One) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> No.	
Equipment Type <b>CASE SBDL HOE</b>		Trench Width <b>2.5'</b>		No. of Samples <b>-</b>		Bulk <b>-</b>		Grab <b>-</b>	
Bucket Width <b>2</b>		Trench Length		Drive <b>-</b>		Hand Auger <b>-</b>		% Man-Made Debris <b>0</b>	
Geologist or Hydrogeologist/Date				Checked by/Date				Wall of Trench Shown (Circle One) N S E W <input checked="" type="checkbox"/> NE NW SE SW	

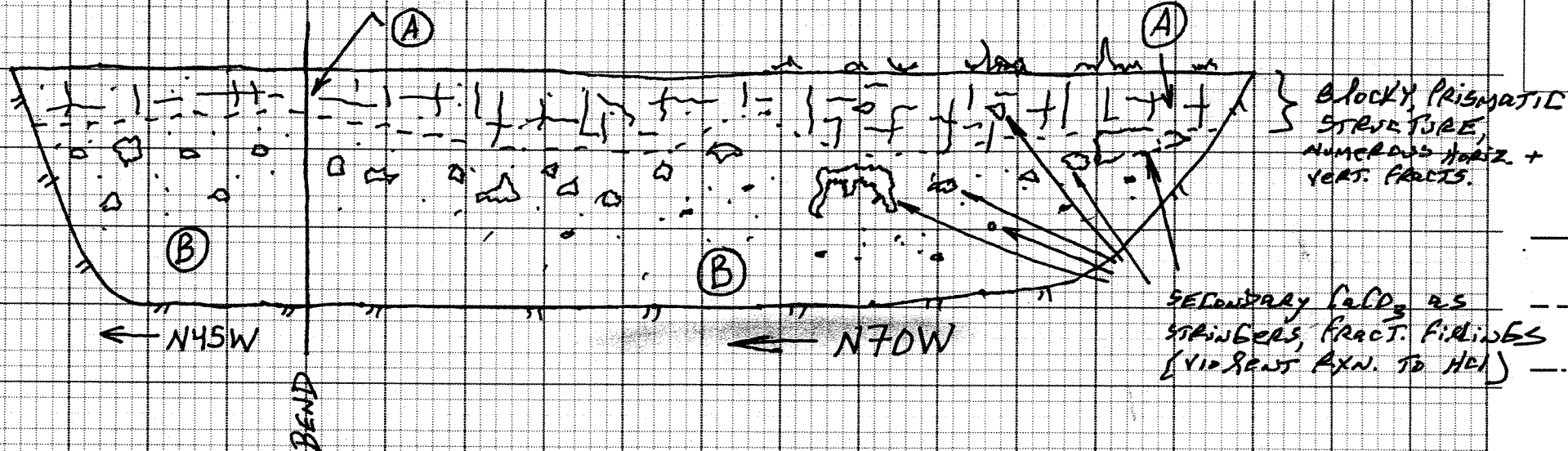
# OGDEN

Plan View-Site Location  
(Provide Sketch)

LENGTH (FEET)

ENTER TRENCH DIRECTION

SCALE: 1" = 8' H  
1" = 4' V



## EXPLANATION

- SOIL TYPE CONTACT (SHARP)
- OTHER CONTACT (AS INDICATED ON LOG)
- FILL/NATIVE BOUNDARY
- X ANALYTICAL SAMPLE LOCATION (WRITE SAMPLE NUMBER OUT TO SIDE)
- G GEOTECHNICAL SAMPLE LOCATION (WRITE SAMPLE NUMBER OUT TO SIDE)
- //// SHADING TO DENOTE STAINING
- //// BASE OF EXCAVATION
- SHOW LOCATIONS AND TYPES OF ALL MAJOR DEBRIS

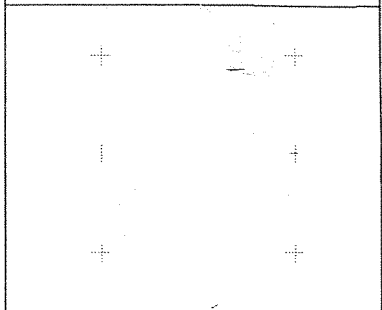
UNIT ④: SANDY CLAY (CL); BROWN (10 YR 4/3); DRY; V. STIFF-  
HARD; BLOCKY, PRISMATIC STRUCTURE; MED. PLAST.;  
HIGH DRY STR.; SLIGHTLY DARKER THAN UNIT ③  
BELOW [A/UPPER B HORIZON, NATIVE SOIL]; MANGANESE/CARBON  
STAINING ON FRACT. SURFS., LOCALLY; SOME SECONDARY CALICHE AS FRACT.  
FILLINGS & STRINGERS.

UNIT ③: CLAYEY SAND (SC); DK. YER. BROWN (10 YR 4/3); MOIST; MED. DENSE; F-M. GR.;  
VISIBLE (PINHOLE-SIZE) POROSITY; ABUNDANT CALICHE LOCALLY AS STRINGERS  
& FRACT. FILLINGS; [B-HORIZON], NATIVE SOIL; NO ADAR, & NO STAINING

Project Name			FIELD TRENCH		
Trench Number <b>EST502</b>	Project Number <b>313150004</b>	Elevation <b>4.0m</b>	Location <b>ESADA</b>		Sheet <b>1</b> of <b>1</b>
Equipment Supplier	Operator <b>MAT</b>	Date and Time Started	Date and Time Completed <b>9/24/99; 1630</b>		Refusal? (Circle One) Yes <input type="radio"/> No <input checked="" type="radio"/> If Yes Depth =
Equipment Type	Trench Orientation	Total Depth <b>4'</b>	Total Number of Samples <b>0</b>		Photo (Circle One) Yes <input checked="" type="radio"/> No <input type="radio"/> No.
Bucket Width	Trench Length	Trench Width <b>3.5'</b>	No. of Samples	Bulk <input type="checkbox"/>	% Man-Made Debris <b>0</b>
Geologist or Hydrogeologist/Date <b>D. BARRIE</b>		Checked by/Date			Wall of Trench Shown (Circle One) N <input checked="" type="radio"/> S <input type="radio"/> E <input type="radio"/> NE <input type="radio"/> NW <input type="radio"/> SE <input type="radio"/> SW



Plan View-Site Location  
(Provide Sketch)



#### EXPLANATION

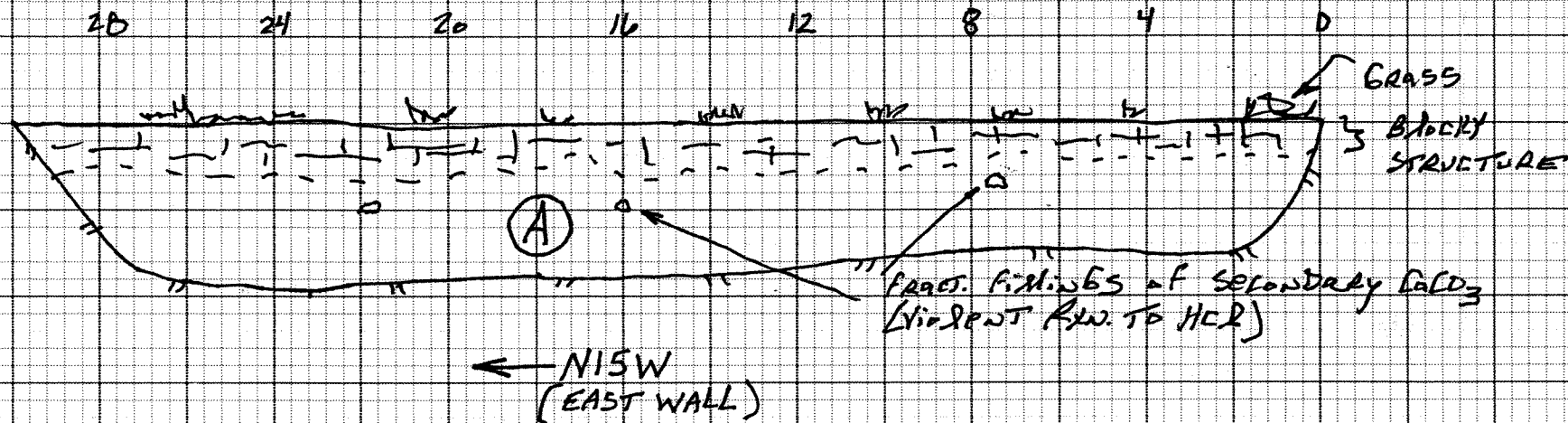
- SOIL TYPE CONTACT (SHARP)
- OTHER CONTACT (AS INDICATED ON LOG)
- FILL/NATIVE BOUNDARY
- X** ANALYTICAL SAMPLE LOCATION (WRITE SAMPLE NUMBER OUT TO SIDE)
- G** GEOTECHNICAL SAMPLE LOCATION (WRITE SAMPLE NUMBER OUT TO SIDE)
- SHADING TO DENOTE STAINING
- BASE OF EXCAVATION
- SHOW LOCATIONS AND TYPES OF ALL MAJOR DEBRIS

LENGTH (FEET)

ENTER TRENCH DIRECTION

SCALE: **1" = 4' H & V**

DEPTH (FEET)



UNIT **A**: CLAYEY SAND (SC); DAY-MAIST; DR. YEL. BAN (10 YR HL);  
V. STIFF-HARD; BLOCKY STRUCT. IN UPPER 0.5-1';  
SL. MORE ORGANIC (i.e., DARKER-COLORED) IN UPPER 0.5';  
[NATIVE SOIL]; NO EVID. OF STAINING OR DISCOLORATION



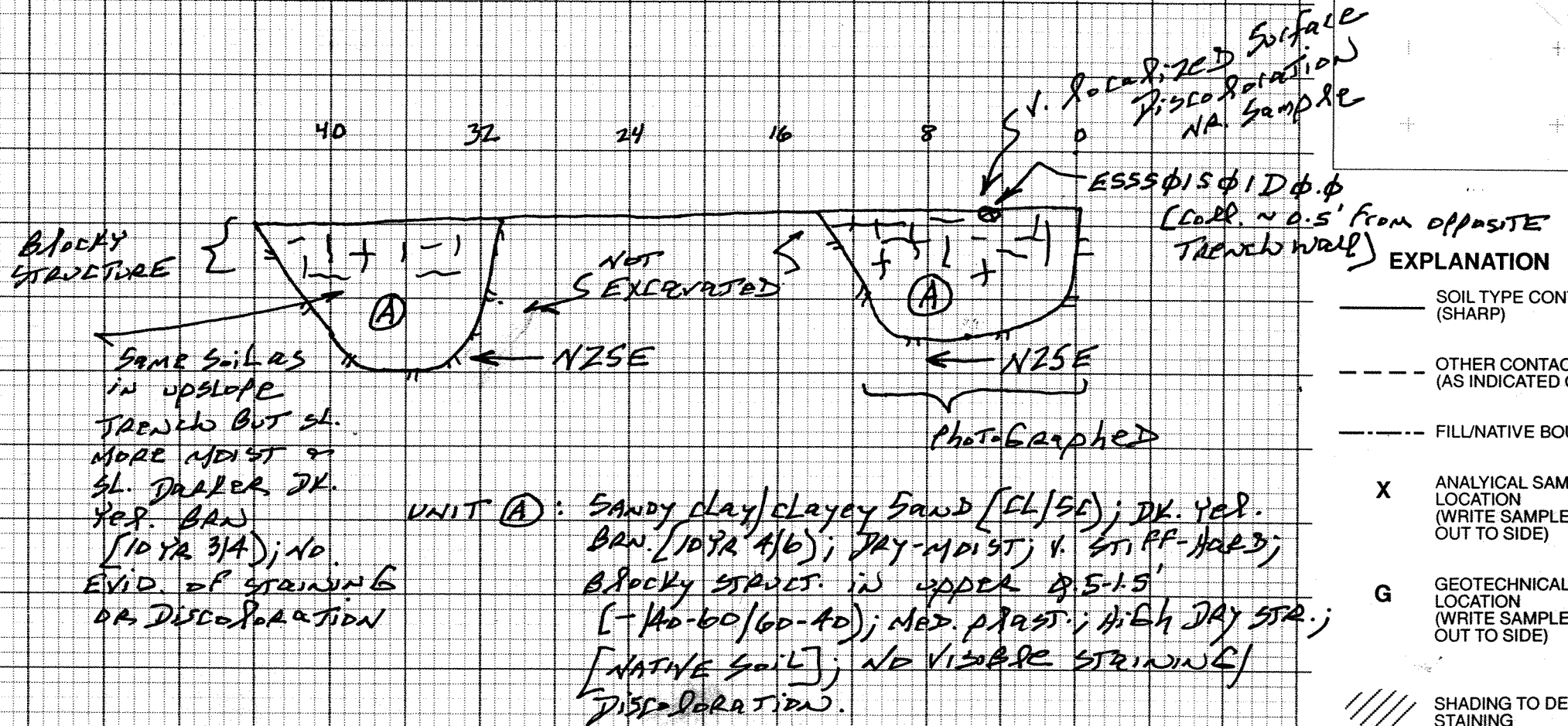
Project: <b>DOE</b>		FIELD TRENCH LOG	
Trench Number: <b>EST503</b>	Project Number: <b>31350004</b>	Location: <b>ESADA</b>	Sheet: <b>1</b> of <b>1</b>
Equipment Supplier: <b>TYLER</b>	Operator: <b>MATT</b>	Date and Time Started: <b>9/24/99; 1630</b>	Date and Time Completed: <b>9/24/99; 1730</b>
Equipment Type: <b>LARGE S&amp;D H&amp;E</b>	Trench Orientation: <b>N25E</b>	Total Depth: <b>4'</b>	Total Number of Samples: <b>1</b>
Bucket Width: <b>2'</b>	Trench Length: <b>44'</b>	Trench Width: <b>3.5'</b>	No. of Samples: <b>1</b>
Geologist or Hydrogeologist/Date: <b>D. BARRIE</b>		Checked by/Date:	



Plan View-Site Location  
(Provide Sketch)

LENGTH (FEET)

ENTER TRENCH DIRECTION  
SCALE: **1" = 8' H**  
**1" = 4' V**



- EXPLANATION**
- SOIL TYPE CONTACT (SHARP)
  - OTHER CONTACT (AS INDICATED ON LOG)
  - FILL/NATIVE BOUNDARY
  - X ANALYTICAL SAMPLE LOCATION (WRITE SAMPLE NUMBER OUT TO SIDE)
  - G GEOTECHNICAL SAMPLE LOCATION (WRITE SAMPLE NUMBER OUT TO SIDE)
  - SHADING TO DENOTE STAINING
  - BASE OF EXCAVATION
  - SHOW LOCATIONS AND TYPES OF ALL MAJOR DEBRIS

## WELL LOGS



## GROUNDWATER RESOURCES CONSULTANTS, INC.

TABLE A-143

## LITHOLOGIC LOG OF MONITOR WELL RD-50

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 4	SANDY CLAY	Dark brown, trace fine-grained sand, loose, low plasticity, slightly moist.
4 - 10	SILTY CLAY	Reddish brown, trace sand, compact, moderate plasticity, slightly moist.
10 - 195	SANDSTONE	<p>Buff, trace silt, fine-grained, very slightly calcareous, poorly graded, subrounded, compact, weak cementation, slightly moist.</p> <p>@ 14' dense, moderate cementation.</p> <p>@ 22' grey brown, very calcareous, moderate to strong cementation, dry.</p> <p>@ 35' light brown, slightly calcareous.</p> <p>@ 56' slightly moist.</p> <p>@ 58' dry.</p> <p>@ 64' non-calcareous, silty.</p> <p>@ 82' grey brown, decreasing silt content, slightly coarser.</p> <p>@ 114' blue grey, very calcareous, strong cementation.</p> <p>@ 145' wet (first groundwater, 5-10 gpm).</p> <p>@ 160' groundwater production increases with depth.</p> <p>@ 168' cementation increasing.</p> <p>@ 190-193' weak cementation.</p>

TOTAL DEPTH OF BOREHOLE = 195 FEET

GROUNDWATER RESOURCES CONSULTANTS, INC.

TABLE A-34

LITHOLOGIC LOG OF MONITOR WELL RS-23

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 6.5	SILTY CLAY	Light brown, low plasticity, soft, slightly moist.
6.5 - 10.0	SILTY CLAY	Mottled light brown and light grey, moderately plastic, firm, slightly moist.
10.0 - 13.0	SILTY SAND (WEATHERED CHATSWORTH FORMATION)	Very light brown, cementation increasing with depth, slightly moist.
At 13.0 feet, Chatsworth Formation.		

TOTAL DEPTH OF BOREHOLE: 13.0 FEET

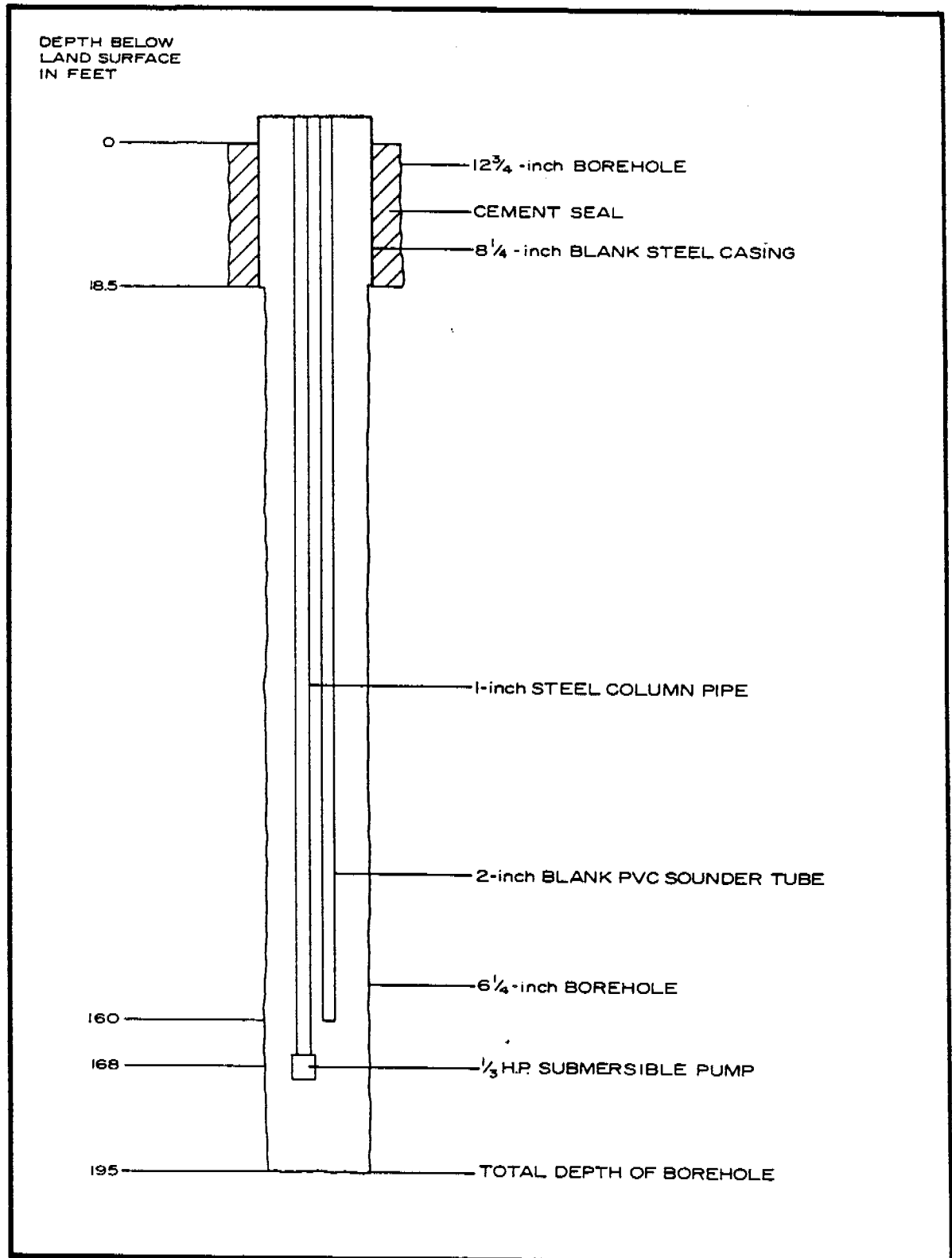


FIGURE E-68  
SCHEMATIC DIAGRAM OF MONITOR WELL RD-50

**APPENDIX C**

**ATTACHMENT C-3**

**DATA QUALITY, VALIDATION AND LABORATORY REPORTS  
(Electronic Copy)**

**APPENDIX C, ATTACHMENT C-3**  
**EMPIRE STATE ATOMIC DEVELOPMENT AUTHORITY AREA (SWMU 7.9)**  
**Electronic Copy of Validation Reports, COCs, and Case Narratives**  
**Readme File**

This Readme file contains information and instructions regarding the electronic copies of the Data Quality Report, validation reports, chain-of-custody forms, case narratives, and data tables Attachment C-3 of the *Group 8-Western Portion of Area IV RCRA Facility Investigation (RFI) Report Santa Susana Field Laboratory* (MWH 2007), and is provided electronically on the compact disc (CD) that comprises this attachment.

This read-only CD contains a summary data table and electronic copies of validation reports, chain-of-custody (COC) forms, and case narratives for samples collected at the ESADA RFI (SWMU 7.9). All data in the tables and documents included in this section were used for the RFI characterization and/or risk assessment of ESADA of the Group 8 – Western Portion of Area IV RFI Report.

There are four main components to this attachment (the Laboratory Data Quality Report, two folders and one summary data table):

**1. Data Quality Report**

This report was prepared to describe data quality of samples collected for the ESADA Group 8 Reporting Area.

**2. “Soil” Folder**

This folder contains sampling and analytical information for soil samples collected at the ESADA RFI Site. The folder is divided into two subfolders:

- **COC – Case Narratives:** This subfolder contains COCs, analytical request change forms (where applicable), and analytical report case narratives. The electronic files are scanned images of hard copy documents presented in Portable Document Format (PDF) files, which can be viewed using Adobe Acrobat software. The electronic files are grouped and organized in this subfolder by the sample delivery group (SDG) number, a tracking and reporting number used by the laboratory to group up to 20 samples upon receipt.

The COCs were generated in the field at the time of sample collection to document the handling and chain of custody for the samples.

The case narrative is text typically found at the beginning of the laboratory report. Laboratories use the case narrative to describe any deviation from standard handling or analytical procedures for a sample or SDG.

Change Forms are generated for samples subsequent to shipment to the laboratory. Generally, change forms were generated when changes or corrections to a COC were needed (e.g., when additional analyses were requested for a sample).

- **Validation Reports:** Validation reports include laboratory results and a data assessment form completed by AMEC Earth and Environmental, Inc. (AMEC) or MEC<sup>X</sup>, LLC (MEC<sup>X</sup>) data validators. The validation report summaries identify the analytical method and target compounds for each sample. Additionally, the report indicates whether each compound was detected, the concentration (or detection limit if not detected), and applicable laboratory and data validation qualifiers. With the exception of field QC samples (field blanks, equipment rinsates), all analytical data generated from background field samples were validated by AMEC or MEC<sup>X</sup>. Data validation report PDFs are sorted by their validation report numbers, which can be associated with results of interest in the ESADA Data Table (see description in section 4 below).

### **3. “Soil Vapor” Folder**

The Soil Vapor folder contains sampling and analytical information for soil vapor samples collected at ESADA RFI Site. The folder contains three subfolders:

- **COC – Case Narrative:** See the analogous description for this subfolder in the Soil Matrix section above.
- **Validation Reports:** See the analogous description for this subfolder in the Soil Matrix section

### **4. ESADA Data Table**

This table is a sampling and analytical results table for ESADA samples included in the ESADA RFI site characterization. The table is provided in PDF format. The data was queried from the SSFL database, which has been maintained throughout the history of the RFI program.

Results included in the ESADA RFI risk assessment are populated with a “yes” in the “Included in Risk Assessment” column of the table.

This table can be used as a correlation look-up table to make documents in this appendix easier to access.

The ESADA RFI Site Data Table is sorted (in order) by:

Matrix Type  
Collection Date  
Object Name  
Sample Identification  
Analytical Method  
Analyte

The structure and directions for use of this table is described below.

#### A. Table Structure

- **Object Name** –Identifier assigned to a unique location point. Samples collected at various depths at a single location will carry the same Object Name.
- **Sample Name** – Prior to June 15, 2006 this represented a unique 5 character identifier assigned in the field to samples to identify analytical laboratory and facilitate database management. For samples collected after June 15, 2006, a single unique ID was applied which substituted for both ‘Sample Name’ and “Sample Identification”. This new identifier is presented in both columns as it is more consistent with ‘Sample Identification’ conventions but also replaces the ‘Sample Name’ as the unique identifier.
- **Sample Identification** –Identification assigned to sample to denote RFI site, sample collection method and sample matrix type, sample location, and sample number. Naming conventions are described in Table 4-1 of the RCRA Facility Investigation Program Report (MWH 2004). For samples collected after June 15, 2006, this column is populated with the “Sample Name”.
- **Collection Date** – Date of sample collection.
- **Matrix** – Surficial sample matrix. See Sample Collection and Matrix Type section of Table 4-1 of the RFI Program Report (MWH, 2004).
- **Sample Type** – Sample type indicates whether the samples is a primary, field duplicate, or split sample. A more detailed description of the different sample types can be found in the Quality Assurance Project Plan (QAPP) contained in the RCRA Facility Investigation Work Plan Addendum Amendment (Ogden. 2000a ).
- **Result Type** – Result type indicates whether the results is a primary, a lab repeat analysis or a tentatively identified compound
- **Analytical Method** – Analytical method use to analyze sample.
- **Analyte** – Chemical for which the sample is analyzed.
- **Concentration** – The concentration of a detected analyte or, if the analyte was not detected, the appropriate detection limit for that analytical method.
- **Units** – Unit of measurement for analyte (e.g., milligrams per kilogram [mg/kg]).
- **Validated** – Indicates the validation status of the individual result (see “Project Qualifier”).
- **Project Qualifier** – If “Validated” column is populated with “Yes”. Project Qualifier represents a validation qualifier code assigned by data reviewer at AMEC or MEC<sup>x</sup> during the validation process. These codes are defined in Table 1.2 of Appendix A of the RFI Program Report (MWH, 2004).  
If “Validated” column is populated with “No” then Project Qualifier represents a Laboratory qualifier code assigned by the analytical laboratory who performed the analysis.
- **PQL** – The Practical Quantitation Limit (PQL) is the concentration that can be reliably measured within specified limits during routine laboratory operating

conditions using approved methods. Under the SSFL RFI program organics and perchlorate are validated and reported to the PQL.

- **MDL** – The Method Detection Limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. Under the SSFL RFI program metals are validated and reported to the MDL.
- **Sample Delivery Group** – Sample Delivery Group (SDG) number is assigned by the laboratory upon receipt of samples. A single SDG number is assigned to all samples on one COC form (up to 20 samples), and each laboratory report includes one SDG.
- **Excavated** – Indicates whether the soil from which the sample was collected has been excavated. If the sample was excavated, this column is populated with “yes”. Samples that have not been excavated are designated with “no” in this column.
- **Analytical Laboratory** – Analytical laboratory where the sample was analyzed.
- **Validation Report Number** – Tracking number assigned by AMEC or MEC<sup>x</sup>. The validation report number provides a system to associate the data in the RFI database with the hard copy version of the validation report. Validation report number assignments and method associations are defined in Table B-1-2 of Appendix B-1 in RFI Program Report (MWH, 2004). .
- **Northings and Eastings** – Map Coordinates (State Plane, NAD 27 Zone V).
- **Included in Risk Assessment** – Populated with either a “yes” or a “no”. A “yes” in this column indicates the result was included in the risk assessment for ESADA. See Appendix F of the Group 8 Bundle Report for more information regarding risk assessments.
- **Rationale for Risk Exclusion** – provides justification for not including a result in the risk assessment for ESADA. This applies only to samples that were not included in the risk assessment. Results with no value in this column were included in the risk assessment. See Appendix F of the Group 8 Bundle Report for more information regarding risk assessments.

#### B. Instructions for use as look-up tables

These tables are configured to facilitate the search for a document in any of the folders described above. To locate documents for samples associated with a particular result:

1. Using the table’s sorting priority described earlier in this section, locate the sample identification and laboratory method.
2. Scroll right to the SDG and validation report number columns.



3. Note the appropriate SDG and validation report number.

Locate the document of interest under the appropriate folder as described above. Validation reports are organized by the validation report numbers.

## **DATA QUALITY REPORT**

**GROUP 8—WESTERN PORTION OF AREA IV  
RCRA FACILITY INVESTIGATION REPORT  
SANTA SUSANA FIELD LABORATORY  
VENTURA COUNTY, CALIFORNIA**

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***VOLUME III – RFI SITE REPORTS***

***APPENDIX C, ATTACHMENT C-3***

***EMPIRE STATE ATOMIC DEVELOPMENT AUTHORITY AREA (SWMU 7.9)***

***LABORATORY DATA QUALITY REPORT***

**Prepared For:**


**THE BOEING COMPANY**

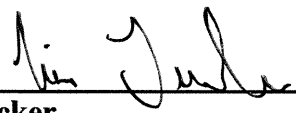
**Prepared by:**

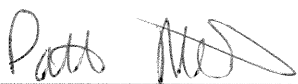
**MEC<sup>x</sup>, LLC  
12269 East Vassar Drive  
Aurora, CO 80014**

**Reviewed by:**

**MWH  
618 Michillinda Ave., Suite 200  
Arcadia, CA 91007**

  
\_\_\_\_\_  
**Elizabeth A. Wessling  
MEC<sup>x</sup>, LLC  
PROGRAM QA/QC MANAGER**

  
\_\_\_\_\_  
**Lisa Tucker  
MWH  
PROJECT CHEMIST**

  
\_\_\_\_\_  
**Patti Meeks, Ph.D.  
MEC<sup>x</sup>, LLC  
PROJECT CHEMIST**

**September 2007**

**ATTACHMENT C-3**



## LIST OF ACRONYMS AND ABBREVIATIONS

CAS	Columbia Analytical Services
ESDA	Empire State Atomic Development Authority
GC/MS	Gas Chromatography/Mass Spectroscopy
GEL	General Engineering Laboratories
ICP	Inductively Coupled Plasma
LCS	Laboratory Control Sample
MDL	Method Detection Limit
MEC <sup>x</sup>	MEC <sup>x</sup> , LLC
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MWH	Montgomery Watson Harza, Inc.
PAH	Polynuclear Aromatic Hydrocarbon
PARCC	Precision, Accuracy, Representativeness, Completeness and Comparability
PCB	Polychlorinated Biphenyl
PE	Performance Evaluation
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RL	Reporting Limit
RPD	Relative Percent Difference
SIM	Selective Ion Monitoring
SOP	Standard Operating Procedure
SSFL	Santa Susana Field Laboratory
SVOC	Semivolatile Organic Compound
TPH	Total Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

### **C3.1 OVERALL QUALITY ASSURANCE PROGRAM**

The Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) at the Santa Susana Field Laboratory (SSFL) includes soil, groundwater, surface water, and biota sampling and analysis, as well as passive and active soil gas sampling and analysis following agency-approved work plans (Ogden 1996, 2000). Group 8 Empire State Atomic Development Authority (ESADA) samples were analyzed by one or more of the following methods:

- Volatile organic compounds (VOCs) by United States Environmental Protection Agency (USEPA) SW-846 Method 8260B,
- Polynuclear aromatic hydrocarbons (PAHs) by USEPA SW-846 Methods 8270C and 8270C selective ion monitoring (SIM),
- Polychlorinated biphenyls (PCBs) by USEPA SW-846 Method 8082,
- Total petroleum hydrocarbons (TPH) by USEPA SW-846 Method SW8015B, modified,
- Metals by USEPA SW-846 Methods 6010B and 6020,
- Mercury by USEPA SW-846 Methods 7471A (soil) and 7470A (water),
- pH by Method SW9045C.

The resulting data were validated by qualified chemists following USEPA guidelines as described in the RFI Quality Assurance Project Plans (QAPPs) (Ogden 1996 and 2000) and data validation standard operating procedures (SOPs). These data validation procedures are based on USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (February 1994) and National Functional Guidelines for Inorganic Data Review (February 1994).

The Group 8 ESADA sampling effort collected and analyzed soil samples following RFI protocols. Field Quality Control (QC) samples provide a means of evaluating the quality of field sampling procedures, the effectiveness of equipment decontamination procedures, and the potential for introduction of contaminants unrelated to the project. Field QC samples collected during the project included field blanks, equipment rinsates, trip blanks, field duplicates, and split samples. Unless otherwise noted, field QC samples were collected according to the SSFL RFI QAPPs.

Data from all samples collected in support of the Group 8 ESADA sampling effort were subsequently validated at either USEPA Level IV or V by MEC<sup>x</sup>. The associated data validation reports, annotated laboratory result forms, and data tables are included in folders located in Attachment C-3.

According to the established data validation protocols, analytical results were annotated following validation with the following qualifications: “U” (nondetected), “J” (estimated), “UJ” (estimated nondetect), “N” (tentative identification), “NJ” (estimated and tentatively identified), and “R” (rejected). Data with “U,” “J,” “UJ,” “NJ,” or “N” qualifiers are usable; data with an “R” qualifier are unusable for any purpose. The data are additionally annotated with codes indicating the reason for the qualification. The following items were reviewed during the Level V validation process: sample management (collection techniques, sample containers, preservation, handling, transport, chain-of-custody, holding times); method blank sample results; blank spike and laboratory control sample (LCS) results; surrogate recoveries, if applicable; matrix spike/matrix duplicate (MS/MSD) recoveries and precision; laboratory duplicate precision, if applicable; serial dilution precision, if applicable; field quality assurance / quality control (QA/QC) sample results; and other QC indicators as applicable. Level IV validation included review of the following: sample management, gas chromatography/mass spectroscopy (GC/MS) instrument performance, initial and continuing calibration, method blank results, continuing calibration blank results, MS/MSD recoveries and precision, matrix spike sample results, surrogate results, laboratory and field QC sample results, internal standard performance, target compound identification, compound quantification, reported detection limits, and a definitive review of the raw data.

As the Group 8 ESADA sampling effort was not a complete field project, but an action intended to eliminate gaps in the Empire State Atomic Development Authority data set, a precision, accuracy, representativeness, completeness, and comparability (PARCC) parameter assessment was not performed.

As discussed below in Sections 2 and 3, the Group 8 ESADA data quality is acceptable for the purposes of the RFI, with qualifications as needed based on review by MEC<sup>x</sup>.

## **C3.2 QUALITY ASSURANCE FINDINGS FOR HISTORIC AND PRIMARY DATA**

The quality of historic and primary data collected from the ESADA RFI Site was reviewed as part of the overall data quality assessment in the RFI Program Report (MWH 2004) and details regarding specific samples and analyses are found therein. The RFI Program Report was not site specific, but a programmatic data review. As such, the quality concerns listed below may or may not affect the ESADA site samples. In general, however, the quality of the historic and primary data was acceptable, except as summarized in the sections below.

### **C3.2.1 HISTORIC DATA**

Historic data validated for the RFI consist of samples collected by ICF Kaiser, McLaren/Hart, and Groundwater Resource Consultants, Inc. from 1987 to 1995. These soil samples were analyzed for general minerals, metals, semivolatile organic compounds (SVOCs), TPH, PCBs, and VOCs. As the samples comprising the historic data were collected by other consulting firms, not all QC data were available; however, validation was performed to the extent possible. In no instance did the lack of QC data invalidate the use of the historic data for the RFI. Historic data that was not validated is not addressed in this report.

### **C3.2.2 PRIMARY DATA**

Primary samples were collected for the RFI from 1995 to May 2007. These soil samples were analyzed for general minerals, metals, PAHs, PCBs, TPH, and VOCs. The quality of the primary data was acceptable with the exceptions noted in the sections below.

#### **C3.2.2.1 INTERFERENCE IN SOIL METAL ANALYSES**

While not all laboratories exhibited soil matrix interference in their inductively coupled plasma (ICP) metals analyses, most soil analyses were affected by high concentrations of the interfering analytes, specifically iron, aluminum, and vanadium. Antimony was the most consistently affected analyte; however, some other elements were affected.

To account for these interferences, the corrective actions taken resulted in the reporting limits (RLs) of the affected analytes being raised to a concentration equivalent to or greater than the interference in the sample. Detects reported below these levels were qualified as nondetected or as estimated nondetects. Detects reported above these levels were reviewed and their validity



was determined on a case-by-case basis. Some detects reported above the raised reporting limits were found to have been affected by interference and were qualified as estimated nondetects.

#### **C3.2.2.2 COLUMBIA ANALYTICAL SERVICES SEMIVOLATILE ORGANIC COMPOUNDS**

Samples were analyzed by Columbia Analytical Services (CAS) for SVOCs by EPA SW-846 Method 8270. CAS also analyzed one performance evaluation (PE) sample at a dilution. Of the 21 spiked compounds, CAS reported nine as nondetected and five others were recovered outside the PE sample performance acceptance limits provided by the sample supplier. Additionally, CAS reported eight compounds as detected that were not present in the PE sample. Although CAS reanalyzed the sample to determine the source of the discrepancies, the reanalysis results were inconclusive. Level IV review of any CAS semivolatile data was recommended where critical decisions were made.

#### **C3.2.2.3 COLUMBIA ANALYTICAL SERVICES TOTAL PETROLEUM HYDROCARBONS**

Samples were analyzed for TPH by CAS by modified EPA SW-846 Method 8015B. TPH was reported in four hydrocarbon ranges; gasoline (C8-C11), kerosene (C11-C14), diesel (C14-C20), and lubricant oil (C20-C30). Due to inadequate integration and overlapping target compound hydrocarbon range retention time windows, all results were qualified as estimated detects or nondetects.

#### **C3.2.2.4 SOIL VAPOR INCOMPLETE BULB DECONTAMINATION AND INSTRUMENT CARRYOVER**

Early in the soil vapor sampling effort, detects in some samples were traced back to incomplete decontamination of bulbs used for sample collection. Additional decontamination procedures were therefore added for sample bulbs containing concentrations of VOCs greater than 1,000 micrograms per liter ( $\mu\text{g/L}$ ). Results for 46 site samples through the SSFL site were rejected due to incomplete bulb decontamination.

Due to very high concentrations of target compounds in some of the samples, effective dilutions were difficult to determine. The laboratory, Centrum (Riverside, CA), reported a few target compounds above the linear range of the calibration, even from dilution analyses. Further

dilutions were not performed, resulting in instrument carryover. As a result, 16 compound results were qualified as estimated detects.

### **C3.3 QUALITY ASSURANCE FINDINGS FOR GROUP 8 ESADA SAMPLES**

Samples were collected for the Group 8 ESADA in two events, one in February 2007 and another in May 2007. Soil samples collected as part of the Group 8 ESADA sampling effort consist of 40 samples for pH, 44 samples for metals (including mercury), 8 samples for PAHs, 9 samples for PCBs, 8 samples for TPH, and 11 samples for VOC soil vapor constituents.

Equipment rinsate samples and field blank samples were collected in association with all applicable analyses performed for Group 8 ESADA. (As equipment rinsate and field blank samples may apply to more than one Group 8 site, the equipment rinsate or field blank sample may be presented in another Appendix.) Two field duplicate and 2 laboratory split samples were collected specific to the Group 8 ESADA RFI Site.

#### **C3.3.1 GENERAL MINERALS AND OTHER ANALYTES**

TestAmerica-Irvine, located in Irvine, California, analyzed 31 soil samples for pH by SW-846 Method 9045C. All data are usable as no data were rejected. No results were qualified.

General Engineering Laboratory (GEL), located in Charleston, South Carolina, analyzed 9 soil samples and 1 field duplicate for pH by SW-846 Method 9045C. All data are usable as no data were rejected. No results were qualified. One field duplicate sample was collected and analyzed by GEL for pH. The relative percent difference (RPD) was less than 100%. The pair was considered to be in good agreement.

TestAmerica-Denver (formerly Severn Trent Laboratories), located in Denver, Colorado, and Lancaster Laboratory, located in Lancaster, Pennsylvania, each analyzed 1 laboratory split sample for pH by SW-846 Method 9045C. The RPDs were less than 100%. The pairs were considered to be in good agreement.

### **C3.3.2 METALS**

TestAmerica-Irvine analyzed 2 soil samples for aluminum and 5 soil samples for aluminum and sodium by SW-846 Method 6010B, 3 soil samples for lead by SW-846 Method 6020, and 9 soil samples, 2 field blanks, and 1 equipment rinsate sample for 21 metals by SW-846 Methods 6010B, and 6020. All data are usable as no results were rejected. One antimony result was reported from a 100× dilution in order to report the analyte within the linear range of the instrument calibration. No other results were reported with elevated method detection limits (MDLs) or RLs. Most metals were detected in most of the samples. A couple analytes in most samples were qualified as nondetected due to method blank contamination. Most molybdenum results were qualified as estimated detects due to molybdenum detected in a field QC sample. Several analytes in one sample were qualified as estimated detects due to MS/MSD recoveries and/or RPDs outside of the QC limits. Most boron results were qualified as estimated detects and nondetects due to a negative result in the ICSA. Detects and nondetects for selenium were evaluated to ensure that the lowest detection limits were attained. Detection limits were consistent with the achievable sensitivities published for the method. Potential false positives and false negatives were eliminated through the review of the continuing calibration blanks and QC samples.

TestAmerica-Irvine subcontracted the mercury analyses to Weck Laboratories (Weck), located in City of Industry, California. Weck analyzed 9 soil samples, 1 equipment rinsate, and 1 field blank for mercury by SW-846 Method 7471A. All data are usable as no results were rejected. No results were reported with elevated method detection limits MDLs or RLs. No results were qualified.

GEL analyzed 18 soil samples, 1 field blank, and 1 equipment rinsate for sodium and aluminum by SW-846 Method 6010B, 5 soil samples, 1 field duplicate, and 1 field blank for antimony, arsenic, and lead by SW-846 Method 6020, and 1 field blank, and 1 equipment rinsate for 22 metals by SW-846 Methods 6010B, 6020, 7470A, and 7471A. One nondetected antimony result was rejected due to low MS/MSD recoveries. All remaining data are usable as no other results were rejected. Due to matrix interference, all 6020 analytes were reported from 2× or 10× dilution. Most metals were detected in most samples. All antimony results were qualified as estimated detects and nondetects due to MS/MSD recoveries below QC limits. Detects and nondetects for selenium were evaluated to ensure that the lowest detection limits were attained. Detection limits were consistent with the achievable sensitivities published for the method.

Potential false positives and false negatives were eliminated through the review of the continuing calibration blanks and QC samples.

One field duplicate sample was collected and analyzed by GEL for antimony, arsenic, and lead. All detects were in common and all RPDs were less than 100%. The pair was considered to be in good agreement.

TestAmerica-Denver analyzed 1 laboratory split sample for antimony, arsenic, and lead SW-846 Method 6020. The split sample antimony result was rejected due to a low MS/MSD recovery; therefore, the antimony results were not assessed. The arsenic and lead RPDs were less than 100% and the pair was considered to be in good agreement.

Lancaster analyzed one split sample for all metal analytes except lithium and zirconium. Boron was detected in the split sample but was qualified as nondetected in the primary sample due to method blank contamination. The silver RPD exceeded 100%. All other detects were in common and all remaining RPDs were less than 100%. The pair was considered to be in reasonable agreement.

### **C3.3.3 PAHS**

GEL analyzed 8 soil samples, 1 field blank, and 1 equipment rinsate for 18 PAH compounds, n-nitrosodimethylamine, and added phthalates by SW-846 Method 8270C. The analyses were not performed using SW-846 8270C SIM as GEL was able to achieve the necessary reporting limits by 8270C in the full scan mode. All data are useable as no results were rejected. No results were reported at elevated MDLs or RLs. Several target compounds were detected in all the samples.

Lancaster analyzed one laboratory split sample for 18 PAH compounds. There was one common detect in the pair with an RPD greater than 100%. There were four other target compounds detected in the split sample. Most of the target compounds were detected in the split sample which had slightly lower MDLs. The pair was not considered to be in agreement.

### **C3.3.4 PCBS**

TestAmerica-Irvine analyzed 9 soil samples, 1 field blank, and 1 equipment rinsate for seven Aroclors by SW-846 Method 8082. All data are usable as no results were rejected. No results were reported at elevated MDLs or RLs. A couple target compounds were detected in a few of the samples. The results for Aroclors 1254 and 1260 were qualified as estimated detects due to coelution.

Lancaster analyzed one laboratory split sample for 7 Aroclor compounds by SW-846 Method 8082. The split sample had one target compound detected below the reporting limit while there were no target compounds detected in the primary sample. Because the detect was below the MDL in the primary sample the pair was considered to be in reasonable agreement.

### **C3.3.5 TPH**

TestAmerica-Irvine analyzed 8 soil samples, 1 field blank, and 1 equipment rinsate sample for four hydrocarbon ranges by SW-846 Method 8015B, modified. All data are acceptable as no data were rejected. All results from one sample were reported from a 2× dilution due to matrix interference. No other results were reported at elevated MDLs or RLs. A few target compounds were detected in some of the samples. No results were qualified.

Lancaster analyzed one laboratory split sample for four hydrocarbon ranges. There were no target compounds detected in either the parent or split sample and the pair was considered to be in agreement.

### **C3.3.7 VOCS IN SOIL VAPOR SAMPLES**

Centrum Analytical, located in Riverside, California, used a mobile lab to analyze 11 soil vapor samples, 1 field duplicate, and 1 field blank for 24 VOC compounds by SW-846 Method 8260B modified for soil vapor constituents. All data are usable as no data were rejected. No results were reported at elevated MDLs or RLs. No target compounds were detected. A few chloroethane results in a few samples were qualified as estimated nondetects due to a continuing calibration percent difference (%D) above the QC limit. A few 1,1-dichloroethene results were qualified as estimated nondetects due to an LSC recovery below the QC limit. There were no

target compounds detected in the duplicate or the primary sample and the pair was considered to be in good agreement.

### **C3.4 REFERENCES**

MWH. 2004. RCRA Facility Investigation Program Report, Santa Susana Field Laboratory, Ventura County. July.

Ogden Environmental and Energy Services, Company, Inc. (Ogden). 1996. RCRA Facility Investigation Work Plan Addendum, Santa Susana Field Laboratory, Ventura County, California. September.

Ogden Environmental and Energy Services, Company, Inc. (Ogden). 2000. RCRA Facility Investigation Work Plan Addendum Amendment, Santa Susana Field Laboratory, Ventura County, California. June.

United States Environmental Protection Plan (USEPA). 1994. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. February.

United States Environmental Protection Plan (USEPA). 1994. Contract Laboratory Program National Functional Guidelines for Organic Data Review. February.

**SOIL**



## **SOIL CASE NARRATIVES AND COCS**

RJ 313

**CEIMIC  
Corporation**

*"Analytical Chemistry for Environmental Management"*

---

June 7, 2001

Mr. Jose Toledo  
AMEC  
5510 Morehouse Drive  
San Diego, CA 92121

JUN 8 2001

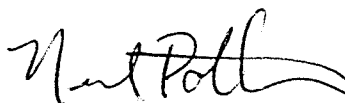
Dear Mr. Toledo:

Enclosed are the results for the analyses performed in support of AMEC's Rocketdyne Project, Case No. 313150, SDG No. RJ313. The samples were taken from the field from April 27, 2001 through May 1, 2001 and received at Ceimic Corporation on May 3, 2001.

These samples are reported under the Ceimic Project Number 010371, which can be referenced when inquiring about this project.

If you have any questions or concerns regarding this data, please call me at the telephone number listed below.

Sincerely,



Neil Pothier, Ph.D.  
Laboratory Director

NP/klw

Enclosures

## INDEX

Page #

Volatiles/1-4 Dioxane ..... 109

Metals ..... 322

Perchlorate ..... 494

## **Project Narrative**

## SDG Narrative

The enclosed data package is in response to AMEC's Rocketdyne Project, Project No. 313150, SDG No. RJ313. Under this SDG there are 3 VOA and 4 Dioxane analyses for 20 soil samples which were received at Ceimic Corporation on May 3, 2001.

This data package includes the analyses for the following samples from SDG No. RJ313:

(1)	Client ID	Ceimic ID	Analysis
	RJ331	010371-19	DIOXANE
	RJ332 ms/msd	010371-20	VOA, DIOXANE

The submitted data covers the analyses of the VOA (Volatiles) and 1-4 Dioxane fractions and the associated blanks and QA/QC. CEIMIC would like to highlight the following points pertaining to the analyses performed for this case:

### (2) Sample Receipt

The cooler temperatures upon receipt are annotated on the Chain of Custodies and on the Ceimic Sample Receiving Checklist.

### (3) Instrumentation and Column Identification

The following instruments were used for the analyses:

#### MS/GC Analysis

##### A. VOA

MS12: HP5973 GC/MS, 20 m, 0.18mm ID, 1um, DB-624 capillary column  
OI trap #10 (8cm Tenax, 8cm silica gel, 8cm carbon molecular sieve)

MS15: HP5970B GC/MS, 105m, 0.53mm ID, 3 um, VOCOL megabore column  
OI trap #10 (8cm Tenax, 8cm silica gel, 8cm carbon molecular sieve)

##### B. 1-4 Dioxane

MS12: HP5973 GC/MS, 20m, 0.2mm ID, 1.8 um, DB-624 capillary column.  
OI trap #10 (8cm Tenax, 8cm silica gel, 8cm carbon molecular sieve)

**(4) Sample Information**

**A. VOA (Method 8260B)**

The results were reported on a wet weight basis, since no sample for %moisture was submitted.

Sample RJ332 (010371-20) was reanalyzed as a Medium Soil. The reanalysis and VBLKOJ had a high recovery for the surrogate BFB.

**B. 1-4 Dioxane Fraction (Method SIM)**

The 1,4-Dioxane analysis was performed by SIM (Selective Ion Monitoring)

The results were reported on a wet weight basis, since no sample for %moisture was submitted.

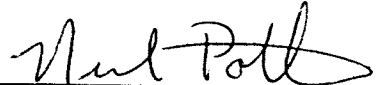
Sample RJ331 (010371-19) had 1,4-Dioxane out of calibration.

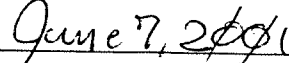
**Deviation from the SOW**

None other than specified above.

**End of SDG Narrative**

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in computer-readable data submitted on diskette has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

  
Neil Pothier, Laboratory Director

  
Date

## **Inorganic SDG Narrative**

**Client Case ID:** Rocketdyne

**Ceimic Project No.:** 010371

**SDG No.:** RJ313

The following samples were received at Ceimic Corporation on May 3, 2001:

RJ313

RJ314 (MS/MSD)

RJ315

RJ316

The above samples were digested and analyzed for total metal using SW846 methods 3050A/6010B/7471A and reported in accordance with the Inorganic Statement of Work (SOW) ILM04.1.

### **Comments on Data Package:**

### **QA/QC Samples:**

Inorganic Ventures CICV-1, CICV-2, and CICV-3 were used for the ICV for the ICP metals. CPI CAL-3, CAL-5 and CAL-8 were used for the calibration standards and the CCV for the ICP metals. Inorganic Ventures CLPP-ICS-A and CLPP-ICS-B were used for the ICSA and ICSAB samples. Environmental Resource Associates standard (lot# 248) was used for the metals LCSS sample.

### **Observations:**

All elements except mercury were determined using inductively coupled plasma (ICP) emission spectroscopy. Mercury analysis was performed via automated cold vapor atomic absorption spectroscopy (CVAA).

A "U" flag in the C column on the sample result forms (Form I-IN) indicates that the concentration of that analyte in the sample is undetected at the method detection limit (MDL). For the sample concentration reported between the Contract Required Detection Limits (CRDL) and the instrument MDL, a "B" flag is shown in the C column on the Form I-IN.

### **Deviations from Contract:**

None.

End of case Narrative.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Neil Pothier  
Neil Pothier  
Laboratory Manager

June 6, 2001  
Date



## **Chain-of-Custody**

Control Number: **COC** **RJ3241**  
Date **5/2/01** Page 1 of 1

Sample Disposal Instructions: Laboratory Disposal
Shipment Method: Fed-Ex
Comment:

[illegible][illegible]

For Lab Use	
Lab Number:	GP-Geoprobe
Do COC match samples: Y or N	
Broken container: Y or N	
Received within holding time: Y or N	
COC seal intact: Y or N	
Any other problems: Y or N	
If any YES, Ogden contacted: Y or N	
Date contacted: ____ / ____ / ____	
Temperature °C	

**1 Original, 2 Lab Copy, 3 Field Copy**

\* 14-day TAT

von, 21

# Chain of Custody

Control Number: **COC RV313**  
Date **5/2/01** Page 1 of 1

[illegible]

CEIMIC CORPORATION  
Sample Receiving Checklist

LMS: 010377

Client: AMEC

Project: Rockettype

Cooler Number: 1

Number of Coolers: 1

Date Received: 5103101

- A. PRELIMINARY EXAMINATION PHASE: Date cooler was opened: 5103101
1. Have designated person initial here to acknowledge receipt of cooler: JC (date): 5103101
  2. Did cooler come with a shipping slip (airbill, etc.)? YES NO  
If YES, enter carrier name & airbill number here: EX 828437662096
  3. Were custody seals on outside of cooler? YES NO  
How many & where: \_\_\_\_\_ seal date: 1 4 1 seal name: NA
  4. Were custody seals unbroken and intact at the date and time of arrival YES NO NA
  5. Did you screen samples for radioactivity using a Geiger Counter? \_\_\_\_\_ Reading: 0cpm YES NO
  6. Chain of Custody #: RS 313, RS 324
  7. Were custody papers sealed in a plastic bag & taped inside to the lid? YES NO
  8. Were custody papers filled out properly (ink, signed, etc.)? YES NO
  9. Did you sign custody papers in the appropriate place? YES NO
  10. Was project identifiable from custody papers? YES NO
  11. If required, was enough ice used? \_\_\_\_\_ Cooler Temperature: 5 °C Type of ice: cube YES NO

- B. LOG-IN PHASE: Date samples were logged-in: 5103101
- by (print): J. Cannon (sign): J. Cannon
12. Describe type of packing in cooler: bubble
  13. Were all bottles sealed in separate plastic bags? YES NO
  14. Did all bottles arrive unbroken and were labels in good condition? YES NO
  15. Were all bottle labels complete (ID, date, time, signature, preservative, etc.)? YES NO
  16. Did all bottle labels agree with custody papers? YES NO
  17. Were correct containers used for the tests indicated? YES NO
  18. Were samples received at the correct pH? \_\_\_\_\_ YES NO NA
  19. Was a sufficient amount of sample sent for tests indicated? YES NO
  20. Were bubbles absent in VOA samples? If NO, list by sample#: \_\_\_\_\_ YES NO
  21. Are the lot numbers of the bottleware consistent with those of the bottleware shipped to the client? YES NO
  22. Laboratory labelling verified by: (Initials): JC (date): 5103101

**RUSH****CEIMIC Corporation**  
*Sample Log In Information*

Date: 05/03/01 14:45:44

Date Samples Received: 05/03/01

Date Due: 05/17/01

Client: AMEC

Project Name: Rocketdyne

Client Task: 2000-32R-69813

Client Contact: Dixie Hambrick

Project #: 010371

SDG: RJ313

Case: 313150

Project Amount: \$1,420.00

Stored : VOA.24

Ceimic Rep: HOUSE

Coordinator: NEIL

Report To : AMEC  
5510 Morehouse Drive  
San Diego, CA 92121

Attn : Jose Toledo

Invoice To: AMEC  
5510 Morehouse Dr, Suite 300  
San Diego, CA 92121

Attn : Accounts Payable

LAB ID	CLIENT ID	NO. CONT.	MATRIX	DATE RCVD	DATE SAMP	TIME SAMP	ANALYSIS & METHOD
-01A	RJ313	1	SOIL	05/03/01	04/27/01	15:46:00	TAL Metals(6010B) L TAL Metals(6010B), TRACE
-02A	RJ314	1	SOIL	05/03/01	04/27/01	16:21:00	TAL Metals(6010B) L TAL Metals(6010B), TRACE
-02B	RJ314 ms		SOIL	05/03/01	04/27/01	16:21:00	TAL Metals(6010B) L TAL Metals(6010B), TRACE
-02C	RJ314 msd		SOIL	05/03/01	04/27/01	16:21:00	TAL Metals(6010B) L TAL Metals(6010B), TRACE
-03A	RJ315	1	SOIL	05/03/01	04/27/01	16:52:00	TAL Metals(6010B) L TAL Metals(6010B), TRACE
-04A	RJ316	1	SOIL	05/03/01	05/01/01	07:40:00	TAL Metals(6010B) L TAL Metals(6010B), TRACE
-05A	RJ317	1	SOIL	05/03/01	04/30/01	10:25:00	Perchlorate L
-06A	RJ318	1	SOIL	05/03/01	04/30/01	10:35:00	Sample on hold L
-07A	RJ319	1	SOIL	05/03/01	04/30/01	10:45:00	Sample on hold L

Project #: 010371

LAB ID	CLIENT ID	NO. CONT.	MATRIX	DATE RCVD	DATE SAMP	TIME SAMP	ANALYSIS & METHOD
-08A	RJ320	1	SOIL	05/03/01	04/30/01	10:55:00	Sample on hold
-09A	RJ321	1	SOIL	05/03/01	04/30/01	08:00:00	Perchlorate
-09B	RJ321 ms		SOIL	05/03/01	04/30/01	08:00:00	Perchlorate
-09C	RJ321 msd		SOIL	05/03/01	04/30/01	08:00:00	Perchlorate
-10A	RJ322	1	SOIL	05/03/01	04/30/01	08:15:00	Sample on hold
-11A	RJ323	1	SOIL	05/03/01	04/30/01	08:25:00	Sample on hold
-12A	RJ324	1	SOIL	05/03/01	04/30/01	08:40:00	Sample on hold
-13A	RJ325	1	SOIL	05/03/01	04/30/01	08:55:00	Sample on hold
-14A	RJ326	1	SOIL	05/03/01	04/30/01	09:10:00	Sample on hold
-15A	RJ327	1	SOIL	05/03/01	04/30/01	09:40:00	Perchlorate
-16A	RJ328	1	SOIL	05/03/01	04/30/01	09:50:00	Sample on hold
-17A	RJ329	1	SOIL	05/03/01	04/30/01	10:00:00	Sample on hold
-18A	RJ330	1	SOIL	05/03/01	04/30/01	10:10:00	Sample on hold
-19A	RJ331	4	SOIL	05/03/01	04/30/01	11:45:00	1-4 Dioxane (SIM)
-20A	RJ332	6	SOIL	05/03/01	05/01/01	07:40:00	Volatiles(8260B/5035) 1-4 Dioxane (SIM)
-20B	RJ332 ms		SOIL	05/03/01	05/01/01	07:40:00	Volatiles(8260B/5035) 1-4 Dioxane (SIM)
-20C	RJ332 msd		SOIL	05/03/01	05/01/01	07:40:00	Volatiles(8260B/5035) 1-4 Dioxane (SIM)



Analytical **Technologies, Inc.**

Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

AREA 7 201-  
VOA'S, MISC.  
NOT BINA

ATI I.D. 808317

RECEIVED SEP 23 1988

September 21, 1988

Groundwater Resources Consultants, Inc.  
1020 S. Euclid Avenue  
Tucson, Arizona 85719

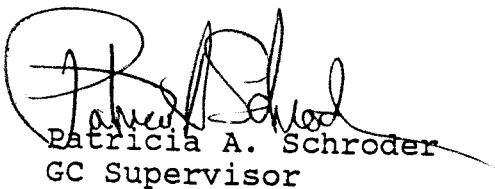
Project No.: 8640-4

Project Name: Rocketdyne


Attention: Chuck Dickens

On August 27, 1988, Analytical Technologies, Inc. received twenty-two soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. Please see the attached sheet for the sample cross reference.

The results, the sample cross reference, and the quality control data are enclosed. The semi-volatile organic results will be sent under a separate cover.

  
Patricia A. Schroder  
GC Supervisor

PAS:mag

  
Richard M. Amano  
Laboratory Manager

Validate  
"NEWCONS" & "ESADA"  
Samples Only!

(602) 529-0909

Client name		Job number		Analyses required		Special handling required		Remarks	
Project name		Sampler(s)		Number of containers		Sample description		Time	
Project manager		Date sampled		Time sampled		Type Composite or Grab		Company	
Sample number		Date sampled		Time sampled		Type Composite or Grab		Company	
SA0A1	15-20'	8/23/88	10:00	G	Soil, BRASS TUBES	01	1		
SA1	40-45'	"	10:20	"	"	02	1		
SA2	10-15'	"	11:00	"	"	03	1		
SA2	45-50'	"	11:20	"	"	04	1		
SA3	10-15'	8/24/88	7:15	"	"	05	1		
SA3	35-40'	8/24/88	7:20	"	"	06	1		
CONS1	15-20'	8/24/88	8:10	"	"	07	1		
CONS1	35-40'	8/24/88	8:20	"	"	08	1		
CONS2	1-15'	8/24/88	8:50	"	"	09	1		
CONS2	35-40'	8/24/88	8:55	"	"	10	1		
CONS3	10-15'	8/24/88	9:10	"	"	11	1		
CONS3	35-38'	8/24/88	9:20	"	"	12	1		
Relinquished by		Signature		Company		Date		Time	
Received by		Signature		Company		Date		Time	
Relinquished by		Signature		Company		Date		Time	
Received by		Signature		Company		Date		Time	
Relinquished by		Signature		Company		Date		Time	
Received by		Signature		Company		Date		Time	



CHAIN OF CUSTODY RECORD

BC Log Number

Client name <b>ROCKEDYNE</b>		Job number <b>0690-4</b>		Sampler(s) <b>G. FORTSWEET, D. HAWKINS</b>		Project name <b>95FL- AREA IV</b>		Project manager <b>G. DICKENS</b>		Analyst required <b>TOXIC PAVL. HYDROGEOLOGIST</b>		BC Log Number	
Sample number	Date sampled	Time sampled	Type Composite or Grab	Sample description	Number of containers	Remarks	Hazardous sample handling required		Special handling required		Date		
DRUM 1015	8/24	10:05	61	SOIL, BRASS TUBES	1	headspace in						8/25/00	13:30
DRUM 3546	"	10:25			1	BRASS TUBES below							
DRUM 1015	"	10:50			1	B100-1, B100-4							
DRUM 3546	"	11:00			1	SE Drum 1 3.5-4.0,							
DRUM 2028	"	11:25			1	SE Drum 2 1.0-1.5,							
DRUM 3546	"	11:35			1	SE Drum 2 3.5-4.0,							
0-1	8/25	14:20			1	NEW CANS 2 3.5-4.0							
-100-2	"	14:40			1								
-100-3	"	15:00			1								
-100-4	"	15:05			1								
Relinquished by						Signature		Company		Date		Time	
Received by						Signature		Groundwater Resources		8/25/00		13:30	
Relinquished by						Signature		Analytical Technologies		8/27/00		1400	
Received by						Signature							
Relinquished by						Signature							
Received by						Signature							

Note: Samples are discarded 30 days after results are reported unless other arrangements are made. The return samples will be returned to client as directed.



Analytical**Technologies, Inc.**

Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

AREA IV BNA  
SOLLS

ATI I.D. 808317

October 18, 1988

Groundwater Resources Consultants, Inc.  
1020 S. Euclid Avenue  
Tucson, Arizona 85719

TABD 10/21 GF

Project No.: 8640-4

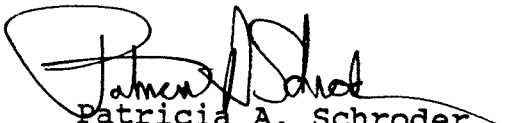
RECEIVED OCT 20 1988

Project Name: Rocketdyne

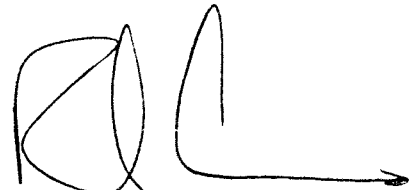
Attention: Chuck Dickens

Enclosed are the semi-volatile organic results which were missing from the report dated September 21, 1988.

We apologize for this delay.

  
Patricia A. Schroder  
GC Supervisor

PAS:bc

  
Richard M. Amano  
Laboratory Manager



November 16, 1999

Lisa Arrasmith  
Ogden  
5510 Morehouse Drive  
San Diego, CA 92121

**Re: Rocketdyne SSFL / Project No. 313150002 / CAS SDG No. L9904022**

Dear Lisa:

Enclosed are the results of the samples submitted to our laboratory on September 23, 1999. The samples were sent to Alta for Dioxins. Please find their report (#7380) attached. For your reference, these analyses have been assigned our service request number L9904022.

All analyses were performed in accordance with our laboratory's quality assurance program. Results are intended to be considered in their entirety and apply only to the samples analyzed. Columbia Analytical Services is not responsible for use of less than the complete report.

Columbia Analytical Services is certified for environmental analyses by the California Department of Health Services (certificate number: 1296A, expiration: August 31, 2000).

If you have any questions, please call me at (818) 587-5550, extension 300.

Respectfully submitted,

**Columbia Analytical Services, Inc.**

Leo C. Raab  
Lab Director

LCR/iz

000001

**Table of Contents**

Cover Letter.....	001
Case Narrative.....	002
Acronym List.....	003
Sample Delivery Group Assignment.....	004-006
Chain of Custodies.....	007-009
Percent Solids.....	100
Base Neutral / Acid Semivolatile Organic Compounds Analytical Data.....	200-213
Base Neutral / Acid Semivolatile Organic Compounds Raw Data.....	300-437
Base Neutral / Semivolatile Organic Compounds Analytical Data.....	500-505
Base Neutral Semivolatile Organic Compounds Raw Data.....	600-683
Polychlorinated Biphenyls (PCBs) Analytical Data.....	700-704
Polychlorinated Biphenyls (PCBs) Raw Data.....	800-868
Hydrocarbon Scan / Fuel Characterization Analytical Data.....	900-910
Hydrocarbon Scan / Fuel Characterization Raw Data.....	1000-1093
Volatile Organic Compounds Analytical Data.....	1100-1128
Volatile Organic Compounds Raw Data.....	1200-1592
Metals Analytical Data.....	1600-1605
Metals Raw Data.....	1700-1764
Inorganic Parameters Analytical Data.....	1800-1803
Dioxins Data.....	Appendix A

**COLUMBIA ANALYTICAL SERVICES, INC.**

**Client:** Ogden  
**Project:** Rocketdyne/313150002  
**Sample Matrix:** Soil

**Service Request No.:** L9904022  
**Date Received:** 9/23-24/99

**CASE NARRATIVE**

All analyses were performed in accordance with our laboratory's quality assurance program. This report contains analytical results for sample(s) designated for Tier III data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Matrix Spike (MS), Duplicate Matrix Spike (DMS) and Laboratory Control Sample (LCS).

All EPA recommended holding times have been met for analyses in this sample delivery group.

Refer to the "Internal Login Summary Report" form for a listing of Ogden (EPA) Sample ID's versus Columbia Analytical Services' SDG/Service Request numbers, sample dates, received dates, matrix and requested analyses.

Laboratory Control Samples are liquids. For solid SDGs, data is calculated and reported in solid units.

The Dioxin sample was analyzed by Alta Analytical. Their job number is 7380.

The following difficulties were experienced during analysis of this batch:

For method 8082, sample RS330 was extracted 5 days past the end of the recommended maximum holding time.

On 9/23/99 the CCV for Chloromethane (Method 8021B), had a percent difference result above 15%. This same CCV for Chlorotrifluoroethane uses linear regression. There is no sample curve for this compound. The second standard for the CCV on 9/23/99 has percent difference results above 15% for 1,1-DCA and 2-Chloroethyl Vinyl Ether. This CCV also uses linear regression for Chlorotrifluoroethane. On 9/24/99 the CCV has percent difference results above 15% for 1,1,2-TCA and 2-Chloroethyl Vinyl Ether. Once again this CCV uses a linear regression method for Chlorotrifluoroethane. The second standard for the CCV on 9/24/99 has three compounds above the 15% percent difference level. On 9/24/99 the MTBE result from the PID has a percent difference above 15%. The OGDEN CCV has two compounds above 15%. A curve for linear regression compounds in Ogden's standard is also necessary. The CCV on 9/25/99, third standard, has four compounds that are above the 15% difference level. The PID has Xylene above the 15% difference level. Once again a linear regression curve is needed. The Ogden CCV has Acetone at 21% difference from the PID.

The Ethylbenzene hit on sample RS329 does not confirm.

On sample RS901, the MS/DMS results were not calculated for Aluminum. This is due to the relatively high concentration of the sample analyte compared to the spike concentration. Antimony, Arsenic, Lead, Molybdenum and Selenium are also outside of acceptance limits. In all cases the LCS was acceptable, therefore, the data was approved.

Data Qualifier Flags are: U = Not Detected, E = Estimated Value above calibration range, J = Estimated Value between MDL and PQL.

Approved by: Eydie Schwartz Date: 11/16/99

000002

# Columbia Analytical Services, Inc.

## Acronyms

<b>8015M</b>	California DHS LUFT Method
<b>A2LA</b>	American Association for Laboratory Accreditation
<b>ASTM</b>	American Society for Testing and Materials
<b>BOD</b>	Biochemical Oxygen Demand
<b>BTEX</b>	Benzene/Toluene/Ethylbenzene/Xylenes
<b>CAM</b>	California Assessment Metals
<b>CARB</b>	California Air Resources Board
<b>CAS Number</b>	Chemical Abstract Service Registry Number
<b>CFC</b>	Chlorofluorocarbon
<b>CFU</b>	Colony-Forming Unit
<b>COD</b>	Chemical Oxygen Demand
<b>CRDL</b>	Contract Required Detection Limit
<b>DEC</b>	Department of Environmental Conservation
<b>DEQ</b>	Department of Environmental Quality
<b>DLCS</b>	Duplicate Laboratory Control Sample
<b>DMS</b>	Duplicate Matrix Spike
<b>DOE</b>	Department of Ecology
<b>DOH or DHS</b>	Department of Health Services
<b>ELAP</b>	Environmental Laboratory Accreditation Program
<b>EPA</b>	U.S. Environmental Protection Agency
<b>EQL</b>	Estimated Quantitation Limit
<b>GC</b>	Gas Chromatography
<b>GC/MS</b>	Gas Chromatography/Mass Spectrometry
<b>IC</b>	Ion Chromatography
<b>ICB</b>	Initial Calibration Blank sample
<b>ICP</b>	Inductively Coupled Plasma atomic emission spectrometry
<b>ICV</b>	Initial Calibration Verification sample
<b>J</b>	Estimated concentration. The value is less than the MRL, but greater than or equal to the MDL. If the value is equal to the MRL, the result is actually <MRL before rounding.
<b>LCS</b>	Laboratory Control Sample
<b>LUFT</b>	Leaking Underground Fuel Tank
<b>M</b>	Modified
<b>MBAS</b>	Methylene Blue Active Substances
<b>MCL</b>	Maximum Contaminant Level. The highest permissible concentration of a substance allowed in drinking water as established by the U.S. EPA.
<b>MDL</b>	Method Detection Limit
<b>MPN</b>	Most Probable Number
<b>MRL</b>	Method Reporting Limit
<b>MS</b>	Matrix Spike
<b>MTBE</b>	Methyl- <i>tert</i> -Butyl Ether
<b>NA</b>	Not Applicable
<b>NAN</b>	Not Analyzed
<b>NC</b>	Not Calculated
<b>NCASI</b>	National Council of the paper industry for Air and Stream Improvement
<b>ND</b>	None Detected at or above the Method Reporting/Detection Limit (MRL/MDL)
<b>NIOSH</b>	National Institute for Occupational Safety and Health
<b>NTU</b>	Nephelometric Turbidity Units
<b>ppb</b>	Parts Per Billion
<b>ppm</b>	Parts Per Million
<b>PQL</b>	Practical Quantitation Limit
<b>QA/QC</b>	Quality Assurance/Quality Control
<b>RCRA</b>	Resource Conservation and Recovery Act
<b>RPD</b>	Relative Percent Difference
<b>SIM</b>	Selected Ion Monitoring
<b>SM</b>	<i>Standard Methods for the Examination of Water and Wastewater</i> , 18th Ed., 1992.
<b>STLC</b>	Solubility Threshold Limit Concentration
<b>SW</b>	<i>Test Methods for Evaluating Solid Waste, Physical/Chemical Methods</i> , SW-846, Third Edition, 1986 and as amended by Updates I, II, IIA, and IIB.
<b>TCLP</b>	Toxicity Characteristics Leaching Procedure
<b>TDS</b>	Total Dissolved Solids
<b>TPH</b>	Total Petroleum Hydrocarbons
<b>tr</b>	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL. If the value is equal to the PQL, the result is actually <PQL before rounding.
<b>TRPH</b>	Total Recoverable Petroleum Hydrocarbons
<b>TSS</b>	Total Suspended Solids
<b>TTLC</b>	Total Threshold Limit Concentration
<b>VOA</b>	Volatile Organic Analyte(s)

000003

**Bottles: 10 - Canisters/Decore**

Service Req. No. 1990/0022  
Client No. 154375  
Client Name Ogden Environmental  
Bill To: Ogden Environmental  
Attn: Accounts Payable  
5510 Morehouse Dr.  
San Diego, CA 92121  
P.O. No.  
Logged In By  
ISR Num  
COC Received  
Samples Submitted 23-SEP-99 thru 24-SEP-99 Y

Project No.	Project Name
313150002	Rocketdyne

**Bill To:** Ogden Environmental  
Attn: Accounts Payable  
5510 Morehouse Dr.  
San Diego, CA 92121

**Report To:**  
Ogden Environmental  
Lisa Arrasmith  
5510 Morehouse Dr.  
San Diego, CA 92121

P.O. No. \_\_\_\_\_  
Logged In By **SMALONE**

Site ID	Eydie Schwartz
Project	Chemist

needs D.P

**Storage:**

COC Received  
Samples Submitted 23-SEP-99 thru 24-SEP-99

CAS Samp No.	Client Sample No.	Matrix	Collected	DueDate	8024	8082	DIOXINS	ICP-2	PH	SIM-PP	TPH	FC-CA	-DIGEST	TS	GEN
L9904022-001	98325	SOIL	23-SEP-99	01-OCT-99	111									111	
L9904022-002	R3326	SOIL	23-SEP-99	01-OCT-99	111						111	111		111	
L9904022-003	R3327	SOIL	23-SEP-99	01-OCT-99	111						111	111		111	
L9904022-004	R3328	SOIL	23-SEP-99	01-OCT-99	111						111	111		111	
L9904022-005	R3329	SOIL	23-SEP-99	01-OCT-99	111						111	111		111	
L9904022-006	RS901	SOIL	24-SEP-99	01-OCT-99				111	111				111	111	
L9904022-007	RS902	SOIL	24-SEP-99	01-OCT-99			ALA			111					
L9904022-008	RS903	SOIL	24-SEP-99	01-OCT-99			ALA			111					
L9904022-009	RS904	SOIL	24-SEP-99	01-OCT-99	111			111	111		111	111		111	
L9904022-010	8330	SOIL	24-SEP-99	01-OCT-99		111		111	111		111	111		111	

METALS  
IC  
SEMI VOA

Columbia Analytical Services -- Canoga Park  
INTERNAL LOGIN SUMMARY REPORT (i101)  
08-OCT-99 13:24

000000

Bottles: 10 - Canisters/Decore

Service Req. No. L9904022  
Client No. 154375  
Client Name Ogden Environmental  
Bill To: Ogden Environmental  
Attn: Accounts Payable  
5510 Morehouse Dr.  
San Diego, CA 92121  
P.O. No. SMALONE  
Logged In By  
ISR Num  
COC Received Y  
Samples Submitted 23-SEP-99 thru 24-SEP-99

Project No. 313150002  
Project Name Rocketdyne  
Report To: Ogden Environmental  
Lisa Arrasmith  
5510 Morehouse Dr.  
San Diego, CA 92121

Site ID  
Project Chemist Eydie Schwartz

Storage:

CAS Samp No.	Client Sample No.	Matrix	Collected DueDate	TITLE 22 METALS	AS/GFAA	TITLE 22 METALS	HG/CVAA	TITLE 22 METALS	TL/GFAA	TITLE 22 METALS	SE/GFAA
L9904022-001	RS325	SOIL	23-SEP-99 01-OCT-99								
L9904022-002	RS326	SOIL	23-SEP-99 01-OCT-99								
L9904022-003	RS327	SOIL	23-SEP-99 01-OCT-99								
L9904022-004	RS328	SOIL	23-SEP-99 01-OCT-99								
L9904022-005	RS329	SOIL	23-SEP-99 01-OCT-99								
L9904022-006	RS901	SOIL	24-SEP-99 01-OCT-99	III		III		III		III	
L9904022-007	RS902	SOIL	24-SEP-99 01-OCT-99								
L9904022-008	RS903	SOIL	24-SEP-99 01-OCT-99	III		III		III		III	
L9904022-009	RS904	SOIL	24-SEP-99 01-OCT-99	III		III		III		III	
L9904022-010	LS330	SOIL	24-SEP-99 01-OCT-99	III		III		III		III	



Columbia Analytical Services -- Canoga Park  
INTERNAL LOGIN SUMMARY REPORT (i101)  
08-OCT-99 13:24

Bottles: 10 - Canisters/Decaps

Service Req. No. L9904022  
Client No. 154375  
Client Name Ogden Environmental  
Bill To: Ogden Environmental  
Attn: Accounts Payable  
5510 Morehouse Dr.  
San Diego, CA 92121

Project No. 313150002  
Project Name Rocketdyne

Report To: Ogden Environmental  
Lisa Arrasmith  
5510 Morehouse Dr.  
San Diego, CA 92121

P.O. No. SMALONE  
Logged In By SMALONE  
ISR Num Y  
COC Received Y  
Samples Submitted 23-SEP-99 thru 24-SEP-99

Site ID  
Project Chemist Eydie Schwartz

Storage:

CAS Samp No. Client Sample No. Matrix Collected DueDate  
TITLE 22 METALS  
ICP-13

L9904022-001	RS325	SOIL	23-SEP-99	01-OCT-99
L9904022-002	RS326	SOIL	23-SEP-99	01-OCT-99
L9904022-003	RS327	SOIL	23-SEP-99	01-OCT-99
L9904022-004	RS328	SOIL	23-SEP-99	01-OCT-99
L9904022-005	RS329	SOIL	23-SEP-99	01-OCT-99
L9904022-006	RS329	SOIL	24-SEP-99	01-OCT-99
L9904022-007	RS901	SOIL	24-SEP-99	01-OCT-99
L9904022-008	RS902	SOIL	24-SEP-99	01-OCT-99
L9904022-009	RS903	SOIL	24-SEP-99	01-OCT-99
L9904022-010	LS330	SOIL	24-SEP-99	01-OCT-99

Comments:

L9904022 Dry weight.  
L9904022 EDD  
L9904022 More to come.  
L9904022 8081: 8082 PCB's ONLY1  
L9904022 SIM-PP: 8270sim for PAH. Added 10/8/99 & HT up 10/8/99.

# Chain of Custody

<b>Project Manager:</b>	Dixie Hambrick
<b>Project Name:</b>	Rocketdyne
<b>Project Number:</b>	313150002
Deliver results to the address above or as stated in contract	

<b>Bill To:</b>	Purchasing
<b>Company:</b>	Ogden Environmental
<b>Address:</b>	5510 Morehouse Drive, San Diego, CA 92121

Sample Disposal Instructions: Laboratory Disposal
Shipment Method:
Comment:

Cooler No:	<i>AB 100</i>	TAT:	14-day hardcopy summary 28-day full package
QC Level:	Level4		

Sample Data						
Sample ID	Description (for Ogden use only)	Depth	Date Collected	Time Collected	U/LS Number	Lab ID
RS901	CDBS01501	0.5	9/24/04	10:50	6	6
RS902	CDBS28501	1.0		11:5	30	7
RS903	CDBS29501	1.0		12:15	31	8
RS904	AABS48501	4.5		1545	51	9
RS905	ES5501501	0.5		1640	5	10

[illegible][illegible]

Samplers Signature	Date	Time
<i>[Signature]</i>	9/24/99	1715
Relinquished By:	Date	Time
<i>[Signature]</i>	9/24/99	1900
Received By:	Date	Time
<i>[Signature]</i>	9/24/99	1700
Relinquished By:	Date	Time
Received By (LAB):	Date	Time

For Lab Use	
Lab Number:	<p>Do COC match samples: <u>Y</u> or N</p> <p>Broken container: Y or <u>N</u></p> <p>Received within holding time: <u>Y</u> or N</p> <p>COC seal intact: Y or <u>N/A</u></p> <p>Any other problems: Y or <u>N</u></p> <p>If any YES, Ogden contacted: Y or N</p> <p>Date contacted: ___ / ___ / ___</p> <p>Temperature °C <u>7.0</u></p>

**OGDEN** ENVIRONMENTAL AND ENERGY SERVICES  
■■■■■

5510 Morehouse Drive  
San Diego, CA 92121-1709  
(619) 458-9044  
fax: (619) 458-0943

---

*FACSIMILE*

---

To: Ms. Eydie Schwartz/Mr. Leo Raab/Columbia Analytical Services  
Fax No.: (818) 587-5555

From: Lisa Arrasmith sign: *Lisa Arrasmith*

Date: 10/08/99 There are 1 Page to transmit including this cover page

Subject: **Chain-of-Custody Form Analytical Request Change**

---

Please make the changes listed below to the chain-of-custody analytical request form. Include this form with the final data deliverables for these samples.

COC No.	EPA Sample ID	Date Collected	Method (s) Originally Requested <sup>(n)</sup>	Method (s) Now Requested <sup>(n)</sup>
RS901	RS902	9/24/1999	R & D	S & D
RS901	RS903	9/24/1999	R & D	S & D

- <sup>(n)</sup> S = SVOCs, 8270SIM  
R = SVOAs, 8270R  
D = 8290, Dioxin/furan

The reason for these changes is:

*Incorrectly marked on COC form* X

*Lack of sample volume* \_\_\_\_\_

*Ogden office personnel require this change* \_\_\_\_\_

*Other: Containers mislabeled* \_\_\_\_\_

Thank you.

**DIVIDER SHEET**

**DATA FOR**

**PERCENT SOLIDS**

---

**ANALYSIS**



Analytical  
Services, Inc.

6925 CANOGA AVENUE • CANOGA PARK, CA 91303

% Solids / % Moisture  
SM 2540B

DUP

Sample#

A. Dish+sample (g)

B. Dried weight (g)

C. Dish weight (g)

D. Dry sample weight (g)  
(B-C)

E. Sample weight/volume  
(A-C) (g) (ml)

F. Result (%) or mg/L

MB	04022-1	04022-1	04022-2
9.1618	7.8638	7.9913	10.5352
9.1612738	7.8638	7.9913	9.5740
1.2710	1.2845	1.2845	1.2749
0.0026	6.0455	6.16	8.2991
7.8908	6.5793	6.7068	9.2603
<1	91.89	91.89	89.62
799	8.11	8.15	10.38

Avg: 91.87 RPD = < 1%

Sample#

A. Dish+sample (g)

B. Dried weight (g)

C. Dish weight (g)

D. Dry sample weight (g)  
(B-C)

E. Sample weight/volume  
(A-C) (g) (ml)

F. Result (%) or mg/L

04022-3	04022-4	04022-5	04022-6
10.2681	8.5367	9.2949	7.7032
9.3259	8.0039	8.5477	7.5902
1.2841	1.2818	1.2799	1.2747
8.0418	6.7221	7.2678	6.3155
8.984	7.2549	8.015	6.4285
89.51	92.66	90.68	98.24
10.49	7.34	9.32	1.76

Sample#

A. Dish+sample (g)

B. Dried weight (g)

C. Dish weight (g)

D. Dry sample weight (g)  
(B-C)

E. Sample weight/volume  
(A-C) (g) (ml)

F. Result (%) or mg/L

04022-7	04022-8	04022-9	04022-10
10.7541	12.2502	8.5342	5.8019
9.4069	9.4196	8.1651	5.5376
1.2745	1.2828	1.2778	1.2783
8.1324	8.1368	6.8873	4.2593
9.4796	10.9674	7.2564	4.5232
89.79	74.19	94.91	94.19
14.21	25.81	5.09	5.83

Time in:

13:20

Temperature:

105°C

Comments:

Time out:

08:30

Temperature:

104°C

Analyst:

RH

Date:

10/11/99 - 10/12/99

Signature: *[Signature]*

10/12/99 000100



200000




Date: 09/22/99 Page 1 of 1

[illegible]

4.1 → DWMS

For Lab Use	
Lab Number:	
Do COC match samples: Y or N	
Broken container: Y or N	
Received within holding time: Y or N	
COC seal intact: Y or N	
Any other problems: Y or N	
If any YES, Ogden contacted: Y or N	
Date contacted: ____ / ____ / ____	
Temperature °C	

Sampler's Signature	Date	Time
	9/23/99	17:00
Relinquished By:	Date	Time
	9/23/99	19:15
Received By:	Date	Time
	9/23/99	19:15
Relinquished By:	Date	Time
Received By (LAB):	Date	Time

## LABORATORY REPORT

Prepared For: MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
San Diego, CA 92123  
Attention: Lisa J. Tucker

Project: SSFL Group 8 - SSPN  
1891263

Sampled: 02/21/07  
Received: 04/04/07  
Issued: 04/10/07 16:05

NELAP #01108CA California ELAP#1197 CSDLAC #10256

*The results listed within this Laboratory Report pertain only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a wet weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the sole use of TestAmerica and its client. This report shall not be reproduced, except in full, without written permission from TestAmerica. The Chain(s) of Custody, 4 pages, are included and are an integral part of this report.*

*This entire report was reviewed and approved for release.*

## SAMPLE CROSS REFERENCE

### LABORATORY ID

IQD0373-01

IQD0373-02

### CLIENT ID

ESBS0011S03

ESBS0010S03

### MATRIX

Soil

Soil

Reviewed By:



TestAmerica - Irvine, CA

Michele Chamberlin

Project Manager

MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
San Diego, CA 92123  
Attention: Lisa J. Tucker

Project ID: SSFL Group 8 - SSPN  
1891263  
Report Number: IQD0373

Sampled: 02/21/07  
Received: 04/04/07

## METHOD BLANK/QC DATA

### METALS

Analyte	Result	Reporting Limit	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
<b>Batch: 7D05093 Extracted: 04/05/07</b>											
<b>Blank Analyzed: 04/06/2007 (7D05093-BLK1)</b>											
Aluminum	ND	10	5.0	mg/kg wet							
<b>LCS Analyzed: 04/06/2007 (7D05093-BS1)</b>											
Aluminum	52.9	10	5.0	mg/kg wet	50.0		106	80-120			
<b>Matrix Spike Analyzed: 04/06/2007 (7D05093-MS1)</b>						<b>Source: IQD0318-01</b>					
Aluminum	12100	10	5.0	mg/kg wet	49.8	8800	6627	75-125			MHA
<b>Matrix Spike Dup Analyzed: 04/06/2007 (7D05093-MSD1)</b>						<b>Source: IQD0318-01</b>					
Aluminum	12200	10	5.0	mg/kg wet	49.8	8800	6827	75-125	1	20	MHA

TestAmerica - Irvine, CA  
Michele Chamberlin  
Project Manager



MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
San Diego, CA 92123  
Attention: Lisa J. Tucker

Project ID: SSFL Group 8 - SSPN  
1891263  
Report Number: IQD0373

Sampled: 02/21/07  
Received: 04/04/07

## METHOD BLANK/QC DATA

### INORGANICS

Analyte	Result	Reporting Limit	MDL	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Data Qualifiers
<b>Batch: 7D04166 Extracted: 04/04/07</b>										
<b>Blank Analyzed: 04/04/2007 (7D04166-BLK1)</b>										
Percent Solids	ND	0.10	0.10	%						
<b>Duplicate Analyzed: 04/04/2007 (7D04166-DUP1)</b>						<b>Source: IQD0376-01</b>				
Percent Solids	65.4	0.10	0.10	%		71		8	20	

TestAmerica - Irvine, CA  
Michele Chamberlin  
Project Manager

*The results pertain only to the samples tested in the laboratory. This report shall not be reproduced, except in full, without written permission from TestAmerica.*

**IQD0373 <Page 5 of 7>**

MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
San Diego, CA 92123  
Attention: Lisa J. Tucker

Project ID: SSFL Group 8 - SSPN  
1891263  
Report Number: IQD0373

Sampled: 02/21/07  
Received: 04/04/07

## DATA QUALIFIERS AND DEFINITIONS

<b>H-1</b>	Sample analysis performed past the method-specified holding time per client's approval.
<b>MHA</b>	Due to high levels of analyte in the sample, the MS/MSD calculation does not provide useful spike recovery information. See Blank Spike (LCS).
<b>ND</b>	Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified.
<b>RPD</b>	Relative Percent Difference

TestAmerica - Irvine, CA  
Michele Chamberlin  
Project Manager

MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
San Diego, CA 92123  
Attention: Lisa J. Tucker

Project ID: SSFL Group 8 - SSPN  
1891263  
Report Number: IQD0373

Sampled: 02/21/07  
Received: 04/04/07

## Certification Summary

### TestAmerica - Irvine, CA

Method	Matrix	Nelac	California
EPA 160.3 MOD	Soil	N/A	N/A
EPA 6010B	Soil	X	X

*Nevada and NELAP provide analyte specific accreditations. Analyte specific information for TestAmerica may be obtained by contacting the laboratory or visiting our website at [www.testamericainc.com](http://www.testamericainc.com)*

TestAmerica - Irvine, CA  
Michele Chamberlin  
Project Manager



Del Mar Analytical

2852 Alton Ave., Irvine, CA 92606 (949) 261-1022 FAX (949) 261-1228  
1014 E. Cooley Cr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046  
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689  
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851  
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

IQD0373

## ADDITIONAL ANALYSIS REQUEST FORM

Today's Date: 4/4/07 Del Mar Analytical Project Manager: mc

Request via: ☐ telephone ☐ chain of custody form ☐ fax transmission ☒ E-mail ☐ other

Client: MWH-San Diego/Boeing Contact: Lisa Tucker

Project: Group 8 - ESADA - DOE

Date Sampled: 2/21/07 Date Received: 2/22/07

Status: ☐ in progress ☐ completed ☐ received today ☐ received yesterday ☒ on hold ☐ other

**SAMPLE  
NUMBER**

**SAMPLE  
DESCRIPTION**

**ANALYSIS  
REQUESTED**

**SPECIAL  
REQUIREMENTS**

1QB2451-04

ESBS0011S03

0% solids and Al

1QB2451-07

ESBS0010S03



\* Add-on with new WO # \*

VB  
4/4/07  
17:45

TURNAROUND STATUS: ☐ Same Day ☐ 24hr ☐ 48hr ☐ 3days

☒ 5days ☐ Standard ☐ No Rush Charge

\* due 4/11/07 \*



Del Mar Analytical

2852 Alton Ave., Irvine, CA 92606 (949) 261-1022 FAX (949) 261-1228  
1014 E. Cooley Cr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046  
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689  
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851  
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

IQD0373

## ADDITIONAL ANALYSIS REQUEST FORM

Today's Date: 4/4/07 Del Mar Analytical Project Manager: mc

Request via: ☐ telephone ☐ chain of custody form ☐ fax transmission ☒ E-mail ☐ other

Client: MWH-San Diego/Boeing Contact: Lisa Tucker

Project: Group 8 - ESADA - DOE

Date Sampled: 2/21/07 Date Received: 2/22/07

Status: ☐ in progress ☐ completed ☐ received today ☐ received yesterday ☒ on hold ☐ other

**SAMPLE  
NUMBER**

**SAMPLE  
DESCRIPTION**

**ANALYSIS  
REQUESTED**

**SPECIAL  
REQUIREMENTS**

1QB2451-04

ESBS0011S03

0% solids and Al

1QB2451-07

ESBS0010S03



\* Add-on with new WO # \*

VB  
4/4/07  
17:45

TURNAROUND STATUS: ☐ Same Day ☐ 24hr ☐ 48hr ☐ 3days

☒ 5days ☐ Standard ☐ No Rush Charge

\* due 4/11/07 \*





# CHAIN OF CUSTODY RECORD

Customer Information		Project Information		Project Information		Project Information	
Site:	SSFL	Client Name:	BOE BONEILLY	Collector:	Shelby Valenzuela	Boeing PM:	
Company:	MWH	Sampling Event:	Group 8 Data Gaps-Soil	Contact #:			
Report to:	Lisa Tucker	Project Number:	+881504 1891263	Requested Analyses			
Address:	9444 Farnham Street Suite 300 San Diego CA 92123	Project Manager:	Diane Buchanan (625) 588-8897	TPPI by SW801504 - Soil SVOCs by SW8270C SIM - Soil pH by SW8045C - Soil PCBs by SW8062 - Soil Metals: 7471A Soil Mercury Metals: 8020 Soil Lead Metals: 8010B/8020 Soil Group 8 % Solids - Soil			
Email:	boeingdms@oh2m.com Lisa.Tucker@mwhglobal.com	Field Contact:		Legend: Numerical values for analyses require to turn around time in days M - Hold EH - Exped. Hold			
		Field Contact #:		Comments Hold all analysis except for pH. See notes below. Hold all analysis except for pH. See notes below. Hold all analysis except for pH. See notes below.			
		Lab Name:	Test America, Inc.				
		Lab Contact:	Michelle Chamberlin				
		Lab Address:	17481 Darlan Ave, Suite 100 Irvine, CA 92606				
		Lab Phone:	(949) 261-1022				
Sample Name		Matrix		Date	Time	No. of Containers	
ES850015904	Soil		22/2007	13:10	1		
ES850015906	Soil		22/2007	13:11	1		
ES850015908	Soil		22/2007	13:24	1		

4C

1. Relinquished by:		2. Received by:		3. Relinquished by:		4. Received by:	
Date:	2/22/2007	Date:	2/22/07	Date:	7/27/07	Date:	2/22
Company:	MWH	Company:	TESTAMERICA-INTL	Company:	TESTAMERICA	Company:	TESTAMERICA
Time:	15:12	Time:	15:12	Time:	2:00	Time:	2:00
Comments: Analyze PCB of samples ES850015901 thru 903 if PCB detected on ES850015904. Analyze PCB of ES850015904 if detected. Geotracker EDF ES850015901. Analyze PCB of ES850015905 if detected on ES850015902. Analyze PCB of ES850015906 if detected on ES850015903.							



## LABORATORY REPORT

Prepared For: MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
San Diego, CA 92123  
Attention: Lisa J. Tucker

Project: SSFL Group 8 - SSPN  
1891263

Sampled: 02/14/07-02/21/07

Received: 03/20/07

Issued: 04/05/07 16:23

NELAP #01108CA California ELAP#1197 CSDLAC #10256

*The results listed within this Laboratory Report pertain only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a wet weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the sole use of TestAmerica and its client. This report shall not be reproduced, except in full, without written permission from TestAmerica. The Chain(s) of Custody, 10 pages, are included and are an integral part of this report.*

*This entire report was reviewed and approved for release.*

## CASE NARRATIVE

**SAMPLE RECEIPT:** Samples were received intact, at 4°C, on ice and with chain of custody documentation.

**HOLDING TIMES:** Not all holding times were met. Results were qualified where the sample analysis did not occur within method specified holding time requirements.

**PRESERVATION:** Samples requiring preservation were verified prior to sample analysis.

**QA/QC CRITERIA:** All analyses met method criteria, except as noted in the report with data qualifiers.

**COMMENTS:** Results that fall between the MDL and RL are 'J' flagged.

**SUBCONTRACTED:** Refer to the last page for specific subcontract laboratory information included in this report.

**ADDITIONAL INFORMATION:** Enclosed are complete final results. The results for Mercury were added.

### LABORATORY ID

### CLIENT ID

### MATRIX

IQC2079-01	ESBS0011S02	Soil
IQC2079-02	ESBS0010S02	Soil
IQC2079-03	ESBS0005S02	Soil
IQC2079-04	ESBS0008S02	Soil
IQC2079-05	ESBS0012S02	Soil
IQC2079-06	ESBS0009S02	Soil
IQC2079-07	ESBS0019S02	Soil

Reviewed By:



**TestAmerica - Irvine, CA**  
Michele Chamberlin  
Project Manager

MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
San Diego, CA 92123  
Attention: Lisa J. Tucker

Project ID: SSFL Group 8 - SSPN  
1891263  
Report Number: IQC2079

Sampled: 02/14/07-02/21/07  
Received: 03/20/07

## METHOD BLANK/QC DATA

### METALS

Analyte	Result	Reporting Limit	MDL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Data Qualifiers
<b>Batch: 7C20121 Extracted: 03/20/07</b>											
<b>Blank Analyzed: 03/21/2007 (7C20121-BLK1)</b>											
Antimony	ND	1.0	0.030	mg/kg wet							
Arsenic	ND	0.50	0.25	mg/kg wet							
Barium	ND	0.50	0.080	mg/kg wet							
Beryllium	ND	0.30	0.040	mg/kg wet							
Cadmium	ND	0.50	0.025	mg/kg wet							
Chromium	ND	1.0	0.35	mg/kg wet							
Cobalt	ND	0.50	0.080	mg/kg wet							
Copper	0.226	1.0	0.20	mg/kg wet							J
Lead	ND	0.50	0.050	mg/kg wet							
Molybdenum	ND	1.0	0.10	mg/kg wet							
Nickel	ND	1.0	0.45	mg/kg wet							
Selenium	ND	1.0	0.20	mg/kg wet							
Silver	ND	0.50	0.050	mg/kg wet							
Thallium	0.102	0.50	0.10	mg/kg wet							J
Vanadium	ND	1.0	0.40	mg/kg wet							
Zinc	ND	10	1.3	mg/kg wet							
<b>LCS Analyzed: 03/21/2007 (7C20121-BS1)</b>											
Antimony	45.4	1.0	0.030	mg/kg wet	50.0		91	80-120			
Arsenic	44.9	0.50	0.25	mg/kg wet	50.0		90	80-120			
Barium	47.5	0.50	0.080	mg/kg wet	50.0		95	80-120			
Beryllium	47.5	0.30	0.040	mg/kg wet	50.0		95	80-120			
Cadmium	44.5	0.50	0.025	mg/kg wet	50.0		89	80-120			
Chromium	47.8	1.0	0.35	mg/kg wet	50.0		96	80-120			
Cobalt	48.1	0.50	0.080	mg/kg wet	50.0		96	80-120			
Copper	48.5	1.0	0.20	mg/kg wet	50.0		97	80-120			
Lead	47.5	0.50	0.050	mg/kg wet	50.0		95	80-120			
Molybdenum	47.0	1.0	0.10	mg/kg wet	50.0		94	80-120			
Nickel	48.3	1.0	0.45	mg/kg wet	50.0		97	80-120			
Selenium	42.0	1.0	0.20	mg/kg wet	50.0		84	80-120			
Silver	24.2	0.50	0.050	mg/kg wet	25.0		97	80-120			
Thallium	47.5	0.50	0.10	mg/kg wet	50.0		95	80-120			
Vanadium	46.8	1.0	0.40	mg/kg wet	50.0		94	80-120			
Zinc	44.1	10	1.3	mg/kg wet	50.0		88	80-120			

TestAmerica - Irvine, CA  
Michele Chamberlin  
Project Manager

MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
San Diego, CA 92123  
Attention: Lisa J. Tucker

Project ID: SSFL Group 8 - SSPN  
1891263  
Report Number: IQC2079

Sampled: 02/14/07-02/21/07  
Received: 03/20/07

## METHOD BLANK/QC DATA

### METALS

Analyte	Result	Reporting Limit	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
<b>Batch: 7C20121 Extracted: 03/20/07</b>											
<b>Matrix Spike Analyzed: 03/21/2007 (7C20121-MS1)</b>						<b>Source: IQC2079-07</b>					
Antimony	22.3	1.2	0.035	mg/kg dry	58.8	3.3	32	75-125			M2
Arsenic	49.4	0.59	0.29	mg/kg dry	58.8	4.2	77	75-125			
Barium	164	0.59	0.094	mg/kg dry	58.8	100	109	75-125			
Beryllium	44.1	0.35	0.047	mg/kg dry	58.8	0.64	74	75-125			M2
Cadmium	51.4	0.59	0.029	mg/kg dry	58.8	0.30	87	75-125			
Chromium	75.5	1.2	0.41	mg/kg dry	58.8	27	82	75-125			
Cobalt	50.5	0.59	0.094	mg/kg dry	58.8	7.9	72	75-125			M2
Copper	49.9	1.2	0.24	mg/kg dry	58.8	12	64	75-125			M2
Lead	261	0.59	0.059	mg/kg dry	58.8	210	87	75-125			
Molybdenum	49.7	1.2	0.12	mg/kg dry	58.8	0.51	84	75-125			
Nickel	55.2	1.2	0.53	mg/kg dry	58.8	14	70	75-125			M2
Selenium	44.0	1.2	0.24	mg/kg dry	58.8	0.43	74	75-125			M2
Silver	25.8	0.59	0.059	mg/kg dry	29.4	0.079	87	75-125			
Thallium	51.0	0.59	0.12	mg/kg dry	58.8	0.39	86	75-125			
Vanadium	110	1.2	0.47	mg/kg dry	58.8	45	111	75-125			
Zinc	83.8	12	1.5	mg/kg dry	58.8	47	63	75-125			M2
<b>Matrix Spike Dup Analyzed: 03/21/2007 (7C20121-MSD1)</b>						<b>Source: IQC2079-07</b>					
Antimony	23.3	1.2	0.035	mg/kg dry	58.8	3.3	34	75-125	4	20	M2
Arsenic	49.4	0.59	0.29	mg/kg dry	58.8	4.2	77	75-125	0	20	
Barium	167	0.59	0.094	mg/kg dry	58.8	100	114	75-125	2	20	
Beryllium	43.9	0.35	0.047	mg/kg dry	58.8	0.64	74	75-125	1	20	M2
Cadmium	51.9	0.59	0.029	mg/kg dry	58.8	0.30	88	75-125	1	20	
Chromium	75.7	1.2	0.41	mg/kg dry	58.8	27	83	75-125	0	20	
Cobalt	51.0	0.59	0.094	mg/kg dry	58.8	7.9	73	75-125	1	20	M2
Copper	50.1	1.2	0.24	mg/kg dry	58.8	12	65	75-125	0	20	M2
Lead	332	0.59	0.059	mg/kg dry	58.8	210	207	75-125	24	20	M1, R-3
Molybdenum	49.8	1.2	0.12	mg/kg dry	58.8	0.51	84	75-125	0	20	
Nickel	55.8	1.2	0.53	mg/kg dry	58.8	14	71	75-125	1	20	M2
Selenium	44.1	1.2	0.24	mg/kg dry	58.8	0.43	74	75-125	0	20	M2
Silver	26.1	0.59	0.059	mg/kg dry	29.4	0.079	89	75-125	1	20	
Thallium	50.8	0.59	0.12	mg/kg dry	58.8	0.39	86	75-125	0	20	
Vanadium	109	1.2	0.47	mg/kg dry	58.8	45	109	75-125	1	20	
Zinc	84.0	12	1.5	mg/kg dry	58.8	47	63	75-125	0	20	M2

TestAmerica - Irvine, CA  
Michele Chamberlin  
Project Manager

MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
San Diego, CA 92123  
Attention: Lisa J. Tucker

Project ID: SSFL Group 8 - SSPN  
1891263  
Report Number: IQC2079

Sampled: 02/14/07-02/21/07  
Received: 03/20/07

## METHOD BLANK/QC DATA

### METALS

Analyte	Result	Reporting Limit	MDL	Units	Spike Level	Source Result	%REC	Limits	RPD	RPD Limit	Data Qualifiers
<b>Batch: 7C20122 Extracted: 03/20/07</b>											
<b>Blank Analyzed: 03/21/2007-03/28/2007 (7C20122-BLK1)</b>											
Aluminum	ND	10	5.0	mg/kg wet							
Boron	ND	5.0	1.0	mg/kg wet							
Lithium	ND	6.3	3.8	mg/kg wet							
Potassium	ND	50	19	mg/kg wet							
Sodium	ND	50	24	mg/kg wet							
Zirconium	ND	25	1.5	mg/kg wet							
<b>LCS Analyzed: 03/21/2007-03/28/2007 (7C20122-BS1)</b>											
Aluminum	46.4	10	5.0	mg/kg wet	50.0		93	80-120			
Boron	46.1	5.0	1.0	mg/kg wet	50.0		92	80-120			
Lithium	48.4	6.3	3.8	mg/kg wet	50.0		97	80-120			
Potassium	462	50	19	mg/kg wet	500		92	80-120			
Sodium	482	50	24	mg/kg wet	500		96	80-120			
Zirconium	51.0	25	1.5	mg/kg wet	50.0		102	80-120			
<b>Matrix Spike Analyzed: 03/21/2007-03/28/2007 (7C20122-MS1) Source: IQC2079-07</b>											
Aluminum	24700	12	5.9	mg/kg dry	58.8	20000	7993	75-125			MHA
Boron	63.5	5.9	1.2	mg/kg dry	58.8	14	84	75-125			
Lithium	72.0	7.4	4.5	mg/kg dry	58.8	23	83	75-125			
Potassium	5480	59	22	mg/kg dry	588	4800	116	75-125			MHA
Sodium	623	59	28	mg/kg dry	588	75	93	75-125			
Zirconium	44.0	29	1.8	mg/kg dry	58.8	4.0	68	75-125			M2
<b>Matrix Spike Dup Analyzed: 03/21/2007-03/28/2007 (7C20122-MSD1) Source: IQC2079-07</b>											
Aluminum	24100	12	5.9	mg/kg dry	58.8	20000	6973	75-125	2	20	MHA
Boron	59.8	5.9	1.2	mg/kg dry	58.8	14	78	75-125	6	20	
Lithium	70.9	7.4	4.5	mg/kg dry	58.8	23	81	75-125	2	20	
Potassium	5480	59	22	mg/kg dry	588	4800	116	75-125	0	20	MHA
Sodium	623	59	28	mg/kg dry	588	75	93	75-125	0	20	
Zirconium	43.5	29	1.8	mg/kg dry	58.8	4.0	67	75-125	1	20	M2

TestAmerica - Irvine, CA  
Michele Chamberlin  
Project Manager

MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
San Diego, CA 92123  
Attention: Lisa J. Tucker

Project ID: SSFL Group 8 - SSPN  
1891263  
Report Number: IQC2079

Sampled: 02/14/07-02/21/07  
Received: 03/20/07

## METHOD BLANK/QC DATA

### INORGANICS

Analyte	Result	Reporting Limit	MDL	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Data Qualifiers
<b>Batch: 7C20148 Extracted: 03/20/07</b>										
<b>Blank Analyzed: 03/20/2007 (7C20148-BLK1)</b>										
Percent Solids	ND	0.10	0.10	%						
<b>Duplicate Analyzed: 03/20/2007 (7C20148-DUP1)</b>						<b>Source: IQC2184-01</b>				
Percent Solids	4.70	0.10	0.10	%		4.7		0	20	

TestAmerica - Irvine, CA  
Michele Chamberlin  
Project Manager

MWH-San Diego/Boeing  
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Project ID: SSFL Group 8 - SSPN  
1891263  
Report Number: IQC2079

Sampled: 02/14/07-02/21/07  
Received: 03/20/07

## DATA QUALIFIERS AND DEFINITIONS

<b>B</b>	Analyte was detected in the associated Method Blank.
<b>H-1</b>	Sample analysis performed past the method-specified holding time per client's approval.
<b>J</b>	Estimated value. Analyte detected at a level less than the Reporting Limit (RL) and greater than or equal to the Method Detection Limit (MDL). The user of this data should be aware that this data is of limited reliability.
<b>M1</b>	The MS and/or MSD were above the acceptance limits due to sample matrix interference. See Blank Spike (LCS).
<b>M2</b>	The MS and/or MSD were below the acceptance limits due to sample matrix interference. See Blank Spike (LCS).
<b>MHA</b>	Due to high levels of analyte in the sample, the MS/MSD calculation does not provide useful spike recovery information. See Blank Spike (LCS).
<b>R-3</b>	The RPD exceeded the acceptance limit due to sample matrix effects.
<b>ND</b>	Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified.
<b>RPD</b>	Relative Percent Difference

TestAmerica - Irvine, CA  
Michele Chamberlin  
Project Manager

MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
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Attention: Lisa J. Tucker

Project ID: SSFL Group 8 - SSPN  
1891263  
Report Number: IQC2079

Sampled: 02/14/07-02/21/07  
Received: 03/20/07

## Certification Summary

### TestAmerica - Irvine, CA

Method	Matrix	Nelac	California
EPA 160.3 MOD	Soil	N/A	N/A
EPA 6010B	Soil	X	X
EPA 6020	Soil	X	X

*Nevada and NELAP provide analyte specific accreditations. Analyte specific information for TestAmerica may be obtained by contacting the laboratory or visiting our website at [www.testamericainc.com](http://www.testamericainc.com)*

### Subcontracted Laboratories

#### Weck Laboratories, Inc

14859 E. Clark Avenue - City of Industry, CA 91745

Analysis Performed: Mercury-7471 (dry wt)  
Samples: IQC2079-05, IQC2079-07

### TestAmerica - Irvine, CA

Michele Chamberlin  
Project Manager

7032011

## SUBCONTRACT ORDER - PROJECT # IQC2079

### SENDING LABORATORY:

TestAmerica - Irvine, CA  
17461 Derian Avenue, Suite 100  
Irvine, CA 92614  
Phone: (949) 261-1022  
Fax: (949) 260-3297  
Project Manager: Michele Chamberlin

### RECEIVING LABORATORY:

Weck Laboratories, Inc  
14859 E. Clark Avenue  
City of Industry, CA 91745  
Phone: (626) 336-2139  
Fax: (626) 336-2634  
Project Location: California

Standard TAT is requested unless specific due date is requested => Due Date: \_\_\_\_\_ Initials: \_\_\_\_\_

Analysis	Expiration	Comments
Sample ID: IQC2079-05 Soil	Sampled: 02/14/07 11:30	ADD ON 03/20/07 from IQB1681-02
Level 4 Data Package - Weck	03/14/07 11:30	sub to Weck, provide Element transfer EDD
Mercury-7471 (dry wt)-OUT	03/14/07 11:30	J & B flag, sub to Weck, 9 day TAT

#### Containers Supplied:

Brass Sleeve (IQC2079-05B)

Sample ID: IQC2079-07 Soil	Sampled: 02/16/07 09:20	ADD ON 03/20/07 from IQB1822-01
Level 4 Data Package - Weck	03/16/07 09:20	sub to Weck, provide Element transfer EDD
Mercury-7471 (dry wt)-OUT	03/16/07 09:20	J & B flag, sub to Weck, 9 day TAT

#### Containers Supplied:

Brass Sleeve (IQC2079-07B)

### SAMPLE INTEGRITY:

All containers intact: ☒ Yes ☐ No  
Custody Seals Present: ☐ Yes ☒ No

Sample labels/COC agree: ☒ Yes ☐ No  
Samples Preserved Properly: ☒ Yes ☐ No

Samples Received On Ice: ☒ Yes ☐ No  
Samples Received at (temp): 5-6

Released By: <u>[Signature]</u>	Date: <u>3/20/07</u>	Time: <u>800</u>	Received By: <u>[Signature]</u>	Date: <u>3/20/07</u>	Time: <u>800</u>
Released By: <u>[Signature]</u>	Date: <u>3/20/07</u>	Time: <u>(1015)</u>	Received By: <u>[Signature]</u>	Date: <u>3/20/07</u>	Time: <u>10:15</u>





1QC2079

## ADDITIONAL ANALYSIS REQUEST FORM

Today's Date: 3-19-07 Del Mar Analytical Project Manager: Michelle Chamberlin

Request via: ☐ telephone ☐ chain of custody form ☐ fax transmission ☒ E-mail ☐ other

Client: MWH - San Diego / Boeing Contact: \_\_\_\_\_

Project: SSFL Group 8 - D

Date Sampled: \_\_\_\_\_ Date Received: \_\_\_\_\_

Status: ☐ in progress ☐ completed ☐ received today ☐ received yesterday ☐ on hold ☐ other

SAMPLE NUMBER	SAMPLE DESCRIPTION	report from batch 7016117	ANALYSIS REQUESTED	SPECIAL REQUIREMENTS
IQB 1681-02	ESBS 0012 S02		% Solids, Met Group - CAM 6020	+Hg, Al, B, Li, K, Na, Zr
IQB 1681-04	ESBS 0009 S02		% Solids, Na, Al	
IQB 1822-01	ESBS 0019 S02		% Solids, Met Group + Hg	Al, B, Li, K, Na, Zr
IQB 2451-03	ESBS 0011 S02		% Solids, Al, Na	
IQB 2451-06	ESBS 0010 S02		% Solids, Al, Na	
IQB 2451-09	ESBS 0005 S02		% Solids, Al, Na	
IQB 2451-11	ESBS 0008 S02		% Solids, Al, Na	

Add to new work order.

3/20/07  
811

TURNAROUND STATUS: ☐ Same Day ☐ 24hr ☐ 48hr ☐ 3days

☐ 5days ☒ Standard ☐ No Rush Charge

Due 3-30



Weck Laboratories, Inc.

Analytical Laboratory Services - Since 1964

14859 E. Clark Ave., Industry, CA 91745

Phone 626.336.2139 Fax 626.336.2634

info@wecklabs.com www.wecklabs.com

## CERTIFICATE OF ANALYSIS

**Client:** TestAmerica, Inc. - Irvine  
17461 Derian Ave, Suite 100  
Irvine, CA 92614  
Attention: Michele Chamberlin

Phone: (949) 261-1022

Fax: (949) 260-3297

**Report Date:** 04/05/07 09:44

**Received Date:** 03/20/07 10:15

**Turn Around:** Normal

**Work Order #:** 7032011

**Client Project:** IQC2079

NELAP #04229CA ELAP#1132 NEVADA #CA211 HAWAII LACSD #10143

*The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. Weck Laboratories, Inc. certifies that the test results meet all NELAC requirements unless noted in the case narrative. This analytical report is confidential and is only intended for the use of Weck Laboratories, Inc. and its client. This report contains the Chain of Custody document, which is an integral part of it, and can only be reproduced in full with the authorization of Weck Laboratories, Inc.*

Dear Michele Chamberlin :

Enclosed are the results of analyses for samples received 03/20/07 10:15 with the Chain of Custody document. The samples were received in good condition, at 5.6 °C and on ice. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Reviewed by:

*Taylor Maligmat*

Taylor Maligmat

Project Manager



Page 1 of 7





Weck Laboratories, Inc.  
14859 E. Clark Ave.  
Industry, CA 91745  
Phone 626.336.2139 Fax 626.336.2634

TestAmerica, Inc. - Irvine  
17461 Derian Ave, Suite 100  
Irvine CA, 92614

Report ID: 7032011  
Project ID: IQC2079

Date Received: 03/20/07 10:15  
Date Reported: 04/05/07 09:44

#### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Sample Comments	Laboratory	Matrix	Date Sampled
IQC2079-05	client		7032011-01	Solid	02/14/07 11:30
IQC2079-07	client		7032011-02	Solid	02/16/07 09:20



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Irvine CA, 92614

Report ID: 7032011  
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Date Received: 03/20/07 10:15  
Date Reported: 04/05/07 09:44

## QUALITY CONTROL SECTION



Weck Laboratories, Inc.  
14859 E. Clark Ave.  
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Phone 626.336.2139 Fax 626.336.2634

TestAmerica, Inc. - Irvine  
17461 Derian Ave, Suite 100  
Irvine CA, 92614

Report ID: 7032011  
Project ID: IQC2079

Date Received: 03/20/07 10:15  
Date Reported: 04/05/07 09:44

### Metals (Non-Aqueous) by EPA 6000/7000 Series Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
<b>Batch W7C0962 - EPA 7471A</b>										
<b>Blank (W7C0962-BLK1)</b>				Analyzed: 03/30/07						
Mercury, Total	ND	0.010	mg/kg wet							
<b>LCS (W7C0962-BS1)</b>				Analyzed: 03/30/07						
Mercury, Total	0.0836	0.010	mg/kg wet	0.0820		102	80-120			
<b>Matrix Spike (W7C0962-MS1)</b>				<b>Source: 7031931-18</b>		Analyzed: 03/30/07				
Mercury, Total	0.0885	0.010	mg/kg wet	0.0820	0.0057	101	70-130			
<b>Matrix Spike Dup (W7C0962-MSD1)</b>				<b>Source: 7031931-18</b>		Analyzed: 03/30/07				
Mercury, Total	0.0842	0.010	mg/kg wet	0.0833	0.0057	94.2	70-130	4.98	25	
<b>Batch W7C1010 - EPA 7471A</b>										
<b>Blank (W7C1010-BLK1)</b>				Analyzed: 03/30/07						
Mercury, Total	ND	0.010	mg/kg wet							
<b>LCS (W7C1010-BS1)</b>				Analyzed: 03/30/07						
Mercury, Total	0.0805	0.010	mg/kg wet	0.0820		98.2	80-120			
<b>Matrix Spike (W7C1010-MS1)</b>				<b>Source: 7032011-02</b>		Analyzed: 03/30/07				
Mercury, Total	0.110	0.012	mg/kg dry	0.0980	0.011	101	70-130			
<b>Matrix Spike Dup (W7C1010-MSD1)</b>				<b>Source: 7032011-02</b>		Analyzed: 03/30/07				
Mercury, Total	0.104	0.012	mg/kg dry	0.0980	0.011	94.9	70-130	5.61	25	



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TestAmerica, Inc. - Irvine  
17461 Derian Ave, Suite 100  
Irvine CA, 92614

Report ID: 7032011  
Project ID: IQC2079

Date Received: 03/20/07 10:15  
Date Reported: 04/05/07 09:44

### Notes and Definitions

O-09	This sample was received with the EPA recommended holding time expired.
J	Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag).
ND	NOT DETECTED at or above the Reporting Limit. If J-value reported, then NOT DETECTED at or above the Method Detection Limit (MDL)
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

## LABORATORY REPORT

Prepared For: MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
San Diego, CA 92123  
Attention: Lisa J. Tucker

Project: SSFL Group 8 - SSPN  
1891263

Sampled: 02/15/07  
Received: 02/16/07  
Issued: 03/03/07 18:25

NELAP #01108CA California ELAP#1197 CSDLAC #10256

*The results listed within this Laboratory Report pertain only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a wet weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the sole use of TestAmerica and its client. This report shall not be reproduced, except in full, without written permission from TestAmerica. The Chain(s) of Custody, 2 pages, are included and are an integral part of this report.*

*This entire report was reviewed and approved for release.*

## SAMPLE CROSS REFERENCE

### LABORATORY ID

IQB1860-01  
IQB1860-02

### CLIENT ID

ESBS0014S01  
ESBS0013S01

### MATRIX

Soil  
Soil

Reviewed By:



TestAmerica - Irvine, CA  
Michele Chamberlin  
Project Manager

MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
San Diego, CA 92123  
Attention: Lisa J. Tucker

Project ID: SSFL Group 8 - SSPN  
1891263  
Report Number: IQB1860

Sampled: 02/15/07  
Received: 02/16/07

## SHORT HOLD TIME DETAIL REPORT

	Hold Time (in days)	Date/Time Sampled	Date/Time Received	Date/Time Extracted	Date/Time Analyzed
<b>Sample ID: ESBS0014S01 (IQB1860-01) - Soil</b>					
EPA 9045C	1	02/15/2007 10:10	02/16/2007 19:20	02/17/2007 09:55	02/17/2007 11:35
<b>Sample ID: ESBS0013S01 (IQB1860-02) - Soil</b>					
EPA 9045C	1	02/15/2007 11:15	02/16/2007 19:20	02/17/2007 09:55	02/17/2007 11:35

TestAmerica - Irvine, CA  
Michele Chamberlin  
Project Manager

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***IQB1860 <Page 4 of 8>***



MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
San Diego, CA 92123  
Attention: Lisa J. Tucker

Project ID: SSFL Group 8 - SSPN  
1891263  
Report Number: IQB1860

Sampled: 02/15/07  
Received: 02/16/07

## METHOD BLANK/QC DATA

### METALS

Analyte	Result	Reporting Limit	MDL	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Data Qualifiers
<b>Batch: 7B20118 Extracted: 02/20/07</b>										
<b>Blank Analyzed: 02/21/2007 (7B20118-BLK1)</b>										
Lead	0.0530	0.50	0.050	mg/kg wet						J
<b>LCS Analyzed: 02/21/2007 (7B20118-BS1)</b>										
Lead	48.4	0.50	0.050	mg/kg wet	50.0		97	80-120		
<b>Matrix Spike Analyzed: 02/21/2007 (7B20118-MS1)</b>										
						<b>Source: IQB0902-01</b>				
Lead	204	1.9	0.19	mg/kg dry	187	29	94	75-125		
<b>Matrix Spike Dup Analyzed: 02/21/2007 (7B20118-MSD1)</b>										
						<b>Source: IQB0902-01</b>				
Lead	183	1.9	0.19	mg/kg dry	187	29	82	75-125	11	20

TestAmerica - Irvine, CA  
Michele Chamberlin  
Project Manager

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**IQB1860 <Page 5 of 8>**

MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
San Diego, CA 92123  
Attention: Lisa J. Tucker

Project ID: SSFL Group 8 - SSPN  
1891263  
Report Number: IQB1860

Sampled: 02/15/07  
Received: 02/16/07

## METHOD BLANK/QC DATA

### INORGANICS

Analyte	Result	Reporting Limit	MDL	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Data Qualifiers
<b><u>Batch: 7B17034 Extracted: 02/17/07</u></b>										
<b>Duplicate Analyzed: 02/17/2007 (7B17034-DUP1)</b>						<b>Source: IQB1815-04</b>				
pH	7.31	NA	0.00	pH Units		7.22		1	5	
<b>Duplicate Analyzed: 02/17/2007 (7B17034-DUP2)</b>						<b>Source: IQB1822-01</b>				
pH	7.57	NA	0.00	pH Units		7.54		0	5	
<b><u>Batch: 7B20135 Extracted: 02/20/07</u></b>										
<b>Blank Analyzed: 02/21/2007 (7B20135-BLK1)</b>										
Percent Solids	ND	0.10	0.10	%						
<b>Duplicate Analyzed: 02/21/2007 (7B20135-DUP1)</b>						<b>Source: IQB2118-01</b>				
Percent Solids	4.20	0.10	0.10	%		4.2		0	20	

TestAmerica - Irvine, CA  
Michele Chamberlin  
Project Manager

*The results pertain only to the samples tested in the laboratory. This report shall not be reproduced, except in full, without written permission from TestAmerica.*

***IQB1860 <Page 6 of 8>***

MWH-San Diego/Boeing  
9444 Farnham Street, Suite 300  
San Diego, CA 92123  
Attention: Lisa J. Tucker

Project ID: SSFL Group 8 - SSPN  
1891263  
Report Number: IQB1860

Sampled: 02/15/07  
Received: 02/16/07

## DATA QUALIFIERS AND DEFINITIONS

**J** Estimated value. Analyte detected at a level less than the Reporting Limit (RL) and greater than or equal to the Method Detection Limit (MDL). The user of this data should be aware that this data is of limited reliability.

**ND** Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified.

**RPD** Relative Percent Difference

TestAmerica - Irvine, CA  
Michele Chamberlin  
Project Manager

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***IQB1860 <Page 7 of 8>***

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## Certification Summary

### TestAmerica - Irvine, CA

Method	Matrix	Nelac	California
EPA 160.3 MOD	Soil	N/A	N/A
EPA 6020	Soil	X	X
EPA 9045C	Soil	X	X

*Nevada and NELAP provide analyte specific accreditations. Analyte specific information for TestAmerica may be obtained by contacting the laboratory or visiting our website at [www.testamericainc.com](http://www.testamericainc.com)*

TestAmerica - Irvine, CA  
Michele Chamberlin  
Project Manager

**Michele Chamberlin**

---

**From:** Jose L Toledo [Jose.L.Toledo@us.mwhglobal.com]  
**Sent:** Friday, February 16, 2007 3:11 PM  
**To:** Michele Chamberlin  
**Cc:** Lisa J Tucker; Edmund M Sarao  
**Subject:** Fw: COC prelim - Group 8 - 02/16/2007

Per Ed's comments we will need to place ESBS0014S01 on hold except for pH. I do not have the signed coc to revise. Could you send that to me? This sample was collected yesterday, so you should have received it today.

Thanks.

Jose

----- Forwarded by Jose L Toledo/User/Americas/Montgomery Watson on 02/16/2007 03:08 PM -----

**Edmund M Sarao/User/Americas/Montgomery Watson**

To jose.toledo@MWHGLOBAL.COM

cc Diana.Buchanan@mwhglobal.com

02/16/2007 01:34 PM

Subject COC prelim - Group 8 - 02/16/2007

Hi Jose,

I will be delivering these directly to the Lab today. If there are any changes please call me at (760)815-4638 as I may be in transit. Also, just want to mention that we need to place ESBS1400S01 on HOLD except for pH. It was collected yesterday. The ESBS sample that needs to be analyzed is included in the COC below...ESBS0014S02...

[attachment "0216\_01.pdf" deleted by Jose L Toledo/User/Americas/Montgomery Watson] [attachment "0216\_00.pdf" deleted by Jose L Toledo/User/Americas/Montgomery Watson] [attachment "0216\_02.pdf" deleted by Jose L Toledo/User/Americas/Montgomery Watson]

# CHAIN OF CUSTODY RECORD

COC #:

MWHSV20070215\_00

Page: 1 of 1

Customer Information				Project Information				Project Information			
Site:	SSFL	Client Name:	Boeing	Collector:	Shelby Valenzuela	Boeing PM:					
Company:	MWH	Sampling Event:	Group 8 Data Gaps-Soil	Contact #:							
Report to:	Lisa Tucker	Project Number:	1891263								
Address:	9444 Farnham Street	Project Manager:	Diana Buchanan								
	Suite 300	PM Phone #:	(626) 568-6897								
	San Diego	Field Contact:									
	CA	Field Contact #:									
	92123	Lab Name:	Test America, Inc.								
	boeingdms@ch2m.com	Lab Contact:	Michele Chamberlin								
Email:	Lisa Tucker@mwhglobal.com	Lab Address:	17461 Derian Ave, Suite 100								
			Irvine, CA 92606								
		Lab Phone:	(949) 261-1022								
Sample Name	Matrix	Date	Time	No. of Containers							
ESBS0014S01	Soil	2/15/2007	10:10	2							
ESBS0013S01	Soil	2/15/2007	11:15	2							
					<p>Requested Analyses</p> <p>pH by SW9045C - Soil</p> <p>Metals 6020 Soil Lead</p> <p>% Solids - Soil</p>						
					<p>Instructions/TAT</p> <p>Legend:</p> <p>Numerical values for analyses equate to turn around time in days</p> <p>H - Hold</p> <p>EH - Extract Hold</p>						
					<p>Comments</p>						

1. Relinquished by:		Date:	2. Received by:		Date:	3. Relinquished by:		Date:	4. Received by:		Date:
C. Sano		2/16/2007	B. Tucker		2/16/2007	B. Tucker		2/16/2007	B. Tucker		2/16/2007
Company:	MWH	Time:	Company:	TEST AMERICA	Time:	Company:	TEST AMERICA	Time:	Company:	TEST AMERICA	Time:
Comments:											

Geotracker EDF ☐

Data Validation Package ☒ Level IV

417

HE 2-16-07

2120

5.5/5.0