Report

Group 5 – Central Portion of Areas III and IV RCRA Facility Investigation Report Santa Susana Field Laboratory, Ventura County, California

Volume VIII – RFI Site Reports
Appendix Q

United States Department of Energy Leach Fields 3

Prepared for:

The Boeing Company
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DRAFT IN PROGRESS

Jill Bensen
Program Manager

Michael O. Bower, P.E.
Project Manager

John Lovenburg, P.G.
Senior Reviewer

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Acronyms and Abbreviations

AI	Atomics International
AOC	Area of Concern
AST	aboveground storage tank
Boeing	The Boeing Company
bgs	below ground surface
BMP	best management practice
BTEX	benzene, toluene, ethylbenzene, and xylenes
Cal-EPA	California Environmental Protection Agency
CCR	Current Conditions Report
CF	Chatsworth Formation
CFOU	Chatsworth Formation Operable Unit
CMS	Corrective Measures Study
COC	chemical of concern
COEC	chemical of ecological concern
COPC	chemical of potential concern
CPEC	chemical of potential ecological concern
CSM	conceptual site model
CTE	central tendency exposure
CUA	Chemical Use Area
DCA	dichloroethane
DCE	dichloroethene
DOE	United States Department of Energy
DQO	data quality objective
DTSC	Department of Toxic Substances Control
ECL	Engineering Chemistry Laboratory
EEL	Environmental Effects Laboratory
ELCR	estimated lifetime cancer risk
EPC	exposure point concentration
ERA	ecological risk assessment
ESL	ecological screening level

ETEC	Energy Technology Engineering Center
GRC	Groundwater Resource Consultants, Inc.
H&A	Haley & Aldrich, Inc.
HAR	Hydrogeologic Assessment Report
HI	hazard index
HMSA	Hazardous Material Storage Area
HQ	hazard quotient
HRA	human health risk assessment
HSA	Historical Site Assessment
ICF	ICF Kaiser Engineers
ILCR	incremental lifetime cancer risk
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
msl	mean sea level
MWH	Montgomery Watson Harza
NA	not applicable
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
PDU	Coal Gasification Process Development Unit
pg/g	picograms per gram
ppb	parts per billion (µg/kg or µg/L)
ppm	parts per million (mg/kg or mg/L)
PRG	preliminary remediation goal

QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RA	risk assessment
RBSL	risk-based screening level
RCRA	Resource Conservation and Recovery Act
RIHL	Rockwell International Hot Laboratory
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RME	reasonable maximum exposure
Rocketdyne	Rocketdyne Propulsion and Power
RWQCB	Los Angeles Regional Water Quality Control Board
SAIC	Science Applications International Corporation
SE Drum Yard	Southeast Drum Storage Yard
SMOU	Surficial Media Operable Unit
SNAP	Systems for Nuclear Auxiliary Power
SOP	standard operating procedure
SPA	Storable Propellant Area
SRAM	Standardized Risk Assessment Methodology
SRE	Sodium Reactor Experiment
SSFL	Santa Susana Field Laboratory
STL-IV	Systems Test Laboratory IV
STP-3	Area 3 Sewage Treatment Plant
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
3-D	three dimensional
TCDD-TEQ	2,3,7,8-tetrachlorodibenzodioxin toxicity equivalency quotient
TDS	total dissolved solids
TEQ	toxicity equivalency quotient
TIC	tentatively identified compound
TCE	trichloroethene
TPH	total petroleum hydrocarbons
TRV	toxicity reference value

UCL	upper confidence limit
USEPA	United States Environmental Protection Agency
UST	underground storage tank
µg/dl	micrograms per deciliter
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µg/Lv	micrograms per liter vapor
µs/cm	micro siemens per centimeter
VOC	volatile organic compound
WPA	RFI Work Plan Addendum
WPAA	RFI Work Plan Addendum Amendments

Appendix Q

Q.1 Introduction

This appendix to the Group 5 Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report presents findings and recommendations based on the results of the investigation conducted at the United States Department of Energy (DOE) Leach Fields 3 (DOE LF3) RFI Site of the Santa Susana Field Laboratory (SSFL). The DOE LF3 Site contains four Areas of Concern (AOCs): Building 4353 Leach Field, Building 4363 Leach Field, Building 4373 Leach Field, and Building 4383 Leach Field. The DOE LF3 Site, located within Area IV of the SSFL, was used in support of DOE operations. 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 DOE LF3 Site is 1 of 17 RFI sites included in the Group 5 RFI Report. The location of the DOE LF3 Site within the SSFL and Group 5 Reporting Area is shown in Figure Q.1-1. An RFI Site is an area that includes at least one Solid Waste Management Unit (SWMU), and/or an AOC and some adjacent land for the purpose of characterization. The other 16 Group 5 RFI sites are:

- Boeing Area IV Leach Field (AOC)
- Compound A Facility (SWMU 6.4)
- Engineering Chemistry Laboratory (ECL) (SWMUs 6.1, 6.2, 6.3, and AOC)
- Environmental Effects Laboratory (EEL) (SWMU 6.9)
- Pond Dredge Area (AOC)
- Coal Gasification Process Development Unit (PDU) (SWMU 7.10)
- Area 3 Sewage Treatment Plant (STP-3) (AOC)
- Southeast Drum Storage Yard (SE Drum Yard) (AOC)
- Systems Test Laboratory IV (STL-IV) (SWMUs 6.5, 6.6, and 6.7)
- Building 65 Metals Laboratory Clarifier (Building 65) (AOC)
- Building 100 Trench (SWMU 7.5)
- Department of Energy Leach Field 1 (DOE LF1) (AOC)
- Department of Energy Leach Field 2 (DOE LF2) (AOC)
- Hazardous Material Storage Area (HMSA) (AOC)
- Rockwell International Hot Laboratory (RIHL) (SWMU 7.7)
- Systems for Nuclear Auxiliary Power Facility (SNAP) (AOC)

The DOE LF3 Site is in the central portion of the Group 5 Reporting Area, east of the RIHL, Building 100 Trench, and Pond Dredge Sites, northwest of the STL-IV Site, south of the Building 65 Site, southwest of the Boeing Area IV Leach Field Site, and west of the EEL Site (Figure Q.1-1).

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

(that is, the ecosystem), and (3) gather data for the next phase of RCRA Corrective Action support the recommendations included in this RFI Report regarding areas recommended for no further action (NFA), corrective measures study (CMS) areas, and interim stabilization.

The SSFL has been divided into two operable units (OUs)—the Surficial Media Operable Unit (SMOU) and the Chatsworth Formation Operable Unit (CFOU). The DOE LF3 Site characterization presented in this appendix comprises data for both the SMOU and the CFOU. The SMOU 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.

Q.1.1 Report Organization

This DOE LF3 Site Report provides detailed sampling data and evaluation pertaining to the DOE LF3 Site, including a summary of the site history, a summary of the RFI sampling and analyses, risk assessment results, and site recommendations. This information is presented in sections organized as follows:

- **Section Q.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 also described.
- **Section Q.3 – Nature and Extent of Chemical Impacts.** Presents a summary of SMOU and CFOU characterization information for the DOE LF3 Site.
- **Section Q.4 – Summary of Risk Assessment Findings**. Presents the results of the human health risk assessment (HRA) and ecological risk assessment (ERA) for the DOE LF3 Site; the complete risk assessment is included in Appendix A of the Group 5 RFI Report.
- **Section Q.5 – DOE LF3 Site Action Recommendations**. Presents a summary of the DOE LF3 Site areas recommended for either NFA or further evaluation in the CMS. CMS Areas recommended for interim measures to prevent contaminant migration are also identified, if any.
- **Section Q.6 – References.** Includes a list of cited references.

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

- **Attachment Q-1**: Site-specific regulatory agency documents and correspondence
- **Attachment Q-2**: Subsurface information (soil boring, trench, piezometer, and well logs)
- **Attachment Q-3**: Data quality, validation and laboratory reports
- **Attachment Q**-4: Building surveys

Information regarding characterization for the DOE LF3 Site is provided in the following figures and tables:

- Figure Q.1-1: Presents the location of the DOE LF3 Site within the SSFL and the Group 5 Reporting Area.
- Figure Q.2-1: Presents a plan view of the DOE LF3 Site, showing known and potential Chemical Use Areas. Tables Q.2-1 through Q.2-5 present summaries of buildings, tanks, transformers, other site features, and spills at the DOE LF3 Site.
- Figure Q.2-2: Presents a plan view of the DOE LF3 Site, showing soil and vapor sampling locations and locations of nearby monitoring wells.
- Figures Q.2-3A through Q.2-3D: Present geologic cross-sections across the DOE LF3 Site.
- Figures Q.3-1 through Q.3-9: Summarize the results of soil and soil vapor sampling performed at the DOE LF3 Site. Soil and vapor sampling results are shown on these maps and correlate with appropriate sections of Tables Q.3-2A and Q.3-2B.

Information regarding Group 5 area-wide conditions, transport and fate of chemicals between RFI sites, and other evaluations of area-wide issues are contained in the Group 5 RFI Report (Volume I) and appendices. Pertinent appendices to this Group 5 RFI Report are:

- **Appendix A:** 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.
- **Appendix B:** Presents information regarding groundwater conditions in the Group 5 Reporting Area, including the DOE LF3 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.

Q.1.2 Historical Reference Documents

A searchable database of historical documents for the Group 5 Reporting Area is being submitted to DTSC along with this Group 5 RFI Report (Boeing, 2008). Included are facility records, maps and drawings, correspondence, and reports relevant to the RFI for each of the Group 5 RFI Sites. Documents pertaining to the entire SSFL are included if they are relevant to Group 5. The Group 5 document database includes documents relevant to the DOE LF3 Site. It is worth noting that information presented in this DOE LF3 Site report is supplemented by background documents that contain information about site and facility background, SMOU Program background, and methodologies/procedures. Key historical documents are listed below with brief descriptions:

- RCRA Facility Assessment (RFA) (Science Applications International Corporation [SAIC], 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 2000b]. 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 (Montgomery Watson Harza [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 SMOU field sampling program, including work plans followed, overall sampling scope performed, sampling methods and subcontractors used, and protocol followed
  - Details of the analytical program for the SMOU 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
  - 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, 2000a; 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 groundwater.
- Annual and quarterly groundwater monitoring reports, including:
  - Annual Groundwater Monitoring Report, 2007 (Haley & Aldrich, Inc. [H&A], 2008a)
  - Second Quarter 2007 Groundwater Monitoring Report (H&A, 2007a)
  - Third Quarter 2007 Groundwater Monitoring Report (H&A, 2007b)
  - Fourth Quarter 2007 Groundwater Monitoring Report (H&A, 2008b)
  - First Quarter 2008 Groundwater Monitoring Report (H&A, 2008c)
- Historical Site Assessment (Sapere, 2005). This report contains:
  - Facility descriptions and historical operational information for buildings used for radiological research and development in Area IV
  - Information regarding radiological demolition activities, surveys, releases, and removal actions conducted for radiological areas within Area IV
- Debris Area Survey and Sampling Methodology (CH2M HILL document in progress). This standard operating procedure (SOP) provides general guidelines for performing the following activities:
  - Visual inspections of the SSFL for surficial evidence of solid waste disposal (referred to herein as debris areas)
  - Sampling for chemical analytes at debris areas
- Quality Assurance Project Plan (QAPP) (MECx, 2008). This QAPP provides general guidelines that include:
  - Quality assurance/quality control (QA/QC) procedures to ensure that field and laboratory data quality and project work meet the data quality objectives (DQO)
  - Ensuring that the project work performed is in accordance with professional standards and regulatory guidelines

- Building Feature Evaluation and Sampling (MWH, 2008). This SOP presents the procedures for evaluating environmental conditions associated with existing buildings, concrete pads, and supporting infrastructure under the following scenarios:
  - Environmental assessment prior to building demolition
  - Environmental assessment during/after building demolition
  - Environmental assessment for buildings not planned for demolition

Q.2 Site History, Chemical Use, and Current Conditions

The DOE LF3 Site is approximately 18.6 acres in the east-central portion of Area IV at the SSFL. The site location within the SSFL is shown in Figure Q.1-1, which also shows the Group 5 Reporting Area boundary. The site layout and the locations of Chemical Use Areas are shown in Figure Q.2-1. The sampling locations across the site are shown in Figure Q.2-2.

During the RFA, various SWMUs and AOCs within the SSFL were identified. The Building 4353, 4363, 4373, and 4383 Leach Fields were identified as AOCs in the RFA (SAIC, 1994). No other SWMUs or AOCs were identified in the RFA within the boundary of the DOE LF3 Site as it is defined in this report (Figure Q.1-1).

Based on site inspections, reviews of historical aerial photographs, drawings, and facility maps, as well as on interviews with site personnel conducted during the RFI, the DOE LF3 Site boundary was defined to include operations associated with the AOCs identified above. In addition, facilities or features near these AOCs were included for assessment in the RFI. These include Buildings 4015, 4055, 4155, 4343A/B, 4353, 4363, 4373, 4374, 4375, 4383, 4393, 4461, 4462, 4463, 4473, 4482, 4483, 4484, 4485, 4486, 4487, 4628, 4662, 4848, 4854, 4863, 4873, 4874, and 4875. Also included were 12 aboveground storage tanks (ASTs), 9 underground storage tanks (USTs), 2 transformer poles, and 9 electrical substations. The identified Chemical Use Areas at the DOE LF3 Site are shown in Figure Q.2-1 and described in Tables Q.2-1 through Q.2-4. A spill record is included in Table Q.2-5.

The following sections describe AOCs, site history and operations, chemical uses, and current conditions at the DOE LF3 Site.

Q.2.1 SWMUs and/or AOCs at the DOE LF3 Site

The DOE LF3 Site contains four AOCs (SAIC, 1994). A brief description of the AOCs that are included in this RFI Site Report is presented below.

Q.2.1.1 Building 4353 Leach Field (AOC)

This leach field received sanitary wastes from a septic tank located east of Building 4353, which was used for sodium mass transfer studies. The leach field comprised a total of 200 linear feet across two leach field lines and is suspected to be constructed of 4-inch-diameter terra cotta clay piping surrounded by gravel, buried at a depth of approximately 2 feet below ground surface (bgs). The leach field was used until the early 1960s, when a central sewer system was constructed. The leach field was removed in 2001. Additional information is in Tables Q.2-1 through Q.2-4.

Q.2.1.2 Building 4363 Leach Field (AOC)

This leach field received sanitary wastes from a 1,500-gallon septic tank located east of Building 4363, which was used as a research and development laboratory for SRE components. The leach field comprised a total of 200 linear feet across two leach field lines and was constructed of 4-inch-diameter terra cotta clay piping surrounded by gravel, buried at depths ranging from 4 to 6 feet bgs. The leach field was used until the early 1960s, when a central sewer system was constructed. The leach field was removed in 2002. Additional information is in Tables Q.2-1 through Q.2-4.

Q.2.1.3 Building 4373 Leach Field (AOC)

This leach field received sanitary wastes from a septic tank located south of Building 4373, which was used to test rocket engines, manufacture rocket fuels, and conduct SNAP reactor criticality tests. The leach field comprised a total of 300 linear feet and is suspected to be constructed of 4-inch-diameter terra cotta clay piping surrounded by gravel, buried at depths ranging from 1 to 2 feet bgs. The leach field was used until the early 1960s, when a central sewer system was constructed. The leach field was removed in 2000. Additional information is in Table Q.2-1 through Table Q.2-4.

Q.2.1.4 Building 4383 Leach Field (AOC)

This leach field received sanitary wastes from a septic tank located north of Building 4383, which was used for Liquid Metal Engineering Center assembly and testing. The leach field comprised a total of 300 linear feet across three leach field lines and was constructed of 3-inch-diameter terra cotta clay piping surrounded by gravel, buried at depths ranging from 2 to 6 feet bgs. The leach field was used until the early 1960s, when a central sewer system was constructed. The leach field was removed in 2000. Additional information is in Tables Q.2-1 through Q.2-4.

Q.2.1.5 Other Site Features

As listed above, there are 31 existing and former buildings, 12 ASTs, 9 USTs, 2 transformer poles, and 9 electrical substations included in the DOE LF3 Site. Detailed descriptions of these features are presented in Tables Q.2-1 through Q.2-4. In summary, a number of process areas supporting the SNAP and Sodium Reactor Experiment (SRE) programs are included. These areas consist of nuclear materials development, component development and testing, material and chemical laboratories, pump test facilities, several support buildings (guard shacks, time clocks, ventilation, and cooling), and several office buildings. Chemical uses for each of these process areas are described in detail in Table Q.2-8 and in Section Q.2.3 below.

Q.2.2 DOE LF3 Site History

A summary of the site chronology, including descriptions of site operations and investigation activities for the DOE LF3 Site, is presented in this subsection. 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. Primary sources of information are summarized Section Q.1.2.

Q.2.2.1 Site Chronology

A summary of key historic investigation and remediation activities is presented in Tables Q.2-5 and Q.2-6. A more detailed description of the DOE LF3 Site is presented below.

Q.2.2.1.1 1950s through late-1970s

Buildings within the DOE LF3 Site supported the SNAP and SRE programs during the 1950s, 1960s, and 1970s. SNAP reactor criticality tests were performed at the DOE LF3 Site between 1957 and 1963. During this same period, SRE mechanical components were developed and examined. SNAP control rod assemblies were tested from the late 1950s

through 1968. Nuclear materials research and development was performed from 1967 to 1979.

Q.2.2.1.2 1950s through 1961

The DOE LF3 Site accepted sanitary wastes from site buildings until the construction and connection of a sanitary sewer in 1961.

Q.2.2.1.3 Mid-1970s through 2001

Buildings within the DOE LF3 Site supported development and testing of large sodium pumps.

Q.2.2.1.4 1986

Tank UT-12 (UT-55), a 1,000 gallon fuel-oil tank, was characterized and removed. Holes in the tank and stained soil were observed during tank removal. It was estimated that approximately 1,000 gallons of diesel/fuel-oil was released during removal. Forty-five cubic yards of contaminated soil were removed following the tank removal. Low total petroleum hydrocarbon (TPH)-diesel concentrations (10 to 1,400 milligrams per kilogram [mg/kg]) were detected in soil following over-excavation. The tank site is currently not closed.

Q.2.2.1.5 1999

Tank UT-72, a 1,500 gallon fuel-oil tank, was removed and confirmation sampling was conducted. Although diesel range organics were not detected in confirmation samples, metal concentrations in excess of background were detected in soil following removal. The tank site is currently not closed. The Ventura County Environmental Health Division transferred oversight of UT-72 to the Los Angeles Regional Water Quality Control Board in 1999.

Q.2.2.1.6 2000 through 2002

All sanitary leach fields were removed during this timeframe. Sampling of soil was conducted during removal, and only metals in excess of background concentration were noted.

Q.2.2.1.7 2001

Tank UT-75, a 500 gallon fuel-oil tank, was removed and soil was excavated to 9 feet bgs. The tank was found filled with mud at the time of removal. One hole was observed at the bottom, south end of the UST (1/16 inch x 3 inches). No staining of soil was observed. TPH-diesel and volatile organic compounds (VOCs) were not detected in soil samples collected following removal of the UST. The excavation was backfilled with native soil and compacted. The tank site was closed by Ventura County Environmental Health Division.

Q.2.2.2 Site Inventories

Inventories of buildings, tanks, transformers, and chemicals used at the DOE LF3 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, transformers, and other site features are shown in Figure Q.2-1. The inventories are included in the following tables:

- Building inventory – Table Q.2-1
- Storage tank inventory – Table Q.2-2
- Transformer inventory – Table Q.2-3
- Inventory of other site features – Table Q.2-4
- Spill inventory – Table Q.2-5

Q.2.3 DOE LF3 Site Chemical Use Areas

Chemical Use Areas are locations where chemicals were documented to have been (or potentially have been) used, stored, spilled, discharged, and/or disposed of. Based on the review of historical documents, 37 Chemical Use Areas were identified within the DOE LF3 Site boundary. Chemicals that were potentially used or stored in these Chemical Use Areas include VOCs, semivolatile organic compounds (SVOCs), TPH, polychlorinated biphenyls (PCBs), metals, inorganics, and energetics. Chemical use areas at the DOE LF3 Site are shown in Figure Q.2-1 and described in Table Q.2-8.

Q.2.4 Site Conditions

This section provides summaries of site conditions near the DOE LF3 Site, including topography, geology, soil, groundwater, surface water, and biology.

Q.2.4.1 General Conditions and Topography

The DOE LF3 Site is located within the east-central portion of Area IV. Portions of the site are currently active, and five structures remain. Topography in the central portion of the site slopes to the southeast. Current surface elevations at the DOE LF3 Site range from a low of approximately 1770 feet above mean sea level (msl) in the southeast portion of the site to a high of approximately 1820 feet msl in the southwestern portions of the site. A summary site conceptual model is presented in Table Q.2-8. Figures Q.2-3B through Q.2-3D present cross-sections developed for the DOE LF3 Site (Surficial Cross Sections I-I', K-K', and L-L'), detailing topography, locations and depths of alluvium, and the most recent available groundwater elevations. The locations of the cross-sections are shown in Figure Q.2-3A.

Q.2.4.2 Geology

The DOE LF3 Site is located north of the Coca Fault, with the majority of the site located in the Lower Burro Flats Member of the Upper Chatsworth Formation (Dibblee, 1992; MWH, 2002 and 2007C). The southeast corner of the site overlies the Storable Propellant Area (SPA) Member and a small portion of the Silvernale Member of the Upper Chatsworth Formation.

Beds of the Lower Burro Flats, SPA, and Silvernale Members generally strike N70°E and dip 25°NW. The Lower Burro Flats Member is predominantly composed of fine- and medium-grained sandstone with significant interbeds of siltstone and shale. The SPA Member is predominantly composed of interbedded fine-grained sandstone, siltstone, and shale. The Silvernale Member is predominantly composed of fine- and medium-grained sandstone with minor siltstone sandstone units. Figure 2-5 of the Group 5 RFI Report (Volume I) shows the geologic units represented within the RFI site. The locations of the Burro Flats Fault and the deformation bands are shown in Plate B-1 in Appendix B of the Group 5 RFI Report. Additional geologic information is presented in Appendix B of the Group 5 RFI Report.

Q.2.4.3 Soil

Throughout most of the DOE LF3 Site, soil typically range from approximately 0.5 foot to greater than 20 feet thick. A map depicting the distribution of alluvial soil within the Group 5 Reporting Area is provided as Figure 2-4 in the Group 5 RFI Report (Volume I). Soil within the former excavation areas consists of DTSC-approved soil from an onsite borrow area. Fill soil is primarily composed of fine-grained silty sands, clayey sandy silts, silty clays, and lean clay. Soil in the undisturbed areas of the site consist of weathered Chatsworth Formation materials, which are primarily fine-grained silty sands, clayey sands, sandy silts, lean clays, sandy-lean clays, and silt. Soil boring logs are included as Attachment Q-2 to this appendix.

Q.2.4.4 Groundwater

The groundwater system and monitoring network in RFI Group 5 is discussed in detail in Appendix B of the Group 5 RFI Report. In that appendix, Figure B-4 shows the locations of wells and piezometers that are used to monitor groundwater at and near the DOE LF3 Site. Figure Q.2-2 shows the locations of wells in and around the DOE LF3 Site.

At the DOE LF3 Site, three piezometers (PZ-005, PZ-104, and PZ-105) were installed to monitor groundwater conditions in alluvium and weathered bedrock (that is, in NSGW). Construction details for these piezometers are discussed in Tables B-2 and B-3 of Appendix B of the Group 5 RFI Report, and their locations are shown in Figure Q.2-2. No wells have been installed within the DOE LF3 Site to monitor groundwater conditions in the unweathered bedrock (that is, in CFOU groundwater).

NSGW is perched above CFOU groundwater in the DOE LF3 Site. A cross-sectional diagram of near-surface and Chatsworth Formation groundwater occurrence is shown in Figure B-6 in Appendix B of the Group 5 RFI Report. NSGW is encountered at depths ranging from 19 feet bgs (1782 feet msl) at piezometer PZ-005 to 20 feet bgs (1784 feet msl) at piezometer PZ-105. NSGW at the DOE LF3 Site flows to the east-southeast at a hydraulic gradient of approximately 0.03 to 0.04 foot per foot (ft/ft). NSGW at the DOE LF3 Site is laterally discontinuous and has limited areal extent. The occurrence of NSGW at the DOE LF3 Site is shown in plan view of Figure B-7 in Appendix B of the Group 5 RFI Report.

While there are no wells screened in the CFOU groundwater within the DOE LF3 Site, water level data for nearby well RD-20 indicate that CFOU groundwater is occurs at depths ranging from 40 to 45 feet bgs and flows to the southeast at a hydraulic gradient of approximately 0.05 ft/ft. The occurrence of CFOU Groundwater at the DOE LF3 Site is shown in plan view of Figure B-8 in Appendix B of the Group 5 RFI Report. Additional information related to CFOU groundwater at the DOE LF3 Site is presented in Appendix B of the Group 5 RFI Report.

Q.2.4.5 Surface Water

Surface water flow at the DOE LF3 Site is shown in Figure 2-7 of the Group 5 RFI Report (Volume I). Surface water may exist intermittently at the DOE LF3 Site as the result of seasonal precipitation events. While there are no perennial surface water bodies at the site, surface water flows southeast from the site to R-2 Discharge Ponds.

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

Los Angeles Regional Water Quality Control Board (RWQCB). One monitoring location, Outfall 018, is located downgradient of the site at the discharge of the R-2 Ponds (Figure 2-7 of the Group 5 RFI Report [Volume I]). This discharge point is the ultimate discharge point for a large portion of the western half of SSFL.

Q.2.4.6 Biology

In April 2008, a reconnaissance-level biological survey was conducted at the Group 5 RFI Sites. Biological conditions at the DOE LF3 Site, including habitat/vegetation types, are shown on Figure 2-10 of the Group 5 RFI Report (Volume I). The results of the biological survey and a qualitative plant evaluation are presented in Appendix A, Attachment A18.

Q.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 DOE LF3 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 5 RFI Report (Volume I), Section 5, Contaminant Transport and Fate – Potential migration via surface water flow
- Group 5 RFI Report (Volume II), Appendix A, Risk Assessment – Potential VOC migration from groundwater and subsurface soil to soil vapor, and from soil vapor to indoor and ambient air
- Group 5 RFI Report (Volume III), Appendix B, Groundwater Characterization – Potential migration from soil to groundwater and groundwater migration

Q.3.1 Sampling Objectives

Several soil and soil vapor samples were collected as part of the previous RFA, CCR, and preliminary RFI sample collection events (ICF, 1993; MWH, 2004). Based on the review of historical documents summarized in Section Q.1.2, additional soil and soil vapor samples were collected to further characterize the site based on the RFI DQOs. The process of selecting sampling locations, depths, and analytical methods considered objectives established in the Group 5 DQOs as summarized in the Group 5 RFI Report, Section 4.0 (Volume I).

To achieve these objectives, recent soil sampling was conducted as described in Tables Q.3-1A and Q.3-1B, with consideration of the following:

- Additional information regarding site use and observed site conditions
- Site sampling results and data trends
- Knowledge of chemical properties (such as mobility, volatility, and association with other chemicals)
- 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 comply with site-wide routine monitoring requirements and additional characterization objectives according to regulatory agency-approved work plans (see Section Q.3.2). Based on detected RFI site chemicals, chemical distribution, and site conditions, additional groundwater sampling and analysis were also conducted to complete characterization of individual RFI sites and to 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).

Q.3.2 Sampling Scope

A total of 186 soil matrix samples and 25 soil vapor samples was collected between August 1993 and June 2008 to assess potential impact associated with the Chemical Use Areas at DOE LF3 Site. Sampling locations and analytical suites were based on sampling results from previous investigations, additional facility information obtained from historical records, site inspections and/or personnel interviews, and historical and/or aerial photographs. Sampling summaries are presented in Tables Q.3-1A, Q.3-1B, and Q.3-1C. Sampling locations are shown in Figure Q.2-2.

NSGW has been sampled and analyzed according to agency-approved work plans (GRC, 1995a and 1995b; Ogden, 2000b). Three piezometers (PZ-005, PZ-104, and PZ-105) were used to characterize the NSGW at the DOE LF3 Site. Groundwater characterization data for the DOE LF3 Site are presented with the entire Group 5 groundwater data set in Appendix B of the Group 5 RFI Report.

In 2008, soil samples collected were submitted to two California-certified environmental laboratories—GEL Engineering Laboratories in Atlanta, Georgia, and Test America, Inc. in Arvada, Colorado. As an ongoing, additional QA measure, the field sampling effort consisted of collecting blind duplicates and split samples at a frequency of approximately 5 percent of primary samples. Blind duplicates were submitted along with the primary samples to the two environmental laboratories. Split samples were submitted for analyses to Lancaster Laboratories in Lancaster, Pennsylvania, a California-certified environmental laboratory previously designated for analyzing split samples only. Highest concentrations of usable data from primary, duplicate, and split samples were used when evaluating contamination at the site.

Based on a QA review conducted on soil and soil vapor sampling results, data have been deemed usable and comply with RFI Program requirements as defined by the QAPP in Appendix V of the Group 5 RFI Report. The RFI QA program included individual sample data validation and assessment of the performance of each laboratory, as well as a qualitative review of the precision, accuracy, representativeness, reliability, and completeness parameters for the datasets collected for this RFI. A summary of the data quality evaluation is presented in Attachment Q-3 of this report. Data quality evaluation of historical samples (collected prior to the beginning of the RFI in 1996) is described in the RFI Program Report (MWH, 2004). Site-specific data quality summaries for the DOE LF3 Site are described by media in the sections that follow.

This report presents the results of sampling, if the media exists at the RFI site, conducted during the RFI and previous investigations at the DOE LF3 Site, including results for the following media:

- Soil vapor
- Soil matrix
- Groundwater
- Surface water

Q.3.3 Key Decision Points

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

Site-specific characterization decision points are described in Table Q.3-2A. 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).

Q.3.4 Soil Matrix and Soil Vapor Findings

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

1. Present summaries of sampling results, including nature and extent of impacts
2. Evaluate the soil and soil vapor characterization and assess whether further sampling is warranted.
3. Indicate that soil and soil vapor volumes, for areas recommended for the CMS, can be estimated within a factor of 10 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 and soil vapor 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 and soil vapor analytical results to delineate CMS areas and estimate soil and soil vapor 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.

The evaluation of site characterization data for the DOE LF3 Site is provided in Table Q.3-3A.

Q.3.4.1 Soil and Soil Vapor Data Presentation

The results by chemical group are summarized in Figures Q.3-1 through Q.3-9. Relevant site information, sampling rationale, analytical results, and evaluation of results are presented in Table Q.3-2A. This table discusses the sampling approach for each chemical use area and a brief summary of the sampling results by chemical group, including:

- Column 1 –Chemical Use number.
- Column 2 – Chemical Use Area name.
- Column 3 – Chemical group sampled in a particular Chemical Use Area.

- Column 4 – Sampling scope and rationale for each chemical group in a particular Chemical Use Area.
- Column 5 – Abbreviated summary of sampling results for soil and soil vapor for each chemical group in a particular Chemical Use Area. (A more detailed site-wide summary is presented in Section Q.3.4.2 below.) As appropriate, sample results are compared to established SSFL background concentrations (metals and dioxins only) and/or SSFL risk-based screening levels (RBSLs).[1] The screening levels are also displayed in Tables Q.3-3A and Q.3-3B.
- Column 6 – Assessment of whether characterization 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.
- Column 7 – Assessment of whether the nature and extent of chemicals is defined sufficiently to estimate soil and soil vapor volumes (within a factor of 10) for areas that require further consideration in the CMS (if needed).

Q.3.4.2 Soil and Soil Vapor Data Summary

As detailed in Table Q.2-8, 37 individual confirmed and potential chemical use areas were investigated at the DOE LF3 Site. A summary of the chemicals detected above screening criteria is provided below by chemical analytical group. Concentrations denoted with a "J" flag indicate the results are estimated below the method reporting limits.

Q.3.4.2.1 Volatile Organic Compounds

A total of 25 soil vapor samples were collected at 22 locations and analyzed for VOCs. Of the 25 samples collected, 4 had detectable levels of VOCs, and results are shown in Figures Q.3-1A and Q.3-7.

- Benzene was detected above the Residential RBSL of 0.095 micrograms per liter (µg/L) in one sample collected from U5SV1038 at a depth of 9 to 10 feet bgs (0.1 µg/L).
- Toluene was detected above the Ecological RBSL of 0.084 µg/L in two samples collected from U5SV1038 at depths of 4 to 5 feet bgs (0.19 µg/L) and 9 to 10 feet (0.63 µg/L).
- Ethylbenzene, xylenes, and TCE were detected at concentrations that did not exceed their respective RBSLs.

Soil vapor sampling was also attempted at 9 additional locations in 2008 (Figure Q.3-1A). However, no vapor samples could be collected at these locations due to the presence of shallow bedrock (i.e., less than 5 feet bgs) or insufficient flow from the soil vapor wells to allow sample collection.

[1]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 the significance of detected chemical concentrations or if a Chemical Use Area will be recommended for further consideration in the CMS, but only to provide the reader another tool to evaluate the characterization data. The SRAM-based screening levels represent conservative concentrations that pose a low level of risk. See Appendix A in the Group 5 RFI Report.

A total of 33 soil samples were collected at 21 locations and analyzed for VOCs. Out of the 33 samples collected, 13 had detectable levels of VOCs, and results are shown in Figures Q.3-1B and Q.3-7.

- Benzene was detected above the Residential RBSL of 0.13 micrograms per kilogram (µg/kg) in one sample collected from UT-55-S2 at a depth of 10 feet bgs (28 µg/kg). Samples were collected from three step-out locations based on the exceedance at UT-55 S2. A sample was also collected at a greater depth (15 feet bgs) at UT-55-S2. Benzene was not detected in the step-down and step-out samples.
- Total xylenes were detected above the Residential RBSL of 150 µg/kg in two samples collected from UT-55-S1 at a depth of 10 feet bgs (1,200 µg/kg) and UT-55-S2 at a depth of 10 feet bgs (520 µg/kg). Samples were collected from three step-out locations based on the exceedances at UT-55-S1 and UT-55-S2. A sample was also collected at a greater depth (15 feet bgs) at UT-55-S1 and UT-55-S2. Total xylenes were not detected in the step-down and step-out samples.
- 1,1-Dichloroethene, acetone, ethylbenzene, methylene chloride, styrene, and toluene were detected at concentrations that did not exceed their respective RBSLs.

Further characterization of VOCs in soil is not recommended at the DOE LF3 Site.

Q.3.4.2.2 Semivolatile Organic Compounds

A total of 64 samples were collected at 43 locations and analyzed for SVOCs. Out of the 64 samples collected, 38 had detectable levels of SVOCs, and results are shown in Figures Q.3-2 and Q.3-8.

- Bis(2-ethylhexyl) phthalate, diethyl phthalate, dimethyl phthalate, di-n-butyl phthalate, and di-n-octyl phthalate were detected at concentrations that did not exceed their respective RBSLs.
- N-nitrosodimethylamine (NDMA) was detected above the Residential RBSL of 45 µg/kg in one sample collected from the former footprint of Building 4873 at U5BS1034 at a depth of 0 to 1 foot bgs (115 µg/kg).
- Of the 64 samples collected, 32 had detectable levels of polynuclear aromatic hydrocarbons (PAHs).
  - The following PAHs were detected above their respective Residential and/or Ecological RBSLs in a sample collected from U5BS1052 at a depth of 0 to 1 foot bgs:
    - Benzo(a)anthracene (2,190 µg/kg)
    - Benzo(a)pyrene (2,080 µg/kg)
    - Benzo(b)fluoranthene (2,210 µg/kg)
    - Benzo(k)fluoranthene (913 µg/kg)
    - Indeno(1,2,3-cd)pyrene (800 µg/kg)
    - Phenanthrene (4,830 µg/kg)

    Screening levels are shown in Table Q.3-3A. Samples were collected at three step-out locations based on the exceedances at U5BS1052. A sample was also collected at a greater depth (5 to 6 feet bgs) at U5BS1052. PAHs were not detected in the

step-down sample and, with exception to benzo(a)pyrene, were detected below their respective RBSLs in the step-out locations. Benzo(a)pyrene was detected above the Residential RBSL of 60 µg/kg in a sample collected from a step-out location (U5BS1408) at a depth of 0.5 to 1 foot bgs (296 µg/kg).

– 1-Methyl naphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(g,h,i) perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, naphthalene, and pyrene were detected at concentrations that did not exceed their respective RBSLs.

Q.3.4.2.3 Total Petroleum Hydrocarbons

A total of 82 samples were collected at 51 locations and analyzed for TPH. Of the 82 samples collected, 43 had detectable levels of TPH, and results are shown in Figures Q.3-3 and Q.3-8.

- Diesel-range organics were detected at concentrations (6,100 mg/kg and 14,000 mg/kg) exceeding the Residential RBSL of 1,400 mg/kg in samples collected from 10 feet bgs at UT-55-S1 and UT-55-S2. These samples were collected from the location of former UT-55 at the southwest corner of Building 4055. Step-out and step-down samples were collected surrounding these samples. Diesel-range organics were detected below the Residential RBSL in the step-down and step-out samples.
- Kerosene-range hydrocarbons (C11-C14 and C12-C14) and lubricating-oil-range hydrocarbons (C20-C30, C21-C30, and C25-C36) were detected at concentrations that did not exceed the Residential RBSL of 1,400 mg/kg.

Further characterization of petroleum hydrocarbons in soil is not recommended at the DOE LF3 Site.

Q.3.4.2.4 Polychlorinated Biphenyls

A total of 33 samples were collected at 31 locations and analyzed for PCBs. Of the 33 samples, 14 samples had detectable levels of PCBs, and results are presented in Figures Q.3-4 and Q.3-8.

- Aroclor 1260 was detected above the Ecological RBSL of 77 µg/kg in five samples as follows:
  - U5BX1015 at a depth of 0 to 1 foot bgs (330 J µg/kg)
  - XFBS16S01 at a depth of 1 foot bgs (150 J µg/kg)
  - Composite sample XFBS16 at a depth of 0.5 to 1 foot bgs (110 µg/kg)
  - XFBS16S02 at a depth of 1 foot bgs (91 J µg/kg)
  - XFBS18S02 at a depth of 0 to 0.5 feet bgs (83 J µg/kg)

  These samples were collected from locations near the northwest corner of Building 4462 at Substation 4762B. Aroclor 1260 was not detected at concentrations that exceed the Ecological or Residential RBSL in the step-down and step-out samples from these locations.
- Aroclor 1242 and Aroclor 1254 were detected at concentrations that did not exceed their respective RBSLs.

Further characterization of PCBs in soil is not recommended at the DOE LF3 Site.

Q.3.4.2.5 Metals/Inorganic Compounds

A total of 120 soil samples was collected from a total of 74 locations and analyzed for metals. At least one or more metals were detected at 70 of the 74 sampling locations, and results are shown in Figures Q.3-5, Q.3-9A, and Q.3-9B.

- Aluminum, barium, boron, cadmium, copper, lead, manganese, mercury, nickel, selenium, silver, vanadium, and zinc concentrations were detected above their respective background concentrations and Ecological RBSLs.
  - Aluminum (background concentration of 20,000 mg/kg and Ecological RBSL of 12 mg/kg) was detected at concentrations ranging from 8,840 mg/kg to 29,450 mg/kg. Aluminum was detected above its background concentration and Ecological RBSL in 39 samples collected from 26 locations. See Figures Q.3-9A and Q.3-9B for sample results.
  - Barium (background concentration of 140 mg/kg and Ecological RBSL of 15 mg/kg) was detected at concentrations ranging from 43.6 mg/kg to 290 J mg/kg. Barium was detected above its background concentration and Ecological RBSL in 20 samples collected from 19 locations. See Figures Q.3-9A and Q.3-9B for sample results.
  - Boron (background concentration of 9.7 mg/kg and Ecological RBSL of 6.76 mg/kg) was detected at concentrations ranging from 1.2 J mg/kg to 11.7 mg/kg. Boron was detected above its background concentration and Ecological RBSL in two samples collected from L5BS02 at a depth of 2.5 to 3 feet bgs (11.7 mg/kg) and L5BS01 at a depth of 2 to 2.5 feet bgs (11 mg/kg).
  - Cadmium (background concentration of 1 mg/kg and Ecological RBSL of 0.0045 mg/kg) was detected at concentrations ranging from 0.033 J mg/kg to 1.5 mg/kg. Cadmium was detected above its background concentration and Ecological RBSL in five samples collected as follows:
    - L6TS01S01 at a depth of 6 feet bgs (1.5 mg/kg)
    - L6TS02S01 at a depth of 8 to 8.5 feet bgs (1.5 mg/kg)
    - L8BS1003 at a depth of 0 to 1 foot bgs (1.3 mg/kg)
    - U5BS1027 at a depth of 0 to 1 foot bgs (1.1 mg/kg)
    - L6BS1000 at a depth of 0 to 1 foot bgs (1.05 mg/kg)
  - Copper (background concentration of 29 mg/kg and Ecological RBSL of 1.1 mg/kg) was detected at concentrations ranging from 6.7 mg/kg to 41.6 J mg/kg. Copper was detected above its background concentration and Ecological RBSL in two samples collected from U5TS1502 at a depth of 0.5 to 1 foot bgs (41.6 J mg/kg) and U5BS1060 at a depth of 0 to 1 foot bgs (30 J mg/kg).
  - Lead (background concentration of 34 mg/kg and Ecological RBSL of 0.013 mg/kg) was detected at concentrations ranging from 3.2 mg/kg to 123.45 mg/kg. Lead was detected above its background concentration and Ecological RBSL in one sample collected from U5BS1005 at a depth of 0 to 1 foot bgs (123.45 mg/kg).
  - Manganese (background concentration of 495 mg/kg and Ecological RBSL of 59 mg/kg) was detected at concentrations ranging from 205 J mg/kg to 567 mg/kg.

Manganese was detected above its background concentration and Ecological RBSL in one sample collected from L6TS01S01 at 6 feet bgs (567 mg/kg).

- Mercury (background concentration of 0.09 mg/kg and Ecological RBSL of 0.1 mg/kg) was detected at concentrations ranging from 0.004 J mg/kg to 6.7 J mg/kg. Mercury was detected above its background concentration and Ecological RBSL in 12 samples collected from 10 locations. See Figures Q.3-9A and Q.3-9B for sample results.
- Nickel (background concentration of 29 mg/kg and Ecological RBSL of 0.1 mg/kg) was detected at concentrations ranging from 8.6 J mg/kg to 32.1 mg/kg. Nickel was detected above its background concentration and Ecological RBSL in one sample collected from L6TS01S01 at a depth of 6 feet bgs (32.1 mg/kg).
- Selenium (background concentration of 0.655 mg/kg and Ecological RBSL of 0.17 mg/kg) was detected at concentrations ranging from 0.2 J mg/kg to 2.03 mg/kg. Selenium was detected above its background concentration and Ecological RBSL in seven samples collected as follows:
  - L8BS06 at a depth of 5 feet bgs (2.03 mg/kg)
  - L8BS05 at a depth of 5 feet bgs (1.6 mg/kg)
  - U5BS1059 at a depth of 0 to 1 foot bgs (1.05 J mg/kg) and at 5 to 6 feet bgs (0.99 J mg/kg)
  - BHBS1405 at a depth of 0 to 1 foot bgs (0.873 mg/kg)
  - U5BS1060 at a depth of 0 to 1 foot bgs (0.695 J mg/kg)
  - U5BS1033 at a depth of 5 to 6 feet bgs (0.67 J mg/kg).
- Silver (background concentration of 0.79 mg/kg and Ecological RBSL of 0.54 mg/kg) was detected at concentrations ranging from 0.16 J mg/kg to 6.613 J mg/kg. Silver was detected above its background concentration and Ecological RBSL in six samples collected as follows:
  - L5BS02 at a depth of 2.5 to 3 feet bgs (6.61 J mg/kg)
  - U5TS1502 at a depth of 0.5 to 1 foot bgs (2.85 mg/kg)
  - L8BS1400 at a depth of 0 to 1 foot bgs (1.25 mg/kg)
  - U5BS1071 at a depth of 0.5 to 1.5 feet bgs (0.982 J mg/kg)
  - U5BS1073 at a depth of 0.5 to 1.5 feet bgs (0.809 J mg/kg)
  - L8BS1003 at a depth of 0 to 1 foot bgs (0.8 J mg/kg)
- Vanadium (background concentration of 62 mg/kg, Ecological RBSL of 1.5 mg/kg) was detected at concentrations ranging from 24.1 mg/kg to 67.95 mg/kg. Vanadium was detected above its background concentration and Ecological RBSL in two samples collected from U5BS1069 at a depth of 0 to 1 foot bgs (68 mg/kg) and U5BS1071 at a depth of 0.5 to 1.5 feet bgs (67.9 J mg/kg). The elevated concentrations of vanadium may be consistent with naturally occurring concentrations in the soil derived from the Santa Susana Formation.

  - Zinc (background concentration of 110 mg/kg, Ecological RBSL of 21 mg/kg) was detected at concentrations ranging from 34.1 mg/kg to 333 mg/kg. Zinc was detected above its background concentration and Ecological RBSL in three samples collected from L8BS1003 at a depth of 0 to 1 foot bgs (333 mg/kg), U5BS1027 at a depth of 0 to 1 foot bgs (130 J mg/kg), and U5TS1502 at a depth of 0.5 to 1 foot bgs (117 mg/kg).

- Metals detected above background concentrations (but below their respective RBSLs) include beryllium, chromium, sodium, and thallium. Background concentrations for metals are included in Table Q.3-3A. Sodium was detected at concentrations ranging from 64.3 mg/kg to 730 mg/kg. RBSLs for sodium have not been established.

- Arsenic was detected in all 71 samples analyzed for arsenic. While all samples contained arsenic at concentrations exceeding the Residential and Ecological RBSLs for arsenic, all concentrations were below the background concentration for arsenic. Arsenic was detected at concentrations ranging from 2 J mg/kg to 9.85 J mg/kg. The low-level arsenic concentrations detected are considered to be naturally occurring, and nearly all arsenic concentrations in California exceed residential and ecological screening levels.

- Chromium was detected at concentrations ranging from 14.3 mg/kg to 40.8 J mg/kg. Chromium was detected above the background concentration of 36.8 mg/kg in one sample collected from U5BS1071 at a depth of 0.5 to 1.5 feet bgs (40.8 J mg/kg).

- A total of 14 samples was collected at nine locations and analyzed for perchlorate. Perchlorate was not detected in any of the samples collected.

Q.3.4.2.6 Dioxins

Dioxins were not identified as having been used previously at the DOE LF3 Site during the historical document review. Consequently, dioxins were not included for analysis at any sampling locations.

Q.3.4.2.7 Energetics

A total of 13 samples was collected at eight locations and analyzed for energetics. Of the 13 samples, 2 samples had detectable levels of energetics, and results are presented in Figures Q.3-4 and Q.3-9.

- 1,2-Dinitrobenzene was detected in two samples collected from L7BS01 at a depth of 1.5 to 2 feet bgs (3.7 J mg/kg) and L7BS02 at a depth of 2.5 to 3 feet bgs (3.8 J mg/kg) at the location of the former Building 4373 leach field. Screening levels have not been established for 1,2-dinitrobenzene. Since the leach field was removed in 2000, it is assumed that the soil that samples L7BS01 and L7BS02 were collected from has also been removed.

Further characterization for energetics is not recommended at the DOE LF3 Site.

Q.3.5 Groundwater Findings

Groundwater occurrence and impacts at the DOE LF3 Site are described below.

Q.3.5.1 Groundwater Data Presentation

Groundwater sampling results and characterization findings are summarized in Table Q.3-2B in this appendix and in Appendix B of the Group 5 RFI Report. The purpose of Table Q.3-2B is 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 Q.3-2A, Table Q.3-2B describes groundwater data by chemical group (such as metals, VOCs, and SVOCs). Table Q.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 for risk assessment purposes

A detailed compilation of groundwater data is provided in Appendix B of the Group 5 RFI Report. The groundwater appendix contains a description of hydrogeologic conditions (such as occurrence, water levels, recharge, and yield, for example), 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 the same characterization and transport-and-fate issues addressed in Appendix B of the Group 5 RFI Report.

Q.3.5.2 Groundwater Data Summary

Groundwater conditions in NSGW at the DOE LF3 Site are characterized by three piezometers (PZ-005, PZ-104, and PZ-105). Groundwater findings from these wells are

presented in Table Q.3-2B and in Appendix B of the Group 5 RFI Report. Although there are no CFOU groundwater wells located at the DOE LF3 Site, groundwater conditions in CFOU groundwater across Group 5 are discussed in Appendix B of the Group 5 RFI Report and the CFOU RFI Report.

As described in Appendix B of the Group 5 RFI Report, samples from the NSGW wells at the site (PZ-005, PZ-104, and PZ-105) were analyzed for VOCs, SVOCs, TPH, metals, inorganics, and energetics.

- TCE was detected above the groundwater screening level of 5 µg/L in five samples collected from the following:
  - PZ-005 on May, 25, 2001 (7 µg/L), and on April 10, 2002 (8J µg/L)
  - PZ-104 on April 10, 2002 (8.67 µg/L), and on June 3, 2003 (9 µg/L)
  - PZ-105 on April 9, 2002 (12 µg/L)

  Acetone, 1,1,2-trichloro-1,2,2-trifluoroethane, cis-1,2-dichloroethene, and tetrachloroethene were detected at concentrations that did not exceed their respective screening levels.
- Bis(2-ethylhexyl) phthalate was detected above the groundwater screening level of 4 µg/L in a sample collected from PZ-104 on April 10, 2002 (37 J µg/L). Diethyl phthalate was detected at concentrations that did not exceed its screening levels.
- TPH was not detected in any of the NSGW samples collected.
- Dissolved metals (antimony, barium, boron, chromium, iron, lead, magnesium, nickel, strontium, and zinc) were all detected below screening levels, except the following metals.
  - Copper was detected at a concentration of 9.2 µg/L in a sample collected from PZ-105 on February 18, 2008. This concentration exceeds the groundwater screening level of 4.7 µg/L.
  - Molybdenum was detected at a concentration of 29.8 µg/L in a sample collected from PZ-105 on February 18, 2008. This concentration exceeds the groundwater screening level of 2.2 µg/L.
  - Selenium was detected at a concentration of 2.6 µg/L in a sample collected from PZ-105 on February 18, 2008. This concentration exceeds the groundwater screening level of 1.6 µg/L.
  - Vanadium was detected at a concentration of 3.2 J µg/L in a sample collected from PZ-105 on February 18, 2008. This concentration exceeds the groundwater screening level of 2.6 µg/L.
- Chloride, fluoride, and sulfates were detected in NSGW samples at concentrations that did not exceed any screening levels. Bromide and nitrate were also detected in NSGW, but screening levels have not been established for these constituents.
- Energetics were not detected in any of the NSGW samples collected.

The source of the TCE, bis(2-ethylhexyl) phthalate, and metals detections in NSGW described above is indeterminate and does not appear to be related to impacts due to operations at the DOE LF3 Site. These constituents will be evaluated further in the forthcoming CFOU Groundwater RFI Report.

Q.3.6 Surface Water Findings

Soil within the DOE LF3 Site may have been impacted by upgradient sites via surface water transport. Specifically, lead, cadmium, nickel, and vanadium were detected at elevated concentrations in surface soil in upgradient sites (RIHL and Building 100 Trench Sites) that may have resulted in elevated concentrations of these metals in surface water drainage pathways. Of these metals, cadmium was the only metal detected above background concentrations in a sample collected from the surface water drainage pathway (at sample location L8BS1003). However, cadmium was not detected above its background concentration of 1 mg/kg in a sample collected approximately 50 feet downslope of this location within the surface water drainage (L8BS1400).

Near-surface soil within the DOE LF3 Site has been impacted by PAHs, PCBs, and metals. While it is possible that these constituents could have been mobilized during storm events and subsequently deposited at downstream sites, analytical data for soil samples collected from the surface water drainages (at locations L7BS1003, L7BS1400, L8BS1003, and L8BS1400) suggest that these constituents have not been transported beyond the DOE LF3 Site boundary. The most downstream of the soil samples collected from the drainage pathways did not contain these constituents at concentrations exceeding screening levels, suggesting that downstream sites have not been impacted by surface water runoff from the DOE LF3 Site.

Q.4 Risk Assessment Findings

The objective of this risk assessment (RA) is to determine whether the DOE LF3 Site could pose unacceptable risks that may require remedial action, or is eligible for an NFA designation.

The following sections summarize the findings of the HRA and ERA performed for the DOE LF3 Site. Details regarding how the HRA and ERA were conducted are presented in the SRAM (MWH, 2005) and in Appendix A of the Group 5 RFI Report. Details regarding how the site-specific HRA and ERA were conducted are presented in Appendix A, Attachment A14, of the Group 5 RFI Report.

Q.4.1 Key Decision Points

Site-specific key decision points for the HRA and ERA are listed below and described more fully in Appendix A and Attachment A14 of the Group 5 RFI Report. 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:

- Both direct (drinking water) and indirect (soil vapor) exposures to groundwater COPCs were evaluated in the risk assessment (Appendix A).
- Exposure point concentration (EPC) calculations were based on collected characterization data, as follows:
  - All CFOU Groundwater EPCs were based on maximum levels detected in a single highest-concentration well within Group 5, HAR-18, for both indirect and direct exposure. All NSGW EPCs were based on the maximum concentrations detected in all NSGW piezometers and wells within the DOE LF3 Site for both indirect and direct exposure.
  - A review of time-series plots for chemical constituents, groundwater gradients, and source areas indicates that maximum concentrations detected during the last consecutive 3 years conservatively represent potential future conditions for the purpose of estimating future risks.
  - Soil EPCs were calculated using ProUCL 4.0 following methods specified in the SRAM (MWH, 2005). Two EPCs were used—the central tendency exposure (CTE) and the reasonable maximum exposure (RME). The CTE was the arithmetic mean of the data, and the RME was the 95 percent upper confidence limit (95UCL) as calculated by ProUCL 4.0. In cases where the 95UCL exceeded the maximum detected concentration, the RME defaulted to the maximum detected concentration. In some cases, the CTE also exceeded either the RME or the maximum detected concentration due to differences in assumptions regarding distribution (the arithmetic mean assumes a normal distribution, whereas the method for calculating the 95UCL is based on data distribution) and handling of nondetected values in ProUCL 4.0. In these cases, the value selected as the RME EPC was also used for the CTE EPC.

- Large home-range receptors were assumed to live only in source areas within the DOE LF3 Site. Risks for these receptors using home-range adjusted exposures were calculated for the purpose of evaluating RFI-site-related risks. Large home-range receptor cumulative risk across the SSFL will be presented later in a site-wide summary large home-range receptor risk assessment report.

Q.4.2 Summary of Human Health Risk Assessment Findings

Potential risks were estimated for future urban residents (child and adult) and future recreational users (child and adult) of the DOE LF3 Site. A conceptual site model diagram for human health risk assessment is presented in Figure Q.4-1. A summary of COPCs and risk estimates for human health are presented in Table Q.4-1 and Table Q.4-2, respectively. Results of the risk characterization indicated the following:

- Soil – Benzo(a)pyrene was identified as a COC for direct contact with soil by future residents and future recreators. No COCs were identified for plant consumption by future residents.
- Soil Vapor – No COCs were identified for inhalation of indoor air by future residents. No COCs were identified for inhalation of ambient air by future residents or future recreators.
- NSGW – Tetrachloroethene, trichloroethene, and nitrate-N were identified as COCs for domestic use of shallow groundwater by future residents.
- CFOU Groundwater – COCs will be identified and addressed as part of the CFOU.

The uncertainties associated with the Group 5 RFI Sites in general were discussed in Appendix A. Uncertainties specific to the DOE LF3 Site are summarized in Table Q.4-3.

Q.4.3 Ecological Risk Assessment Findings

Potential risks were estimated for terrestrial plants, soil invertebrates, and terrestrial birds and mammals. A conceptual site model diagram for ecological receptors is presented in Figure Q.4-2, and a summary of risk estimate and chemicals of ecological concern (COECs) is presented in Table Q.4-4. Results of the risk characterization indicate the following:

- Soil – 1,2-Dinitrobenzene, Aroclor 1260, and PCB_toxicity equivalency quotients (TEQs) (birds and mammals) were retained as COECs. Aluminum, barium, cadmium, chromium, copper, mercury, nickel, vanadium, and zinc showed predicted risk but were not retained as COECs. Estimated risks were generally in the low or medium range. Hermit thrush and deer mouse were the most common receptors showing estimated risks. The metals were not retained because they were similar to background concentrations.
- Soil Vapor – No COECs. No chemicals exceeded soil vapor toxicity reference values (TRVs).

The uncertainties associated with the Group 5 RFI Sites in general are discussed in Appendix A of the Group 5 RFI Report. Uncertainties specific to the DOE LF3 Site are noted in Table Q.4-5.

Q.4.4 DOE LF3 Site Risk Assessment Conclusions

This section presents the overall conclusions for the DOE LF3 Site according to this RA. The RA provides a quantitative and qualitative appraisal of the actual or potential effects of contaminants on human health or terrestrial wildlife.

The potential sources of contamination to the DOE LF3 Site consist of process areas supporting the SNAP and SRE programs, including areas of nuclear materials development, component development and testing, material and chemical laboratories, and pump test facilities.

Potential risks associated with direct contamination of soil and soil vapor were assessed in this RA. Soil and soil vapor samples were collected and analyzed for VOC, SVOCs, TPH, metals, inorganics, PCBs, and energetics. Data were considered adequate to evaluate potential risks. Benzo(a)pyrene was identified as a COC in soil for direct contact with soil by future residents and future recreators. No COCs were identified in soil vapor for human health. 1,2-Dinitrobenzene, Aroclor 1260, and PCB_toxicity equivalency quotients (TEQs) (birds and mammals) were identified as COECs in soil during the ERA. No COECs were identified in soil vapor during the ERA.

Near-surface groundwater was analyzed for VOCs, SVOCs, TPH, metals, inorganics, and energetics. Tetrachloroethene, trichloroethene, and nitrate-N were identified as COCs for domestic use of shallow groundwater by future residents. CFOU groundwater will be addressed as part of the CFOU.

The locations within the DOE LF3 Site that will require further action to address human health and ecological risk include the southeast corner of Building 4462 and Substation 4762B near the northeastern corner of Building 4462.

Q.5 DOE LF3 Site Action Recommendations

This section presents a summary of RFI reporting requirements as applicable to the DOE LF3 Site. Section Q.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 are described in Section Q.5.2. Site action recommendations for the DOE LF3 Site are summarized in Sections Q.5.3, Q.5.4, and Q.5.5.

Q.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 DOE LF3 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 Q.3-2A and Q.3-2B). Section Q.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 B of the Group 5 RFI Site Report and other potential transport pathways in Appendix A of the Group 5 RFI Site Report.
3. Identifying potential receptors and estimating potential risks at the DOE LF3 Site (Section Q.4 and Appendix A).
4. Identifying DOE LF3 Site areas requiring further work (this section).

Q.5.2 Basis for Site Action Recommendations

In summary, site action recommendations included in the DOE LF3 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 the characterization and risk assessment findings. 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.

The site action recommendations listed above result from two evaluations described below. CMS or NFA Area recommendations are based on an integrated evaluation of characterization and risk assessment results. Stabilization Area recommendations rely on characterization evaluations, including transport and fate analysis, and comparison to risk based levels. Each process is described further below.

Q.5.2.1 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 5 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., 1×10^{-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 1×10^{-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 Q.5-1. CMS Areas are also depicted graphically in Figure Q.5-1 to illustrate locations and approximate areal extents, and summarized in Table Q.5-2.

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. Updates to this report will be prepared as needed.

Q.5.2.2 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) soil
- 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).

Q.5.3 CMS Site Action Recommendations

Based on the findings presented in this RFI report, portions of the DOE LF3 Site are recommended for CMS.

As presented in Section Q.4, the maximum cumulative human health risk for the DOE LF3 Site is 4×10^{-5} under a hypothetical future residential exposure scenario and 3×10^{-6} under a hypothetical future recreational exposure scenario. The maximum hazard indices under the hypothetical residential and recreational exposure scenarios are 12 and <0.01, respectively. The potential human health risks at the DOE LF3 Site exceed the low end of the risk management range (1×10^{-6}) (excess lifetime cancer risks [ELCRs]) and also exceed a Hazard Index of 1 (noncancer risks). Consequently, a CMS is recommended. As shown in Table Q.5-1, the primary contributors to the human health risk are:

- Benzo(a)pyrene in soil
- Tetrachloroethene, trichloroethene, and nitrate-N in NSGW

As presented in Section Q.4 for the ecological risk assessment, Aroclor-1260, 1,2-dinitrobenzene, and PCB_TEQs (birds and mammals) were retained as COECs in soil. Hazard quotients up to 54 were calculated in the ERA. Because these hazard quotient values exceed 1, a CMS is recommended to address ecological risks.

The following two CMS areas were identified to address the human health and ecological risks for the DOE LF3 Site:

- **DOE LF3 -1**: Southeast corner of Building 4462. The chemical risk driver is benzo(a)pyrene in soil.
- **DOE LF3 -2**: Northeast corner of Building 4462 at Substation 4762B. The chemical risk driver is Aroclor 1260. The presence of PCBs in soil is consistent with the historic use of PCBs at Substation 4762B.

The locations of these two CMS areas are presented in Figure Q.5-1 and described further in Table Q.5-2. As presented in Section Q.3.4.2.7, the soil from which the samples containing 1,2-dinitrobenzene, a COEC, were collected was most likely removed during removal of the Building 4373 Leach Field in 2000. Consequently, this area is not recommended for CMS.

While the HRA identified that the NSGW poses an unacceptable risk to future potential residential receptors, CMS areas were not developed to address COCs in NSGW. COCs in NSGW will be addressed in the forthcoming CFOU Groundwater RFI Report.

Q.5.4 NFA Site Action Recommendations

Based on a detailed review of all available historical documents, an evaluation of sample data collected at the site during previous investigations and the current RFI, including the results of human health and ecological risk assessments performed for the site, all areas of the DOE LF3 Site except the two CMS areas identified in the previous section are appropriate for an NFA designation. For the areas recommended for NFA, the sections below summarize the historical uses, the sampling data collected, and the results of the HRA and ERA.

The NFA recommendation for the DOE LF3 Site will be reevaluated, and if appropriate revised, in the future after the existing structures are demolished. Five buildings remain at the DOE LF3 Site (Buildings 4015, 4055, 4155, 4462, and 4463). As part of the planned demolition of these buildings, soil sampling will be performed, as needed, according to the process specified in SOP: Building Feature Evaluation and Sampling (MWH, 2008) to assess the potential for chemical impacts beneath the buildings. The NFA recommendation for the DOE LF3 Site will be re-evaluated based on the data collected following building demolition.

Q.5.4.1 Historical Uses

CH2M HILL performed a detailed review of all available historical documents, conducted site inspections, interviewed current and previous SSFL employees, and prepared comprehensive maps and tabulations of all information related to chemicals used, stored, or released at the DOE LF3 Site. There are no records available to indicate that chemicals were used, stored, or released at locations outside the Chemical Use Areas identified during the review of historical records. Each of these Chemical Use Areas was subject to site investigation, and sample collection and analysis. In addition, a number of buildings and site features that had no record of historical chemical uses were investigated during the RFI. Consequently, all suspect areas of the DOE LF3 Site were investigated and the findings presented and considered herein.

The area recommended for NFA at the DOE LF3 Site includes all portions of the site that are not recommended for CMS (Figure F.5-1), including the following Chemical Use Areas:

- Chemical Use Area 1 – Building 4353 (research and development laboratory)
- Chemical Use Area 2 – Building 4363 (metallurgical research and development laboratory)
- Chemical Use Area 3 – Building 4373 (SNAP reactor criticality tests)
- Chemical Use Area 4 – Building 4383 (instrumentation)
- Chemical Use Area 5 – Buildings 4375, 4874, and 4875 (Control Rod test tower and pad)
- Chemical Use Area 6 – Substation 4707
- Chemical Use Area 7 – Building 4374 (heat transfer loop testing)
- Chemical Use Area 8 – Substation 4883A
- Chemical Use Area 9 – Building 4055 (Nuclear Materials Development Laboratory)
- Chemical Use Area 11 – UT-75
- Chemical Use Area 12 – UST north of Building 4363
- Chemical Use Area 13 – UT-72
- Chemical Use Area 14 – UT-12 (UT-55)
- Chemical Use Area 15 – Building 4353 Leach Field
- Chemical Use Area 16 – Building 4363 Leach Field
- Chemical Use Area 17 – Building 4373 Leach Field
- Chemical Use Area 18 – Building 4383 Leach Field
- Chemical Use Area 19 – Substation 4760A
- Chemical Use Area 20 – Substation 4755
- Chemical Use Area 21 – Transformer Pole X14
- Chemical Use Area 23 – Substation 4760B
- Chemical Use Area 24 – Substation 4883B
- Chemical Use Area 25 – Substation 4853
- Chemical Use Area 26 – Transformer Pole A324
- Chemical Use Area 27 – Building 4473 (hydraulic test instrumentation facility)
- Chemical Use Area 28 – Building 4854 (radiation fuel gauge test structure)
- Chemical Use Area 29 – Building 4863 (hydraulic test loop)
- Chemical Use Area 30 – Building 4873 (fuel rod test tower and hydraulic test laboratory)
- Chemical Use Area 31 – Building 4015 (construction staging)
- Chemical Use Area 32 – Debris Area 3005
- Chemical Use Area 33 – Building 4463 (sodium cleaning and handling)
- Chemical Use Area 34 – Substation 4780
- Chemical Use Area 35 – Building 4461 (motor generator building)
- Chemical Use Area 36 – Building 4628 (hazardous materials storage)
- Chemical Use Area 37 – Building 4662 (small parts cleaning pad)

Available historical documentation indicates that operations at the Chemical Use Areas identified above might have involved the use of chemicals. However, the sampling data collected at and around these Chemical Use Areas demonstrate that historical activities have not resulted in significant impacts to the site. These sampling data are summarized in the following section.

Q.5.4.2 Sampling and Analysis Results

As presented in Section Q.3, the DOE LF3 Site, including the additional buildings and features identified within the site, were investigated during this RFI. Soil and soil vapor samples were collected and analyzed for VOCs; and soil samples were also analyzed for SVOCs, petroleum hydrocarbons, metals, inorganics, PCBs, and energetics.

Although VOCs, NDMA, and diesel range organics were detected in the area recommended for NFA at concentrations above their respective screening levels, the exceedances are isolated and, as described in Section Q.3.4.2, the lateral and vertical extents of VOCs and diesel range organics in soil are defined. In addition, PAHs were not detected at concentrations exceeding RBSLs in the area where diesel range organics were detected above RBSLs (Chemical Use Area 14).

While various metals were detected at concentrations above background concentrations and Ecological RBSLs in the area recommended for NFA, the detected concentrations were generally not significantly above background concentrations and are consistent with a random distribution across the site. These data suggest that the metals are naturally occurring.

The data for samples collected in the area of the DOE LF3 Site recommended for NFA support the conclusion that previous uses of this portion of the site have not resulted in a significant impact to the environment.

Q.5.4.3 Risk Assessment

The CMS recommendations address all of the constituents that contribute to unacceptable risks to future potential human and ecological receptors at the DOE LF3 Site. Therefore, an NFA designation is appropriate for the entire area outside the areas recommended for CMS at the DOE LF3 Site.

Q.5.5 Source Area Stabilization Site Action Recommendations

The DOE LF3 Site CMS areas do not require stabilization measures because the soil in these CMS areas is largely covered with concrete and the constituents in soil do not pose an imminent threat to human health or the environment. In addition, the CMS areas are not located within or adjacent to defined drainage pathways.

Q.6 References

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Tables

Table Q.2-1
Building Inventory
DOE LF3 RFI Site

Building Number	Start (Year)	End (Year)	Process/Chemical Use	Chemical Use Area Number	Comments	Reference
4015	1974	2004	Construction Staging Storage. Stored PCB filled capacitors (120 kg PCB liquid).	31		Sapere, 2005; Unknown, Date Unknown (HDMSE00187729); Rockwell International, 1985.
4055	1967	In Use (2005)	Nuclear Materials Development Facility, including chemistry laboratories, between 1967 and 1979. Activities that took place included analytical chemistry and research for uranium-plutonium scrap pellet recycling programs, fission research on microscopic dispersion of tungsten in uranium plutonium fuel, mixed uranium-plutonium oxide pellets for irradiation tests, liquid metal fast breeder reactors, demonstration of reduced transuranic solid waste with the use of a molten salt combustor, non-radiological research, and research, development, and production work with alpha emitting and/or highly radiotoxic nuclear and radioisotopic fuels. The products of operations in the building included solid reactor fuel materials, radio-isotope heat sources, and radiation sources. The chemistry laboratory involved the use of solvents, adhesives, and coatings (disposed of as hazardous waste). Two 1,000 gallon hold up tanks containing radioactive liquid waste were located at this building. In addition, CO2, He, N as gas and liquid were stored. Three incidents of radiological releases.	9		Boeing, 2006b; Boeing, 2006a.
4155	Unknown, but use likely started around time of Building 4055 (1967)	Unknown	Guard Shack	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4343 A	Unknown	Unknown	Time Clock south of building 4015, seen on ETEC Industrial Planning Maps from 1962-1975.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4343 B	Unknown	Unknown	Time Clock south of building 4461, seen on ETEC Industrial Planning Maps from 1977-1992.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4353	1956	1970s	Used for sodium mass transfer studies during the 1960s. Research and Development Laboratory Building; General Storage, including explosives. Previously identified as "Organics Reactor Development Building" and "Diffusion Coating Experiment Building" and "Hypersonic Flow Test Facility". Asbestos Removal.	1		MWH, 2003.
4363	1950s (between 1953 and 1957)	1963	Used as a metallurgical research and development laboratory for post-test examination of SRE components. Mechanical Component Development and Counting Building, sodium systems in support of SRE (1957-1963). 4 working bays. Contamination resulting from work on a contaminated sodium component from the SRE Core I accident (1959; uranium & mixed fission products). Tetralin (tetrahydronaphthalene), NaK, and kerosene were used as service coolants on the SRE. Primarily used for storage since 1963. Demolished in 2001.	2		MWH,2003; Atomics International, 1961.
4373	1956	1999	Used to manufacture high-energy rocket fuels. Also used to test large rocket engines (1954 to 1956). Used for conducting SNAP reactor criticality tests (SCA-1, S2ERC, SCA-2, SCA-3, and SCA-4C) (1957-1963). Critical assembly research to support SNAP. Uranium and beryllium were used at this time. Turned into sodium heat transfer facility in 1960. Sodium and mercury used at this time. Solid propellant mixing and casting. NaK, RuK, Hg, K test loops. 5 test bays. Used for storage of heat transfer equipment after 1964. Pump Bearing Facility - used for proof and performance testing of sodium lubricated bearings for the Liquid Metal Fast Breeder Reactor prototype pumps and main heat transfer pumps of the Fast Flux Test.	3		MWH, 2003; Sapere, 2005.
4374	1956	1996	Non-nuclear liquid metal heat transfer loops testing.	7		Sapere, 2005.
4375	1959	1999	Test shelter for control-rod test towers at Buildings 4874 and 4875. Barrel storage around the building after the building was abandoned.	5		Sapere, 2005.
4383	>1962	early 1980s	Identified as "Instrumentation Building" and "Assembly and Testing Building". Liquid Metal Engineering Center Assembly and Testing and Construction Staging.	4		MWH, 2003.
4393	>1962	early 1980s	Serviced Building 4383.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.

Table Q.2-1
Building Inventory
DOE LF3 RFI Site

Building Number	Start (Year)	End (Year)	Process/Chemical Use	Chemical Use Area Number	Comments	Reference
4461	1977	Unknown	Sodium Pump Test Facility Motor Generator Building. Small acid spill on June 8, 1990. Solar panel construction.	35		MWH, 2003a; Rocketdyne, Date Unknown; Rockwell International, 1994; Sapere, 2005; ETEC, 1991.
4462	1974	2001	Sodium Pump Test Facility. Provided test beds for development, performance, and verification testing of large sodium pumps. Approximately 30 to 60 gallons of diesel fuel was released from an emergency generator located on the northeast side of the building. In addition, 1,400 gallons of ethanol and water, 200 pounds of metallic sodium, 0.2 gallons of oil, and 2 gallons of coolant were released between 1995 and 2004. Two sodium fires (in 1994 and 1995).	10		Boeing, 2002; Unknown, Date Unknown (HDMSE00107475); Rockwell, 1984; Salazar, 1994; Unknown, Date Unknown (HDMSE00187729).
4463	1974	Current	Sodium Cleaning and Handling Facility. Used to assemble, disassemble and clean pumps and other parts of the SPTF. Used isopropanol and denatured alcohol for parts cleaning. "Solvent cleaning/hand wipe operations" also reported (i.e., only small quantities of solvents) in 2006.	33	500-8,000 gal spill of isopropanol or denatured ethanol occurred on 6/30/82; spill was reportedly cleaned up (HDMSE00025429)	Sapere, 2005; Unknown, Date Unknown (HDMSE00407395); Unknown, Date Unknown (HDMSE00025429); Boeing, 2006.
4473	Unknown	2003	Hydraulic Test Instrumentation Facility. Tests on piping, pumps, and other loop components using water.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4482	1968	2000	Office Building. Government Project Office.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4483	1968	2000	Offices.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4484	1969	2000	Offices.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4485	1968	2000	Offices. A small quantity (1 gallon) of hydraulic oil was released from a forklift hydraulic hose to dirt and pavement in 1999.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005; Unknown, Date Unknown (HDMSE00187729).
4486	1968	2000	Offices.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4487	1981	2004	Offices. ETEC Building. Safety Health and Environmental Affairs Office. A very small quantity (0.1 gallons) of diesel was released from a truck in 1998.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005; Unknown, Date Unknown (HDMSE00187729).

Table Q.2-1
Building Inventory
DOE LF3 RFI Site

Building Number	Start (Year)	End (Year)	Process/Chemical Use	Chemical Use Area Number	Comments	Reference
4628	Unknown	Unknown	Hazardous Materials Storage Building. Used for the storage of NaK, mercury, and lithium hydroxide.	36		Atomics International, 1964.
4662	1981 (approximate)	Current	Small Parts Cleaning Pad. Concrete pad used for cleaning sodium off parts in support of SPTF. Located approximately 90 feet southwest of Building 4463.	37		Sapere, 2005.
4848	Unknown, but uses likely started around the time of Building 4373 (1956)	Unknown, but uses likely ended around the time of Building 4373 (1999)	Concrete Pad	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4854	1964-1967	late 1990s	Radiation Fuel Gauge Test Structure	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4863	1961	2003	Hydraulic Test Loop - tests on piping, pumps, and other loop components using water. Cooling tower associated with building.	29		Sapere, 2005.
4873	>1967	2003	Fuel Rod Test Tower (1967) and Hydraulic Test Laboratory. Engineers established the parameters of experiments for hydraulic testing.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4874	late 1950s	early 1970s	Control Rod test tower and pad. Non-nuclear facility for testing SNAP control rod assemblies for the Piqua Organic Moderated Reactor (OMR) through 1968. Later used for barrel storage (possibly containing radioactive material). A radiological survey was conducted at the site in 1988 and 1996 and results were below the acceptable limits.	5		Sapere, 2005.
4875	late 1950s	mid 1970s	Control rod test tower. Non-nuclear facility for testing SNAP control rod assemblies for the Piqua Organic Moderated Reactor (OMR) through 1968. Later used for barrel storage (possibly containing radioactive material). A radiological survey was conducted at the site in 1988 and results were below the acceptable limits.	5		Sapere, 2005.
4XXX	Unknown	Unknown	Unknown. Located north of the Building 4363 Leach Field.	N/A	No chemical uses based on available information on operations at this building.	
4XXX	Unknown	Unknown	Unknown. Located south of the Building 4363 Leach Field.	N/A	No chemical uses based on available information on operations at this building.	

Table Q.2-2
Tank Inventory
DOE LF3 RFI Site

Tank ID	Location	Size (gallons)	Contents	Use Period	Use Status	Regulatory Closure Status	Additional Information	Chemical Use Area Number	Comments	Reference
Aboveground Tanks										
T-1	Building 4863	1,000	DI Water	Unknown	Inactive	N/A		N/A		Rockwell International, 1992.
T-2	Building 4863	8,000	DI Water	Unknown	Inactive	N/A		N/A		Rockwell International, 1992.
T-5	Building 4863	1,500	DI Water	1981 to Unknown	Inactive	N/A		N/A		Rockwell International, 1992.
T-12	Building 4863	16,000	DI Water	1979 to Unknown	Inactive	N/A		N/A		Rockwell International, 1992.
T-156	Building 4863	10,000	DI Water	Unknown	Inactive	N/A		N/A		Rockwell International, 1992.
CHCF T-1	Building 4463	31,000	Alcohol	1983	Present, Inactive	N/A	Tank may have contained sodium and not alcohol.	33	Exact location not known.	Rockwell International, 1992d.
CHCF T-2	Building 4463	21,400	Alcohol	Unknown	Present, Inactive	N/A	Tank may have contained sodium and not alcohol.	33	Exact location not known.	Rockwell International, 1992d.
T-4	South side of Building 4463	12,000	Alcohol	Unknown	Present, Inactive	N/A	Tank may have contained sodium and not alcohol.	33	Exact location not known.	Rockwell International, 1992d.
WEST T-1	Building 4463	7,700	Sodium	1965	Removed	N/A	Stainless steel construction Located west of Bldg 4463.	33	Exact location not known.	Rockwell International, 1992d.
Unknown	Bldg 4463 South	4,000	Sodium	Unknown	Unknown	N/A	Stainless steel construction Located south of Bldg 4463.	33	Exact location not known.	Rockwell International, 1992d.
WEST T-3	Building 4463	4,000	Sodium	1958	Removed	N/A	Stainless steel construction Located west of Bldg 4463.	33	Exact location not known.	Rockwell International, 1992d.
WEST T-5	Building 4463	5,000	Sodium	1980	Removed	N/A	Stainless steel construction Located west of Bldg 4463.	33	Exact location not known.	Rockwell International, 1992d.
M-403	Building 4462	Unknown	Unknown	Unknown	Unknown	N/A		N/A		
T-103	Building 4462	Unknown	Unknown	Unknown	Unknown	N/A		N/A		
T-120	Building 4462	Unknown	Unknown	Unknown	Unknown	N/A		N/A		
T-124	Building 4462	Unknown	Unknown	Unknown	Unknown	N/A		N/A		
Underground Tanks										
UT-75	At northeast corner of Building 4353.	500	Fuel-oil	1961 to 1970	Removed	Closed by the VCEHD in 2001.	Single compartment, single-walled, un-lined.	11		MWH, 2003
UST	North of Building 4363 (at eastern end)	Unknown	Fuel-oil	Unknown	Unknown	Regulated under Corrective Action		12		MWH, 2003; Pifko, 1998
UT-72	On eastern side of Building 4373	1,500	Fuel-oil	through 1999	Removed	Regulated under Corrective Action	Mercury was detected at elevated concentrations in surrounding soil during UST removal.	13		MWH, 2003; Ventura Environmental Health Division, 1999
UT-12 (UT-55)	Southwest corner of Building 4055	1,000	Fuel-oil	Unknown	Removed	Regulated under Corrective Action	Used to power an emergency generator at Building 4055.	14		Unknown, 1994; Unknown, 1989; Rockwell International, 1986
UT-13	At Building 4055	1,000	Radioactive Waste	Unknown	Removed	Regulated under Corrective Action	Removed in December 1986.	N/A	No chemical uses based on available information on tank contents.	Unknown, 1994; Unknown, 1989
UT-56	At Building 4055	185	RA Hold Up	Unknown	Removed	Regulated under Corrective Action		N/A	No chemical uses based on available information on tank contents.	Unknown, 1994
UT-57	At Building 4055	230	RA Hold Up	Unknown	Removed	Regulated under Corrective Action		N/A	No chemical uses based on available information on tank contents.	Unknown, 1994
UT-34	South of Building 4462	36,000	Sodium	1974 to 1998	Removed	Regulated under Corrective Action	Stainless Steel Vaulted	10		Boeing, 1999
UT-35	South of Building 4462	35,000	Sodium	1978 to 1998	Removed	Regulated under Corrective Action	Stainless Steel Vaulted	10		Boeing, 1999
Undetermined Tanks										
Unknown	Building 4462	500	Diesel #2	Unknown	Unknown	Regulated under Corrective Action		10	May be aboveground or underground.	Boeing, 1999c

Table Q.2-3
Transformer Inventory
DOE LF3 RFI Site

Transformer/ Substation Number	Location	Use Period	Use Status	Description	Chemical Use Area Number	Comments	Reference
4707	Near intersection of 22nd and G Streets	Unknown	Not in Use	Electrical Substation	6		Sapere, 2005.
4755	Southwest corner of Building 4055	Unknown	Not in Use	Electrical Substation	20		Sapere, 2005.
4760 A	South of Building 4462	Unknown	Not in Use	Electrical Substation	19		Sapere, 2005.
4760 B	East of Building 4462	Unknown	Not in Use	Electrical Substation	23		Sapere, 2005
4762 B	East side of Building 4462	Unknown	Not in Use	Electrical Substation	22	Visible leakage/staining observed at transformer.	Transformer Inspection Record, 2000.
4780	Approx. 100 feet north of Building 4463	Unknown	Removed	Former electrical substation.	34		Sapere, 2005.
4853	North of Building 4353	Unknown	Not in Use	Electrical Substation	25	Concrete pad was removed in 2001 during septic tank removal.	Sapere, 2005.
4883 A	Southeast corner of Building 4487 (Based on 1962 Maps)	Unknown	Not in Use	Electrical Substation	8		Sapere, 2005.
4883 B	Southwest corner of Building 4487 (Based on 1971-78 Maps)	Unknown	Unknown	Electrical Substation	24		Sapere, 2005.
A324	Co-located with Building 4373 Leach Field	Unknown	Not in Use	Pole Mounted Transformer	26		Unknown, 2000.
X14	North of Building 4055	Unknown	Not in Use	Pole Mounted Transformer	21		

Table Q.2-4
Inventory of Other Site Features
DOE LF3 RFI Site

Feature ID	Location	Use Period	Use Status	Process/Chemical Use	Chemical Use Area Number	Comments	Reference
Building 4353 Leach Field	East of Building 4353	Late 1950s through early 1960s	Not in Use	The leach field comprised a total of 200 linear feet across two leach field lines. Received sanitary wastes from a septic tank located east of Building 4353. Likely consisted of 4-inch diameter terra cotta clay piping surrounded by gravel, buried at depths ranging from 2 to 6 feet bgs. Removed in 2001.	15		MWH, 2003a.
Building 4363 Leach Field	Northeast of Building 4363	Late 1950s through early 1960s	Not in Use	The leach field comprised a total of 200 linear feet across two leach field lines. Received sanitary wastes from a 1,500 gallon septic tank located east of Building 4363. Consisted of 4-inch diameter terra cotta clay piping surrounded by gravel, buried at depths ranging from 2 to 6 feet bgs. Removed in 2002.	16		MWH, 2003a.
Building 4373 Leach Field	South of Building 4373	Late 1950s through early 1960s	Not in Use	The leach field comprised a total of 300 linear feet. Received sanitary wastes from a septic tank located outside of Building 4373. Likely consisted of 4-inch diameter terra cotta clay piping surrounded by gravel, buried at depths ranging from 2 to 6 feet bgs. Removed in 2000.	17		MWH, 2003a.
Building 4383 Leach Field	Northeast of Building 4383	Late 1950s through early 1960s	Not in Use	The leach field comprised a total of 300 linear feet across three leach field lines. Received sanitary wastes from a septic tank located outside of Building 4383. Consisted of 3-inch diameter terra cotta clay piping surrounded by gravel, buried at depths ranging from 2 to 6 feet bgs. Removed in 2000.	18		MWH, 2003a.
Debris Location 3005	East of Building 4015	Unknown	Unknown	A long debris pile in the open field. The pile appears to be construction debris materials (soil, asphalt, and concrete) likely from former SSFL demolition activities.	32		CH2M HILL, In Progress

Table Q.2-5
Spill Inventory
DOE LF3 RFI Site

Date	Building/ Feature	Chemical Spilled	Amount (gallons)	Comments	References
2/17/93	4055	Sodium Nitrite	8	An air conditioning unit was struck by a forklift, causing a copper tube in the unit to split and releasing 8 gallons of CST 92. CST 92 is a biodegradable corrosion inhibitor containing sodium nitrite.	Rockwell International, 1993.
2/21/86	4055	Diesel Oil	1,000	On 2/21/1986, UT-55 was removed at the southwest corner of Building 4055. The tank had leaked and released number 2 diesel fuel to the surrounding soil. The tank and soil were removed and no groundwater was encountered. This release is addressed with Chemical Use Area 14.	Unknown, Date Unknown. (HDMSE00107875)
2/12/93	4055	Diesel Oil	3 to 5	On 2/12/1993, diesel fuel was spilled near Building 4055 and Building 4641. This release is addressed with Chemical Use Area 9.	Unknown, 1996.
9/17/84	4462	Diesel Fuel	30-60	On 9/17/1984, control center received a call stating an emergency generator on the northeast side of Building 4462 was leaking diesel fuel. The fuel leak drained to 22nd St. drainage, into a pipe underneath G St. and out to Silvernale Reservoir. This released is addressed by Chemical Use Areas 10, 38, and 39 and drainage sampling.	Rockwell, 1984.
June 1995	4462	Ethanol and Water	1,400	Spill was due to a broken gauge in the storage tank.	Unknown, Date Unknown. (HDMSE00187729)
Sep. 1995	4462	Metallic Sodium	200 lbs.	Spill was due to a leaky pipe.	Unknown, Date Unknown. (HDMSE00187729)
Mar. 1996	4462	Oil	0.2	A forklift crash caused oil to be spilled on the street.	Unknown, Date Unknown. (HDMSE00187729)
6/2/04	4462	Coolant	2	A forklift's lower radiator hose came loose, leaking an estimated 2 gallons of coolant to be released in front of Building 4462.	Unknown, Date Unknown. (HDMSE00187729)
6/30/82	4463	Isopropanol or denatured ethanol	500 to 8,000	Spill of approximately 500 to 8,000 gallons of isopropanol or ethanol at Building 4463. This spill was cleaned up following the release.	Rockwell International, Date Unknown.

Table Q.2-6
Investigations History
DOE LF3 RFI Site

Chemical Use Area Number	Chemical Use Area Name	Date	Purpose	COPCs Analyzed	COPCs Reported	Comments	Reference
3	Building 4373	12/5/1997	Soil: Sampling to evaluate potential impacts in area where standing liquid was observed on historical photograph.	VOCs, TPH, SVOCs, perchlorate, energetic compounds.	Mercury		MWH, 2003a.
11	UT-75	4/24/2001	Sampling at UT-75 prior to tank removal. Sample may have been collected from tank contents (reported as mud).	TPH, VOCs, metals, pH, PCBs.	TPH, pH, select VOCs, and select metals were detected.		Ventura County Environmental Health Division, 2001.
14	UT-12 (UT-55)	July 1995	Soil: Further characterize TPH detected during tank removal in 1986. Two borings (UT-55-S1 and UT-55-S2) were advanced and soil samples were collected at 10 and 15 feet bgs.	TPH-diesel, BTEX	Diesel Range Hydrocarbons and BTEX compounds were detected at elevated concentrations in the sample collected from 10 feet bgs. Non-detect/low concentrations were reported in the 15 feet bgs sample.		Ogden, 1997.
14	UT-12 (UT-55)	1/22/1998	Soil: Define the vertical and lateral extent of contamination detected during July 1995. Three borings advanced (B5BS01, B5BS02, B5BS03) and 7 soil samples were collected.	Gasoline, kerosene, diesel, oil, VOCs	TPH was detected at a maximum concentration of 1,000 mg/kg, VOCs were not detected.	Based on the results of this investigation, a request for closure of UT-12 was made.	Ogden, 1998.
15	Building 4353 Leach Field	8/25/1993	Soil Vapor: CCR Sampling in all leach fields	VOCs	VOCs not detected.		MWH, 2003a.
15	Building 4353 Leach Field	1/16/2001	Soil: 2 samples collected at influent and down slope ends of the leach field, immediately below the leach lines and gravel.	TPH, SVOCs, metals, pH, VOCs	Silver detected above the field action level at the down slope end of the leach field.	DOE LF RFI Report calculated residual human health cancer risks up to 2X10-6 and HIs up to 5.3 (based on assumption that groundwater is potable). HIs up to 0.076 calculated in the ERA. The report recommended implementation of an administrative control to prevent use of groundwater as a drinking water source.	MWH, 2003a.
16	Building 4363 Leach Field	4/2/2002	Soil: Exploratory trenching and soil sampling at influent and down slope ends of the leach field. Samples collected immediately beneath leach field gravel.	Metals, TPH, SVOCs, pH.	Aluminum detected above its background concentration.	DOE LF RFI Report calculated residual human health cancer risks up to 2X10-6 and HIs up to 5.3 (based on assumption that groundwater is potable). HIs up to 0.076 calculated in the ERA. The report recommended implementation of an administrative control to prevent use of groundwater as a drinking water source.	MWH, 2003a.
16	Building 4363 Leach Field	7/18/2002	Soil vapor	VOCs	VOCs not detected.		MWH, 2003a.
17	Building 4373 Leach Field	8/24/1993	Soil Vapor: CCR Sampling in all leach fields	VOCs	VOCs not detected.		MWH, 2003a.
17	Building 4373 Leach Field	12/12/2000	Soil: Exploratory trenching and soil sampling. Samples were collected 0 to 1.5 feet below the leach lines.	TPH, VOCs, SVOCs, metals, perchlorate, energetic compounds	Aluminum and thallium detected above field action levels. TPH, SVOCs, VOCs, perchlorate, and energetic constituents not detected.	DOE LF RFI Report calculated residual human health cancer risks up to 2X10-6 and HIs up to 5.3 (based on assumption that groundwater is potable). HIs up to 0.076 calculated in the ERA. The report recommended implementation of an administrative control to prevent use of groundwater as a drinking water source.	MWH, 2003a.
17	Building 4373 Leach Field	7/18/2002	Soil vapor	VOCs	VOCs not detected.		MWH, 2003a.
18	Building 4383 Leach Field	8/24/1993	Soil Vapor: CCR Sampling in all leach fields	VOCs	VOCs not detected.		MWH, 2003a.
18	Building 4383 Leach Field	4/13/2000-5/8/2000	Soil: Exploratory trenching and soil sampling at influent and down slope ends of the leach field.	Metals and TPH.	Selenium detected above the field action level. TPH not detected.	DOE LF RFI Report calculated residual human health cancer risks up to 2X10-6 and HIs up to 5.3 (based on assumption that groundwater is potable). HIs up to 0.076 calculated in the ERA. The report recommended implementation of an administrative control to prevent use of groundwater as a drinking water source.	MWH, 2003a.
22	Substation 4762	8/20/2004	Soil	PCBs and inorganics	PCBs were detected above risk-based screening levels.		

Table Q.2-7
Site History - Soil Disturbance
DOE LF3 RFI Site

Chemical Use Area Number	Chemical Use Area Name	Date	COPCs Targeted	Media	Key Activities	Status	Reference
11	UT-75	6/13/2001	VOCs, Diesel Range Hydrocarbons	Soil	UST removal and soil excavation to 9 feet bgs. Tank was found filled with mud at the time of removal. One hole observed at bottom, south end of UST (1/16" x 3"). No staining observed. Diesel Range Hydrocarbons and VOCs were not detected in soil samples collected following removal of the UST. The excavation was backfilled with native soil and compacted.	Closed	CDM, 2001; Ventura County Environmental Health Division, 2001.
13	UT-72	4/6/1999	VOCs, TPH, metals, lead	Soil	UST removal and confirmation soil sampling. Metals were detected in soil. Mercury contamination noted in correspondence from Ventura County Environmental Health Division. VOCs, TPH, and organic lead were not detected.	Not closed	MWH, 2003a; Ventura County Environmental Health Division, 1999.
14	UT-12 (UT-55)	2/21/1986	Diesel Range Hydrocarbons/ Fuel-oil Range Hydrocarbons	Soil	UST Removal. Holes in the tank resulted in releases of diesel/fuel-oil (approximately 1,000 gallons) to the subsurface. Staining was observed during tank removal. 45 cubic yards of soil were removed during tank removal due to releases from the tank. Low concentrations (10 to 1,400 mg/kg) of Diesel Range Hydrocarbons were detected in soil following over-excavation.	Not closed	Rocketdyne, 1986; Ogden, 1997.
15	Building 4353 Leach Field	2001	N/A		Leach field removal to a depth of 3 feet bgs.	Not closed	MWH, 2003a.
16	Building 4363 Leach Field	2002	N/A		Leach field removal. Excavation performed to a depth of approximately 9 feet bgs.	Not closed	MWH, 2003a.
17	Building 4373 Leach Field	2000	N/A		Leach field removal to a depth of approximately 3 feet bgs.	Not closed	MWH, 2003a.
18	Building 4383 Leach Field	2000	N/A		Leach field removal	Not closed	MWH, 2003a.

Table Q.2-8
Chemical Use Summary
DOE LF3 RFI Site

Chemical Use Area Number	Chemical Use Area Name	Potential Chemicals Used/Stored	Chemical Use Area Types and Typical Target Analytical Suites														
			Solvent	Petroleum Fuels		Hydrazine-Related Compounds	Oil-Related Materials	Metal Wastes (exclusive of debris areas)	Debris Areas/ Fill	Energetic Constituents	Transformers	Leach Field	Non-metal Inorganic Compounds	Non-metal Inorganic Compounds		Acids/ Bases	
			VOCs	TPH, VOCs [1]	SVOCs	VOCs, SVOCs (Hydrazines, formaldehyde, NDMA, UDMH, and MMH)	SVOCs, TPH, PCBs, Metals	Metals, pH	TPH, Metals, VOCs, SVOCs, PCBs, Dioxins [2]	Energetics, Metals	PCBs	Site Specific	Fluoride, Chloride, Nitrate, Sulfate, Bromide	Perchlorate	Dioxins, Furans	pH	Asbestos
1	Building 4353	Energetics								X							
2	Building 4363	Metals, Solvents, Kerosene, Naphthalene	X	X	X	X		X									
3	Building 4373	TPH, solvents, metals (including mercury), propellants	X	X				X									
4	Building 4383	Solvents	X														
5	Buildings 4375, 4874, and 4875	Unknown (Barrel Storage)	X	X	X	X		X									
6	Substation 4707	PCBs									X						
7	Building 4374	Solvents, metals	X					X									
8	Substation 4883 A	PCBs									X						
9	Building 4055	Solvents, Metals	X					X									
10	Building 4462	TPH, metals		X				X									
11	UT-75	TPH, VOCs (including naphthalene)	X	X													
12	UST (north of Building 4363)	TPH		X													
13	UT-72	TPH, mercury		X				X									
14	UT-12 (UT-55)	TPH		X													
15	Building 4353 Leach Field	Assumed to be the same as those for Building 4353 [3]								X		X					
16	Building 4363 Leach Field	Assumed to be the same as those for Building 4363 [4]										X					
17	Building 4373 Leach Field	Assumed to be the same as those for Building 4373 [5]										X					
18	Building 4383 Leach Field	Assumed to be the same as those for Building 4383 [6]										X					
19	Substation 4760 A	PCBs									X						
20	Substation 4755	PCBs									X						
21	Transformer Pole X14	PCBs									X						
22	Substation 4762 B	PCBs									X						
23	Substation 4760 B	PCBs									X						
24	Substation 4883 B	PCBs									X						
25	Substation 4853	PCBs									X						
26	Transformer Pole A324	PCBs									X						
27	Building 4473	Unknown	X	X			X	X									
28	Building 4854	Unknown								X							
29	Building 4863	Unknown	X	X			X	X									
30	Building 4873	Unknown	X	X			X	X									
31	Building 4015	PCBs									X						
32	Debris Area 3005	Unknown	X		X			X			X						
33	Building 4463	solvents, TPH	X	X													
34	Substation 4780	PCBs									X						
35	Building 4461	Unknown	X	X			X	X		X			X				
36	Building 4628	Unknown	X	X			X	X		X			X				
37	Building 4662	Unknown	X	X			X	X		X			X				

Notes:

1. VOCs were a COPC for Gasoline Range Hydrocarbons.
2. SVOCs and dioxins were evaluated at COPCs if burned materials were observed. PCBs were evaluated as COPCs if elevated concentrations of Lubricant Oil Range Hydrocarbons were detected.
3. Chemical uses for the Building 4353 Leach Field are assumed to be the same as those for Building 4353 (energetics).
4. Chemical uses for the Building 4363 Leach Field are assumed to be the same as those for Building 4363 (Metals, Solvents, Kerosene, Naphthalene).
5. Chemical uses for the Building 4373 Leach Field are assumed to be the same as those for Building 4373 (TPH, solvents, metals, SVOCs/propellants).
6. Chemical uses for the Building 4383 Leach Field are assumed to be the same as those for Building 4383 (solvents).
7. There are no Chemical Use Areas 19, 22, and 23 at the DOE LF3 Site.

Table Q.2-9
Conceptual Site Model
DOE LF3 RFI Site

Chemical Use Area Name (or Site if appropriate)	Ground Surface Elevation (Feet MSL)	Alluvium Thickness (Feet)	Elevation of Unweathered Chatsworth (Feet MSL)	Depth to Near-Surface Groundwater (Feet)	Near-Surface Groundwater Horizontal Gradient/Flow (foot/foot)	Depth to Chatsworth Formation Groundwater (Feet)	Chatsworth Formation Groundwater Horizontal (foot/foot)	Surface Water Present? (Yes/No)	Surface Water Flow Information	Other Information?	Reference
DOE Leach Fields 3	1770 to 1820	0.5 to 20	1740 to 1770	19 to 20	0.03 to 0.04/ east-southeast	40 to 45	0.05/southeast	No	While there are no perennial surface water bodies at the site, rain water flows southeast from the site to R-2 Discharge Ponds.	Near-surface groundwater has a downward vertical gradient. The site is located in the Lower Burro Flats Member, which consists of medium-grained sandstone with siltstone/shale interbeds. Contaminant migration from the site may be impacted by the finer grained geologic member SPA located at the southern end of the site. The SPA member consists of interbedded fine-grained sandstone, siltstone, and shale.	MWH, 2003b.

MSL = above mean sea level

Table Q.3-1A
Sampling Summary for Soil
DOE LF3 RFI Site

Sample Location	Location Type	Sample Name	Collection Date	Top Depth (feet bgs)	Base Depth (feet bgs)	Sample Type	Remediation Status	Consultant	Matrix	Energetics	Geotech	Hydrocarbons	Inorganics	Metals	PCBs	SVOC	VOC
UT-55-S1	Soil Boring	UT-55-S1-10	7/18/1995	10	10	Primary Sample	In Place	AE Schmidt	Soil			X					X
UT-55-S1	Soil Boring	UT-55-S1-15	7/18/1995	15	15	Primary Sample	In Place	AE Schmidt	Soil			X					X
UT-55-S2	Soil Boring	UT-55-S2-10	7/18/1995	10	10	Primary Sample	In Place	AE Schmidt	Soil			X					X
UT-55-S2	Soil Boring	UT-55-S2-15	7/18/1995	15	15	Primary Sample	In Place	AE Schmidt	Soil			X					X
L7BS03	Soil Boring		12/5/1997	3	3	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil								X
L7BS03	Soil Boring	RM506	12/5/1997	3	3	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil			X					
L7BS03	Soil Boring	RS506	12/5/1997	3	3	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil	X			X			X	
B5BS01	Soil Boring		1/22/1998	5	5	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil								X
B5BS01	Soil Boring		1/22/1998	11.5	11.5	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil								X
B5BS01	Soil Boring	RS122	1/22/1998	5	5	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil			X	X				
B5BS01	Soil Boring	RS130	1/22/1998	11.5	11.5	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil			X	X				
B5BS02	Soil Boring		1/22/1998	3.5	3.5	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil								X
B5BS02	Soil Boring		1/22/1998	5	5	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil								X
B5BS02	Soil Boring		1/22/1998	12	12	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil								X
B5BS02	Soil Boring	RS124	1/22/1998	3.5	3.5	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil			X	X				
B5BS02	Soil Boring	RS125	1/22/1998	5	5	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil			X	X				
B5BS02	Soil Boring	RS126	1/22/1998	12	12	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil			X	X				
B5BS03	Soil Boring		1/22/1998	11.5	11.5	MULTIPLE SAMPLE TYPES	In Place	OGDEN Environmental and Energy Services	Soil								X
B5BS03	Soil Boring		1/22/1998	5	5	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil								X
B5BS03	Soil Boring	RS127	1/22/1998	5	5	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil			X	X				
B5BS03	Soil Boring	RS128	1/22/1998	11.5	11.5	MULTIPLE SAMPLE TYPES	In Place	OGDEN Environmental and Energy Services	Soil			X	X				
T-1-UT72	Soil Boring	T-1-UT72	4/6/1999	0	0	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil			X		X		X	X
T-2-UT72	Soil Boring	T-2-UT72	4/6/1999	0	0	Primary Sample	In Place	AMEC	Soil			X		X		X	X
L8BS04	Soil Boring	RX043	4/13/2000	4	4	Primary Sample	In Place	AMEC	Soil			X	X	X			
L8BS05	Soil Boring	RX057	5/8/2000	5	5	Primary Sample	In Place	AMEC	Soil			X	X	X			
L8BS06	Soil Boring	RX058	5/8/2000	5	5	Primary Sample	In Place	AMEC	Soil			X	X	X			
L8BS07	Soil Boring	RX059	5/8/2000	5	5	Primary Sample	In Place	AMEC	Soil				X	X			
L8BS08	Soil Boring	RX060	5/8/2000	5	5	Primary Sample	In Place	AMEC	Soil				X	X			
L8BS09	Soil Boring	RX061	5/8/2000	5	5	Primary Sample	In Place	AMEC	Soil				X	X			
L8BS10	Soil Boring	RX048	5/8/2000	5	5	Primary Sample	In Place	AMEC	Soil				X	X			
PZ-005	Piezometer	RK022	11/7/2000	7.5	17.5	Primary Sample	In Place	MWH	Soil		X		X				
L7BS01	Soil Boring	RJ853	12/12/2000	1.5	2	MULTIPLE SAMPLE TYPES	In Place	MWH	Soil	X		X	X	X		X	
L7BS02	Soil Boring	RJ855	12/12/2000	2.5	3	MULTIPLE SAMPLE TYPES	In Place	MWH	Soil	X		X	X	X		X	
L7BS02	Soil Boring	RZ855	12/12/2000	2.5	3	MULTIPLE SAMPLE TYPES	In Place	MWH	Soil								X
L5BS01	Soil Boring	RJ931	1/16/2001	2	2.5	MULTIPLE SAMPLE TYPES	In Place	MWH	Soil			X		X		X	
L5BS01	Soil Boring	RJ932	1/16/2001	2	2.5	MULTIPLE SAMPLE TYPES	In Place	MWH	Soil				X				
L5BS02	Soil Boring		1/16/2001	2.5	3	MULTIPLE SAMPLE TYPES	In Place	MWH	Soil								X
L5BS02	Soil Boring	RJ933	1/16/2001	2.5	3	MULTIPLE SAMPLE TYPES	In Place	MWH	Soil			X		X		X	
L5BS02	Soil Boring	RZ933	1/16/2001	2.5	3	MULTIPLE SAMPLE TYPES	In Place	MWH	Soil	X			X				
L6TS01S01	Trench	MJ046	4/2/2002	6	6	Primary Sample	In Place	MWH	Soil			X	X	X		X	
L6TS02S01	Trench	MJ045	4/2/2002	8	8.5	Primary Sample	In Place	MWH	Soil			X	X	X		X	
XFBS16	Soil Boring	WD062	8/20/2004	0.5	1	Composite Sample	In Place	MWH	Soil				X		X		
XFBS16	Soil Boring	WD065	8/20/2004	2.3	3	Composite Sample	In Place		Soil				X		X		
XFBS16S01	Soil Boring	WD060	8/20/2004	1	1	Primary Sample	In Place		Soil				X		X		
XFBS16S02	Soil Boring	WD061	8/20/2004	1	1	Primary Sample	In Place		Soil				X		X		
XFBS17	Soil Boring	WD068	8/20/2004	0.5	1	Composite Sample	In Place		Soil				X		X		
XFBS18	Soil Boring	WD072	8/20/2004	0	1	Composite Sample	In Place		Soil				X		X		
XFBS18S02	Soil Boring	WD069	8/20/2004	0	0.5	Primary Sample	In Place		Soil				X		X		
XFBS18S03	Soil Boring	WD070	8/20/2004	1	1	Primary Sample	In Place		Soil				X		X		
XFBS18S04	Soil Boring	WD071	8/20/2004	1	1	Primary Sample	In Place		Soil				X		X		
XFBS19	Soil Boring	WD076	8/20/2004	0	1	Composite Sample	In Place		Soil				X		X		
XFBS32	Soil Boring	WD211	9/23/2005	0	0.5	Composite Sample	In Place		Soil				X		X		
U5BX1006	Soil Boring	U5BX1006C01	3/28/2008	0	1	Composite Sample	In Place	CH2M HILL	Soil				X		X		
U5BX1011	Soil Boring	U5BX1011C01	3/28/2008	0	1	Composite Sample	In Place	CH2M HILL	Soil				X		X		
U5BX1009	Soil Boring	U5BX1009C01	3/31/2008	0	0.5	Composite Sample	In Place	CH2M HILL	Soil				X		X		
U5BX1007	Soil Boring	U5BX1007C01	3/31/2008	0	0.5	Composite Sample	In Place	CH2M HILL	Soil				X		X		
U5BX1017	Soil Boring	U5BX1017S01	3/31/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X		X		
U5BX1018	Soil Boring	U5BX1018S01	3/31/2008	1	2	Primary Sample	In Place	CH2M HILL	Soil				X		X		
U5BX1010	Soil Boring	U5BX1010C01	3/31/2008	0	0.5	Composite Sample	In Place	CH2M HILL	Soil				X		X		
U5BS1050	Soil Boring	U5BS1050S01	4/1/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	

Table Q.3-1A
Sampling Summary for Soil
DOE LF3 RFI Site

Sample Location	Location Type	Sample Name	Collection Date	Top Depth (feet bgs)	Base Depth (feet bgs)	Sample Type	Remediation Status	Consultant	Matrix	Energetics	Geotech	Hydrocarbons	Inorganics	Metals	PCBs	SVOC	VOC
U5BS1050	Soil Boring	U5BS1050S02	4/1/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1052	Soil Boring	U5BS1052S01	4/1/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1052	Soil Boring	U5BS1052S02	4/1/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1005	Soil Boring	U5BS1005S01	4/1/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1048	Soil Boring	U5BS1048S01	4/1/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1048	Soil Boring	U5BS1048S02	4/1/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1033	Soil Boring	U5BS1033S01	4/2/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1033	Soil Boring	U5BS1033S02	4/2/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1033	Soil Boring	U5BS1033S03	4/2/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil				X	X			
L7BS1000	Soil Boring	L7BS1000S01	4/2/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil			X	X	X			
L7BS1000	Soil Boring	L7BS1000S02	4/2/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X			
U5BS1030	Soil Boring	U5BS1030D01	4/2/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X	X			
U5BS1030	Soil Boring	U5BS1030S02	4/2/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1030	Soil Boring	U5BS1030S03	4/2/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1039	Soil Boring	U5BS1039S01	4/2/2008	7	8	Primary Sample	In Place	CH2M HILL	Soil			X	X			X	
L7BS1002	Soil Boring	L7BS1002D01	4/2/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil			X	X	X			
L7BS1002	Soil Boring	L7BS1002S02	4/2/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X			
L7BS1002	Soil Boring	L7BS1002S03	4/2/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1040	Soil Boring	U5BS1040S01	4/2/2008	7	8	Primary Sample	In Place	CH2M HILL	Soil			X	X			X	
U5BS1053	Soil Boring	U5BS1053S01	4/2/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1053	Soil Boring	U5BS1053S02	4/2/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1031	Soil Boring	U5BS1031S01	4/2/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X	X			
U5BS1031	Soil Boring	U5BS1031S02	4/2/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1031	Soil Boring	U5BS1031S03	4/2/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil				X	X			
L8BS1002	Soil Boring	L8BS1002S01	4/2/2008	7	8	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1032	Soil Boring	U5BS1032D01	4/2/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X	X			
U5BS1032	Soil Boring	U5BS1032S02	4/2/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
L8BS1001	Soil Boring	L8BS1001S01	4/2/2008	6	7	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1032	Soil Boring	U5BS1032S03	4/2/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil				X	X			
L5BS1001	Soil Boring	L5BS1001S01	4/2/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil	X			X				
L5BS1001	Soil Boring	L5BS1001S02	4/2/2008	3	4	Primary Sample	In Place	CH2M HILL	Soil	X			X	X			
L5BS1000	Soil Boring	L5BS1000D01	4/2/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil	X			X				
L8BS1000	Soil Boring	L8BS1000S01	4/2/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X	X			
L5BS1000	Soil Boring	L5BS1000S02	4/2/2008	3	4	Primary Sample	In Place	CH2M HILL	Soil	X			X				
L8BS1000	Soil Boring	L8BS1000S02	4/2/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
L8BS1000	Soil Boring	L8BS1000S03	4/2/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil				X	X			
L7BS1003	Soil Boring		4/2/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil								X
L7BS1003	Soil Boring	L7BS1003S01	4/2/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil			X	X	X	X	X	
U5BS1037	Soil Boring	U5BS1037D01	4/3/2008	7	8	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil			X	X			X	
U5BS1038	Soil Boring	U5BS1038S01	4/3/2008	7	8	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
L7BS1001	Soil Boring	L7BS1001S01	4/3/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
L5BS1002	Soil Boring	L5BS1002S01	4/3/2008	1	2	Primary Sample	In Place	CH2M HILL	Soil	X			X				
L5BS1002	Soil Boring	L5BS1002S02	4/3/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil	X			X	X			
U5BS1057	Soil Boring	U5BS1057S01	4/3/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
L5BS1003	Soil Boring	L5BS1003S01	4/3/2008	0	0.5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil	X			X				
L6BS1002	Soil Boring	L6BS1002S01	4/7/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1035	Soil Boring	U5BS1035S01	4/7/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X			X	
L6BS1003	Soil Boring	L6BS1003S01	4/7/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
L6BS1003	Soil Boring	L6BS1003S02	4/7/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
L6BS1000	Soil Boring	L6BS1000D01	4/7/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil			X	X	X		X	
L6BS1000	Soil Boring	L6BS1000S02	4/7/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1028	Soil Boring	U5BS1028S01	4/7/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1028	Soil Boring	U5BS1028S02	4/7/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1027	Soil Boring	U5BS1027S01	4/7/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1027	Soil Boring	U5BS1027S02	4/7/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1029	Soil Boring	U5BS1029S01	4/7/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1029	Soil Boring	U5BS1029S02	4/7/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BX1016	Soil Boring	U5BX1016S01	4/11/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X		X		
U5BX1015	Soil Boring	U5BX1015D01	4/11/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil						X		
U5BX1015	Soil Boring	U5BX1015S01	4/11/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X				

Table Q.3-1A
Sampling Summary for Soil
DOE LF3 RFI Site

Sample Location	Location Type	Sample Name	Collection Date	Top Depth (feet bgs)	Base Depth (feet bgs)	Sample Type	Remediation Status	Consultant	Matrix	Energetics	Geotech	Hydrocarbons	Inorganics	Metals	PCBs	SVOC	VOC
U5BX1015	Soil Boring	U5BX1015S02	4/11/2008	1	2	Primary Sample	In Place	CH2M HILL	Soil				X		X		
U5BX1014	Soil Boring	U5BX1014C01	4/11/2008	0	0.5	Composite Sample	In Place	CH2M HILL	Soil				X		X		
U5BS1063	Soil Boring	U5BS1063S01	4/16/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil			X	X				
U5BS1063	Soil Boring	U5BS1063S02	4/16/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X				
U5BS1059	Soil Boring	U5BS1059D01	4/16/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1059	Soil Boring	U5BS1059S02	4/16/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BX1013	Soil Boring	U5BX1013C01	4/16/2008	0	1	Composite Sample	In Place	CH2M HILL	Soil				X		X		
U5BX1020	Soil Boring	U5BX1020S01	4/16/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X		X		
L8BS1003	Soil Boring		4/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil								X
L8BS1003	Soil Boring	L8BS1003S01	4/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil			X	X	X	X	X	
U5BS1036	Soil Boring	U5BS1036S01	4/21/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1036	Soil Boring	U5BS1036S02	4/21/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1034	Soil Boring	U5BS1034S01	4/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1034	Soil Boring	U5BS1034S02	4/21/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5TS1500	Trench		5/12/2008	0.5	1	Primary Sample	In Place	CH2M HILL	Soil								X
U5TS1500	Trench	U5TS1500S01	5/12/2008	0.5	1	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5TS1501	Trench		5/12/2008	0.5	1	Primary Sample	In Place	CH2M HILL	Soil								X
U5TS1501	Trench	U5TS1501S01	5/12/2008	0.5	1	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5TS1502	Trench		5/12/2008	0.5	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil								X
U5TS1502	Trench	U5TS1502D01	5/12/2008	0.5	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1413	Soil Boring	U5BS1413S01	5/16/2008	0.5	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X			
U5BS1413	Soil Boring	U5BS1413X01	5/16/2008	1	1.5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X	X			
U5BS1413	Soil Boring	U5BS1413S02	5/16/2008	5.5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1072	Soil Boring	U5BS1072S01	5/16/2008	0.5	1.5	Primary Sample	In Place	CH2M HILL	Soil			X	X	X	X	X	
U5BS1072	Soil Boring	U5BS1072S02	5/16/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1073	Soil Boring	U5BS1073S01	5/16/2008	0.5	1.5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil			X	X	X	X	X	
U5BS1073	Soil Boring	U5BS1073S02	5/16/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1412	Soil Boring	U5BS1412S01	5/16/2008	0.5	1	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1412	Soil Boring	U5BS1412S02	5/16/2008	5.5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1411	Soil Boring	U5BS1411S01	5/16/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1411	Soil Boring	U5BS1411S02	5/16/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
L7BS1401	Soil Boring	L7BS1401D01	5/16/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X	X			
L7BS1401	Soil Boring	L7BS1401S02	5/16/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1071	Soil Boring	U5BS1071S01	5/16/2008	0.5	1.5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil			X	X	X	X	X	
U5BS1071	Soil Boring	U5BS1071S02	5/16/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
L7BS1402	Soil Boring	L7BS1402S01	5/16/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X			
L7BS1402	Soil Boring	L7BS1402X01	5/16/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X				
U5BS1070	Soil Boring	U5BS1070D01	5/16/2008	0.5	2	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil			X	X	X	X	X	
L7BS1402	Soil Boring	L7BS1402S02	5/16/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1070	Soil Boring	U5BS1070S02	5/16/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
L7BS1403	Soil Boring	L7BS1403S01	5/16/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X			
L7BS1403	Soil Boring	L7BS1403S02	5/16/2008	5	5.5	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1409	Soil Boring	U5BS1409S01	5/20/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X			X	
U5BS1410	Soil Boring	U5BS1410S01	5/20/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X			X	
U5BX1401	Soil Boring	U5BX1401S01	5/20/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X		X		
U5BX1400	Soil Boring	U5BX1400S01	5/20/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X		X		
U5BS1408	Soil Boring	U5BS1408D01	5/21/2008	0.5	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil							X	
U5BS1408	Soil Boring	U5BS1408S01	5/21/2008	0.5	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X				
U5BS1074	Soil Boring	U5BS1074D01	5/21/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1049	Soil Boring		5/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil								X
U5BS1049	Soil Boring	U5BS1049S01	5/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X				
U5BX1008	Soil Boring	U5BX1008C01	5/21/2008	0	0.5	Composite Sample	In Place	CH2M HILL	Soil				X		X		
U5BS1005A	Soil Boring		5/21/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil								X
U5BS1005A	Soil Boring	U5BS1005AD01	5/21/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X				
U5BS1005A	Soil Boring		5/21/2008	3	4	Primary Sample	In Place	CH2M HILL	Soil								X
U5BS1005A	Soil Boring	U5BS1005AS02	5/21/2008	3	4	Primary Sample	In Place	CH2M HILL	Soil				X				
U5BS1403	Soil Boring	U5BS1403D01	5/21/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X	X			
L7BS1400	Soil Boring	L7BS1400S01	5/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1404	Soil Boring	U5BS1404S01	5/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X			
L8BS1400	Soil Boring	L8BS1400D01	5/21/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X	X			

Table Q.3-1A
Sampling Summary for Soil
DOE LF3 RFI Site

Sample Location	Location Type	Sample Name	Collection Date	Top Depth (feet bgs)	Base Depth (feet bgs)	Sample Type	Remediation Status	Consultant	Matrix	Energetics	Geotech	Hydrocarbons	Inorganics	Metals	PCBs	SVOC	VOC
U5BS1405	Soil Boring	U5BS1405D01	5/21/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X			
U5BS1405	Soil Boring	U5BS1405S01	5/21/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X				
U5BS1032A	Soil Boring		5/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil								X
U5BS1032A	Soil Boring	U5BS1032AS01	5/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X				
U5BS1032A	Soil Boring		5/21/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil								X
U5BS1032A	Soil Boring	U5BS1032AS02	5/21/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X				
U5BS1031A	Soil Boring		5/22/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil								X
U5BS1031A	Soil Boring	U5BS1031AD01	5/22/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X				
U5BS1031A	Soil Boring		5/22/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil								X
U5BS1031A	Soil Boring	U5BS1031AS02	5/22/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X				
U5BS1414	Soil Boring	U5BS1414S01	5/22/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1414	Soil Boring	U5BS1414S02	5/22/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
L7BS1404	Soil Boring	L7BS1404S01	5/22/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X			
L7BS1404	Soil Boring	L7BS1404S02	5/22/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1415	Soil Boring	U5BS1415D01	5/22/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X			
U5BS1415	Soil Boring	U5BS1415S01	5/22/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X				
U5BS1415	Soil Boring	U5BS1415S02	5/22/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1069	Soil Boring	U5BS1069S01	5/22/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1069	Soil Boring	U5BS1069S02	5/22/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil			X	X	X		X	
U5BS1036A	Soil Boring		5/22/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil								X
U5BS1036A	Soil Boring	U5BS1036AD01	5/22/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X				
U5BS1036A	Soil Boring		5/22/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil								X
U5BS1036A	Soil Boring	U5BS1036AS02	5/22/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X				
U5BS1439	Soil Boring	U5BS1439D01	5/28/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X	X			
U5BS1439	Soil Boring	U5BS1439S02	5/28/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1437	Soil Boring	U5BS1437S01	5/28/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1437	Soil Boring	U5BS1437S02	5/28/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1438	Soil Boring	U5BS1438S01	5/28/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1438	Soil Boring	U5BS1438S02	5/28/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X			
BHBS1405	Soil Boring	BHBS1405S01	5/28/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X				
BHBS1405	Soil Boring	BHBS1405X01	5/28/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X			
BHBS1404	Soil Boring	BHBS1404S01	5/28/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X			
U5BS1060	Soil Boring		5/30/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil								X
U5BS1060	Soil Boring	U5BS1060D01	5/30/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil			X	X	X		X	

Table Q.3-1B
Sampling Summary for Soil Vapor
DOE LF3 RFI Site

Sample Location	Location Type	Sample Name	Collection Date	Top Depth (feet bgs)	Base Depth (feet bgs)	Sample Type	Remediation Status	Consultant	Matrix	VOC
SV-LF373-1	Soil Vapor Sample	SVLF3731	8/24/1993	3.5	3.5	Primary Sample	In Place	ICF Kaiser Engineers	Soil Vapor	X
SV-LF483-1	Soil Vapor Sample	SVLF4831	8/24/1993	3	3	Primary Sample	In Place	ICF Kaiser Engineers	Soil Vapor	X
SV-LF353-1	Soil Vapor Sample	SVLF3531	8/25/1993	3.5	3.5	Primary Sample	In Place	ICF Kaiser Engineers	Soil Vapor	X
L6SV01	Soil Vapor Sample		7/18/2002	6	6	Primary Sample	In Place	MWH	Soil Vapor	X
L6SV02	Soil Vapor Sample		7/18/2002	3	3	Primary Sample	In Place	MWH	Soil Vapor	X
L7SV01	Soil Vapor Sample		7/18/2002	4	4	Primary Sample	In Place	MWH	Soil Vapor	X
L8SV1000	Soil Vapor Sample		4/9/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
U5SV1011	Soil Vapor Sample		4/10/2008	4	5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X
U5SV1011	Soil Vapor Sample	U5SV1011D01	4/10/2008	4	5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X
U5SV1015	Soil Vapor Sample		4/10/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
U5SV1014	Soil Vapor Sample		4/10/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
U5SV1004	Soil Vapor Sample		4/10/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
L6SV1000	Soil Vapor Sample		4/11/2008	4	5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X
L6SV1000	Soil Vapor Sample	L6SV1000D01	4/11/2008	4	5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X
U5SV1006	Soil Vapor Sample		4/11/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
U5SV1001	Soil Vapor Sample		4/11/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
U5SV1008	Soil Vapor Sample		4/11/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
U5SV1017	Soil Vapor Sample		4/14/2008	3.5	4.5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
U5SV1017	Soil Vapor Sample		4/14/2008	7.5	8.5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
L7SV1000	Soil Vapor Sample		4/14/2008	4	5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X
L7SV1000	Soil Vapor Sample		4/14/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
L7SV1000	Soil Vapor Sample	L7SV1000S01	4/14/2008	4	5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X
U5SV1029	Soil Vapor Sample		5/15/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
U5SV1013	Soil Vapor Sample		5/15/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
U5SV1038	Soil Vapor Sample		5/15/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
U5SV1038	Soil Vapor Sample		5/15/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
U5SV1037	Soil Vapor Sample		6/4/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
U5SV1036	Soil Vapor Sample		6/4/2008	4	5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X
U5SV1036	Soil Vapor Sample	U5SV1036D01	6/4/2008	4	5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X

Table Q.3-1C
Sampling Summary for Solids
DOE LF3 RFI Site

Sample Location	Location Type	Sample Name	Collection Date	Top Depth (feet bgs)	Base Depth (feet bgs)	Sample Type	Remediation Status	Consultant	Matrix	Geotech	Inorganics
PZ-005	Piezometer	RK023	11/7/2000	26.5	36.5	Primary Sample	In Place	OGDEN Environmental and Energy Services	Solid	X	X

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	**Chemical Use Area Name** (see Section 2 texts and tables for Site History)	**Potential Chemicals Used/Stored**	**Sampling Scope and Rationale** (see Figure Q.2-2 for sampling locations)	**Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?**	**Chemical Use Area sufficiently evaluated for risk assessment?**	**Is delineation sufficient to estimate soil volume in CMS?** (see Figure Q.5-1 for CMS area)
1	Building 4353	Energetics	Chemical uses at Building 4353 includes energetics. Screened for potential energetics in and around building. Soil samples were collected at two (2) locations.	No energetics were detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.7 and Figures Q.3-6 and Q.3-9.	**Yes.** The extent of energetics impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
2	Building 4363	VOCs	Chemical uses at Building 4363 includes solvents. Screen for potential VOCs in and around building. <u>Soil Vapor:</u> Samples were collected at two (2) locations. <u>Soil Matrix:</u> Samples were not collected.	No VOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Chemical uses include naphthalene. Screen for potential SVOCs in and around building. Soil samples were collected at two (2) locations.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPHs	Chemical uses include kerosene. Screen for potential TPHs in and around building. Soil samples were collected at two (2) locations.	TPHs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Building was used as a metallurgical research and development laboratory. Screened for metals in and around building. Soil samples were collected at two (2) locations.	Metals were detected above background and Ecological RBSLs in four samples. L6BS1000 at 0-1 ft bgs (Aluminum, Cadmium, and Mercury) L6BS1000 at 5-6 ft bgs (Aluminum) L6BS1003 at 0-1 ft bgs (Aluminum and Mercury) L6BS1003 at 5-6 ft bgs (Aluminum) Discussion of results is presented in section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of aluminum, cadmium, and mercury impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
3	Building 4373	VOCs	Chemical uses at Building 4373 includes solvents. Screen for potential VOCs in and around building. <u>Soil Vapor:</u> Samples were collected two (2) locations. <u>Soil Matrix:</u> Samples were not collected.	No VOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	Chemical Use Area Name (see Section 2 texts and tables for Site History)	Potential Chemicals Used/Stored	Sampling Scope and Rationale (see Figure Q.2-2 for sampling locations)	Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?	Chemical Use Area sufficiently evaluated for risk assessment?	Is delineation sufficient to estimate soil volume in CMS? (see Figure Q.5-1 for CMS area)
3	Building 4373 (continued)	TPHs	Screen for potential TPH in and around building. Soil samples were collected at two (2) locations.	TPH were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Chemical uses at Building 4373 included metals. Screened for Metals in and around building. Soil samples were collected at six (6) locations.	Metals were detected above background and Ecological RBSLs in seven samples. L7BS1000 at 0-1 ft bgs (Mercury) L7BS1000 at 5-6 ft bgs (Aluminum and Barium) L7BS1002 at 0-1 ft bgs (Aluminum, Barium, and Mercury) L7BS1002 at 5-6 ft bgs (Aluminum and Mercury) L7BS1401 at 5-6 ft bgs (Aluminum and Barium) L7BS1402 at 0-1 ft bgs (Aluminum) L7BS1404 at 0-1 ft bgs (Mercury) Discussion of results is presented in section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of aluminum, barium, and mercury impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
4	Building 4383	VOCs	Chemical uses at Building 4383 includes solvents. Screen for potential VOCs in and around building. <u>Soil Vapor:</u> Samples were collected at one (1) location. <u>Soil Matrix</u>: Soil samples were not collected.	No VOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Building was a liquid Metal engineering center assembly and testing and construction staging area. Screened for Metals in and around building. Soil samples were collected at one (1) location.	Metals were detected above background and Ecological RBSLs in two samples. L8BS1000 at 0-1 ft bgs (Aluminum and Barium) L8BS1000 at 5-6 ft bgs (Aluminum) Discussion of results is presented in section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of aluminum and barium impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
5	Buildings 4375, 4874, and 4875	VOCs	Chemical uses at Buildings 4375, 4874, and 4875 is unknown. Screened for potential VOCs in and around buildings. <u>Soil Vapor:</u> Samples were collected at one (1) location. <u>Soil Matrix:</u> Samples were not collected.	VOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs in and around buildings. Soil samples were collected at three (3) locations.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	**Chemical Use Area Name** (see Section 2 texts and tables for Site History)	**Potential Chemicals Used/Stored**	**Sampling Scope and Rationale** (see Figure Q.2-2 for sampling locations)	**Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?**	**Chemical Use Area sufficiently evaluated for risk assessment?**	**Is delineation sufficient to estimate soil volume in CMS?** (see Figure Q.5-1 for CMS area)
5	Buildings 4375, 4874, and 4875 (continued)	TPHs	Screen for potential TPHs in and around buildings. Soil samples were collected at three (3) locations.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential Metals in and around building. Soil samples were collected at six (6) locations.	Metals were detected above background and Ecological RBSLs in seven samples. U5BS1027 at 0-1 ft. bgs (Aluminum, Cadmium, and Zinc) U5BS1027 at 5-6 ft. bgs (Aluminum and Barium) U5BS1028 at 5-6 ft. bgs (Aluminum) U5BS1029 at 0-1 ft. bgs (Aluminum and Barium) U5BS1437 at 5-6 ft. bgs (Aluminum and Barium) U5BS1439 at 0-1 ft. bgs and at 5-6 ft. bgs (Aluminum) Discussion of results is presented in section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
6	Substation 4707	PCBs	Screen for potential PCBs around former substation. Soil samples collected at one (1) location.	PCBs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-4 and Q.3-8.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
7	Building 4374	VOCs	Chemical uses at Building 4374 includes solvents. Screened for potential VOCs in and around building. <u>Soil Vapor:</u> Samples were collected at one (1) location. <u>Soil Matrix:</u> Samples were collected at one (1) location.	No VOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs in and around building. Soil samples were collected at one (1) location.	No SVOCs were detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPHs	Screen for potential TPHs in and around building. Soil samples were collected at one (1) location.	No TPH was detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	**Chemical Use Area Name** (see Section 2 texts and tables for Site History)	**Potential Chemicals Used/Stored**	**Sampling Scope and Rationale** (see Figure Q.2-2 for sampling locations)	**Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?**	**Chemical Use Area sufficiently evaluated for risk assessment?**	**Is delineation sufficient to estimate soil volume in CMS?** (see Figure Q.5-1 for CMS area)
7	Building 4374 (continued)	Metals	Screened for potential Metals in and around building. Soil samples were collected at two (2) locations.	Metals were detected above background and Ecological RBSLs in three samples. U5BS1030 at 0-1 ft. bgs and 5-6 ft. bgs (Aluminum and Mercury) U5BS1030 at 9-10 ft. bgs (Aluminum) Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Energetics	Chemical uses at Building 4374 includes energetics. Screened for potential energetics in and around building. Soil samples collected at one (1) locations.	No energetics were detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.7 and Figures Q.3-6 and Q.3-9.	**Yes.** The extent of energetics impacts is adequately defined by representative sampling locations. Concentration gradients are sufficient for risk assessment.	**N/A**
8	Substation 4883 A	PCBs	Screen for potential PCBs around former substation. Soil samples collected at one (1) location.	No PCBs were detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-4 and Q.3-8.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
9	Building 4055	VOCs	Chemical uses at Building 4055 includes solvents. Screened for potential VOCs around building. Soil Vapor: Samples were collected at five (5) locations. Soil vapor sampling was also attempted at one (1) additional location (Figure Q.3-1A). However, no soil vapor samples could be collected at this location due to the presence of shallow bedrock (i.e., less than 5 feet bgs) or insufficient flow from the soil vapor well to allow sample collection. Soil Matrix: Samples were collected at two (2) locations.	Soil Vapor: VOCs were detected above Residential and/or Ecological RBSLs in two samples collected. U5SV1038 at 4-5 ft bgs (Toluene) U5SV1038 at 9-10 ft bgs (Benzene and Toluene) Soil Matrix: VOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs around building. Soil samples were collected at five (5) locations.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	Chemical Use Area Name (see Section 2 texts and tables for Site History)	Potential Chemicals Used/Stored	Sampling Scope and Rationale (see Figure Q.2-2 for sampling locations)	Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?	Chemical Use Area sufficiently evaluated for risk assessment?	Is delineation sufficient to estimate soil volume in CMS? (see Figure Q.5-1 for CMS area)
9	Building 4055 (continued)	TPHs	Screen for potential TPHs in and around building. Soil samples were collected at five (5) locations.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		PCBs	Screen for potential PCBs around former building. Soil samples collected at three (3) locations.	PCBs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-4 and Q.3-8.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential Metals in and around building. Soil samples were collected at 11 locations.	Metals were detected above background and Ecological RBSLs in 17 samples. U5BS1031 at 0-1 ft. bgs and 5-6 ft, bgs (Aluminum and Barium) U5BS1032 at 0-1 ft. bgs (Aluminum and Barium) U5BS1032 at 5-6 ft. bgs and 9-10 ft. bgs (Aluminum) U5BS1033 at 0-1 ft. bgs (Aluminum) U5BS1033 at 5-6 ft. bgs (Selenium) U5BS1033 at 9-10 ft. bgs (Aluminum and Barium) U5BS1070 at 5-6 ft. bgs (Barium) U5BS1071 at 0.5-1.5 ft. bgs (Aluminum, Barium, Silver, and Vanadium) U5BS1072 at 0.5-1.5 ft. bgs (Barium) U5BS1073 at 0.5-1.5 ft. bgs (Aluminum and Silver) U5BS1073 at 5-6 ft. bgs (Aluminum) U5BS1411 at 5-6 ft. bgs (Aluminum) U5BS1413 at 0.5-1 ft. bgs (Aluminum) U5BS1413 at 1-1.5 ft. bgs (Barium) U5BS1414 at 5-6 ft. bgs (Barium) Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	**Chemical Use Area Name** (see Section 2 texts and tables for Site History)	**Potential Chemicals Used/Stored**	**Sampling Scope and Rationale** (see Figure Q.2-2 for sampling locations)	**Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?**	**Chemical Use Area sufficiently evaluated for risk assessment?**	**Is delineation sufficient to estimate soil volume in CMS?** (see Figure Q.5-1 for CMS area)
10	Building 4462	VOCs	Screened for potential VOCs around building. Soil Vapor: Samples were collected at one (1) location. Soil vapor sampling was also attempted at two (2) additional locations (Figure Q.3-1A). However, no vapor samples could be collected at these locations due to the presence of shallow bedrock (i.e., less than 5 feet bgs) or insufficient flow from the soil vapor wells to allow sample collection. Soil Matrix: Samples were collected at one (1) location.	VOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B, and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs around building. Soil samples were collected at six (6) locations.	SVOCs were detected above Residential and/or Ecological RBSLs in two samples. U5BS1052 at 0-1 ft. bgs (7 PAH compounds including: Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene and phenanthrene) U5BS1408 at 0.5-1 ft. bgs (Benzo(a)pyrene) Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**No.**
		TPHs	Screen for potential TPHs in and around building. Soil samples were collected at four (4) locations.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential metals in and around building. Soil samples were collected at three (3) locations.	Metals were detected above background and Ecological RBSLs in one sample. U5BS1030 at 0-1 ft. bgs (Copper and Selenium) Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of copper and selenium impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	**Chemical Use Area Name** (see Section 2 texts and tables for Site History)	**Potential Chemicals Used/Stored**	**Sampling Scope and Rationale** (see Figure Q.2-2 for sampling locations)	**Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?**	**Chemical Use Area sufficiently evaluated for risk assessment?**	**Is delineation sufficient to estimate soil volume in CMS?** (see Figure Q.5-1 for CMS area)
11	UT-75	VOCs	Screened for VOCs at location of former UT-75 Samples collected immediately following tank removal and analyzed for VOCs. Soil vapor sampling was also attempted at one (1) location (Figure Q.3-1A). However, no vapor samples could be collected at this location due to the presence of shallow bedrock (i.e., less than 5 feet bgs) or insufficient flow from the soil vapor well to allow sample collection.	VOCs were not detected in soil.	**Yes.** Potential presence of VOCs has been adequately defined by representative soil sampling locations. VOCs were not detected in samples collected during UST removal and area is not recommended for further characterization. Characterization is sufficient for risk assessment.	**N/A**
		TPH	Screened for TPH at location of former UT-75 Samples collected immediately following tank removal and analyzed for TPH.	TPH was not detected in soil.	**Yes.** Potential presence of TPH has been adequately defined by representative soil sampling locations. TPH was not detected in samples collected during UST removal and area is not recommended for further characterization. Characterization is sufficient for risk assessment.	**N/A**
12	UST (north of Building 4363)	VOCs	Screened for potential VOCs in tank area. Soil Vapor: Soil vapor samples were collected at one (1) location. Soil Matrix: No samples were collected.	No VOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs in tank area. Soil samples were collected at one (1) location.	No SVOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPH	Screened for potential TPH in tank area. Soil samples were collected at one (1) location.	No TPH was detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
13	UT-72	VOCs	Screened for potential VOCs in tank area. Soil Vapor: No samples were collected. Soil Matrix: Soil samples were collected at two (2) locations.	No VOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	**Chemical Use Area Name** (see Section 2 texts and tables for Site History)	**Potential Chemicals Used/Stored**	**Sampling Scope and Rationale** (see Figure Q.2-2 for sampling locations)	**Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?**	**Chemical Use Area sufficiently evaluated for risk assessment?**	**Is delineation sufficient to estimate soil volume in CMS?** (see Figure Q.5-1 for CMS area)
13	UT-72 (continued)	SVOCs	Screened for potential SVOCs in tank area. Soil samples were collected at four (4) locations.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPHs	Screen for potential TPHs in tank area. Soil samples were collected at four (4) locations.	TPH was not detected in any of the samples collected. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screen for potential metals in tank area. Soil samples were collected at three (3) locations.	Metals were detected above background and Ecological RBSLs in one sample. T-1-UT72 at surface (Mercury) Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of mercury impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
14	UT-12 (UT-55)	VOCs	Screened for potential VOCs in tank area. Soil Vapor: Soil vapor samples were collected at one (1) location. Soil Matrix: Soil samples were collected at five (5) locations.	Soil Vapor: VOCs were detected but did not exceed their respective RBSLs. Soil Matrix: VOCs were detected above Residential RBSLs in two samples. UT-55-S1 at 10 ft bgs (Xylenes) UT-55-S2 at 10 ft bgs (Benzene and Xylenes) Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs in tank area. Soil samples were collected at one (1) location.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPHs	Screen for potential TPHs in tank area. Soil samples were collected at five (5) locations.	Diesel range organics were detected at concentrations that exceeded the Residential RBSL in two samples. Ut-55-S1 at 10 ft bgs and UT-55-S2 at 10 feet bgs Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	**Chemical Use Area Name** (see Section 2 texts and tables for Site History)	**Potential Chemicals Used/Stored**	**Sampling Scope and Rationale** (see Figure Q.2-2 for sampling locations)	**Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?**	**Chemical Use Area sufficiently evaluated for risk assessment?**	**Is delineation sufficient to estimate soil volume in CMS?** (see Figure Q.5-1 for CMS area)
15	Building 4353 Leach Field	VOCs	Screened for potential VOCs in leach field area. Soil Vapor: Soil vapor samples were collected at one (1) location. Soil Matrix: Soil samples were collected at one (1) location at the down slope end of leach field, immediately below leach line and gravel.	Soil Vapor: VOCs were not detected in samples collected. Soil Matrix: VOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs in leach field area. Soil samples were collected at two (2) locations at the influent and down slope ends of the leach field, immediately below the leach line and gravel.	No SVOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPHs	Screen for potential TPHs in leach field area. Soil samples were collected at two (2) locations at the influent and down slope ends of the leach field, immediately below the leach line and gravel.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential metals in and around leach field. Soil samples were collected at four (4) locations.	Metals were detected above background concentrations and Ecological RBSLs in two samples collected from the influent and down slope ends of the leach field, immediately below the leach line and gravel. L5BS01 at 2-2.5 ft. bgs (Boron) L5BS02 at 2.5-3 ft. bgs (Boron and Silver) Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of boron and silver impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Energetics	Chemical uses at Building 4353 includes energetics. Screened for potential energetics in and around building. Soil samples collected at three (3) locations.	No energetics were detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.7 and Figures Q.3-6 and Q.3-9.	**Yes.** The extent of energetics impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
16	Building 4363 Leach Field	VOCs	Received waste from Building 4363. Chemical use in Building 4363 include solvents. Screened for potential VOCs in leach field area. Soil Vapor: Samples were collected at one (1) location. Soil Matrix: No samples were collected.	No VOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	Chemical Use Area Name (see Section 2 texts and tables for Site History)	Potential Chemicals Used/Stored	Sampling Scope and Rationale (see Figure Q.2-2 for sampling locations)	Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?	Chemical Use Area sufficiently evaluated for risk assessment?	Is delineation sufficient to estimate soil volume in CMS? (see Figure Q.5-1 for CMS area)
16	Building 4363 Leach Field (continued)	SVOCs	Screened for potential SVOCs in leach field area. Soil samples were collected at two (2) locations at the influent and down slope ends of the leach field, immediately below the leach line and gravel.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPHs	Screen for potential TPHs in leach field area. Soil samples were collected at two (2) locations at the influent and down slope ends of the leach field, immediately below the leach line and gravel.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential metals in leach field area. Soil samples were collected at three (3) locations.	Metals were detected above background and Ecological RBSLs in two samples collected from the influent and down slope ends of the leach field, immediately below the leach line and gravel. L6TS01S01 at 6 ft. bgs (Cadmium, Nickel, and Manganese) L6TS02S01 at 8-8.5 ft. bgs (Cadmium) Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
17	Building 4373 Leach Field	VOCs	Received waste from Building 4373. Chemical use in Building 4373 include solvents. Screened for potential VOCs in leach field area. <u>Soil Vapor</u>: Samples were collected at one (1) location. <u>Soil Matrix</u>: Samples were collected at one (1) location.	No VOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs in leach field area. Soil samples were collected at two (2) locations.	No SVOCs were detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPH	Screen for potential TPH in leach field area. Soil samples were collected at two (2) locations.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	**Chemical Use Area Name** (see Section 2 texts and tables for Site History)	**Potential Chemicals Used/Stored**	**Sampling Scope and Rationale** (see Figure Q.2-2 for sampling locations)	**Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?**	**Chemical Use Area sufficiently evaluated for risk assessment?**	**Is delineation sufficient to estimate soil volume in CMS?** (see Figure Q.5-1 for CMS area)
17	Building 4373 Leach Field (continued)	PCBs	Screen for potential PCBs in and around leach field area. Soil samples collected at two (2) locations.	No PCBs were detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-4 and Q.3-8.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential Metals in leach field area. Soil samples were collected at three (3) locations.	Aluminum was detected above background and Ecological RBSLs in one sample. L7BS02 at 2-2.5 ft. bgs Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of aluminum impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Energetics	Chemical uses at Building 4373 includes energetics. Screened for potential energetics in and around building. Soil samples collected at two (2) locations.	1,2-dinitrobenzene was detected in two soil samples. No screening levels have been identified for this compound. Discussion of results is presented in Section Q.3.4.2.7 and Figures Q.3-6, Q.3-9A, and Q.3-9B.	**Yes.** 1,2-dinitrobenzene was detected in samples collected from soil that has likely since been removed (during removal of the leach field in 2000). No further characterization for energetics is recommended. Characterization is sufficient for risk assessment.	**N/A**
18	Building 4383 Leach Field	VOCs	Received waste from Building 4383. Chemical use in Building 4383 include solvents. Screened for potential VOCs in leach field area. Soil Vapor: Samples were collected at one (1) locations. Soil Matrix: Samples were not collected.	No VOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPHs	Screen for potential TPHs in leach field area. Soil samples were collected at three (3) locations.	No TPH was detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential Metals in leach field area. Soil samples were collected at nine (9) locations.	Metals were detected above background and Ecological RBSLs in two samples. L8BS05 at 5 ft. bgs (Selenium) L8BS06 at 5 ft. bgs (Selenium) Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of selenium impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	Chemical Use Area Name (see Section 2 texts and tables for Site History)	Potential Chemicals Used/Stored	Sampling Scope and Rationale (see Figure Q.2-2 for sampling locations)	Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?	Chemical Use Area sufficiently evaluated for risk assessment?	Is delineation sufficient to estimate soil volume in CMS? (see Figure Q.5-1 for CMS area)
19	Substation 4760 A	PCBs	Screen for potential PCBs around former transformer area. Soil samples collected at one (1) locations.	No PCBs were detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-4 and Q.3-8.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
20	Substation 4755	PCBs	Screen for potential PCBs around former transformer. Soil samples collected at two (2) locations.	No PCBs were detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-4 and Q.3-8.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
21	Transformer Pole X14	PCBs	**Soil samples were not collected from this Pole Mounted Transformer because there was only one transformer mounted on this pole. Based on DTSC-approved protocol for sampling at pole-mounted transformers, this chemical use area was not sampled.**			
22	Substation 4762 B	PCBs	Screen for potential PCBs around former transformer area. Soil samples were collected at 15 locations.	Aroclor 1260 was detected above Eco RBSL in five samples. XFBS16 at a depth of 0.5-1 ft. bgs XFBS16S01at a depth of 1 ft. bgs XFBS16S02 at a depth of 1 ft. bgs XFBS18S02 at a depth of 0-0.5 ft. bgs U5BX1015 at a depth of 0-1 ft. bgs Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-4 and Q.3-8.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**Yes.**
23	Substation 4760 B	PCBs	Screen for potential PCBs around former transformer area. Soil samples were collected at one (1) locations.	PCBs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-4 and Q.3-8.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
24	Substation 4883 B	PCBs	Screen for potential PCBs around former transformer. Soil samples collected at one (1) locations.	No PCBs were detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-4 and Q.3-8.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
25	Substation 4853	PCBs	Screen for potential PCBs around former transformer. Soil samples collected at one (1) locations.	No PCBs were detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-4 and Q.3-8.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	**Chemical Use Area Name** (see Section 2 texts and tables for Site History)	**Potential Chemicals Used/Stored**	**Sampling Scope and Rationale** (see Figure Q.2-2 for sampling locations)	**Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?**	**Chemical Use Area sufficiently evaluated for risk assessment?**	**Is delineation sufficient to estimate soil volume in CMS?** (see Figure Q.5-1 for CMS area)
26	A324	PCBs	Screen for potential PCBs around former transformer pole. Soil samples were collected at two (2) locations.	No PCBs were detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-4 and Q.3-8.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
27	Building 4473	VOCs	Screened for potential VOCs in and around building. Soil Vapor: Samples were collected from one (1) location. Soil Matrix: Samples were not collected.	No VOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs in and around building. Soil samples were collected at one (1) location.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPH	Screen for potential TPH in and around building. Soil samples were collected at one (1) locations.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential metals in and around building. Soil samples were collected at one (1) locations.	Metals were detected above background and Ecological RBSLs in two samples. U5BS1059 at 0-1 ft. bgs (Mercury and Selenium) U5BS1059 at 5-6 ft. bgs (Aluminum and Selenium) Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
28	Building 4854	VOCs	Screened for potential VOCs in and around building. Soil Vapor: Soil vapor samples were collected from one (1) location. Soil Matrix: Soil samples were not collected.	No VOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs in and around building. Soil samples were collected at one (1) location.	No SVOCs were detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	Chemical Use Area Name (see Section 2 texts and tables for Site History)	Potential Chemicals Used/Stored	Sampling Scope and Rationale (see Figure Q.2-2 for sampling locations)	Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?	Chemical Use Area sufficiently evaluated for risk assessment?	Is delineation sufficient to estimate soil volume in CMS? (see Figure Q.5-1 for CMS area)
28	Building 4854 (continued)	TPHs	Screen for potential TPHs in and around building. Soil samples were collected at one (1) locations.	No TPH was detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential Metals in building area. Soil samples were collected at one (1) locations.	Metals were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
29	Building 4863	VOCs	Screened for potential VOCs in and around building area. <u>Soil Vapor:</u> Soil vapor sampling was attempted at one (1) location (Figure Q.3-1A). However, no vapor samples could be collected at this location due to the presence of shallow bedrock (i.e., less than 5 feet bgs) or insufficient flow from the soil vapor well to allow sample collection. <u>Soil Matrix:</u> Samples were collected from one (1) location.	VOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs in and around building area. Soil samples were collected at one (1) location.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPH	Screened for potential TPH in and around building area. Soil samples were collected at one (1) location.	TPHs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential metals in and around building area. Soil samples were collected at one (1) location.	Metals were detected above background in one sample collected. U5BS1036 at 0-1 ft. bgs (Sodium). Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	**Chemical Use Area Name** (see Section 2 texts and tables for Site History)	**Potential Chemicals Used/Stored**	**Sampling Scope and Rationale** (see Figure Q.2-2 for sampling locations)	**Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?**	**Chemical Use Area sufficiently evaluated for risk assessment?**	**Is delineation sufficient to estimate soil volume in CMS?** (see Figure Q.5-1 for CMS area)
30	Building 4873	VOCs	Screened for potential VOCs in and around building. Soil Vapor: Samples were collected from one (1) location. Soil Matrix: Samples were not collected.	No VOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs in and around building. Soil samples were collected at one (1) location.	SVOCs were detected above Residential RBSL in one sample. U5BS1034 at 0-1 ft. bgs (n-Nitrosodimethylamine) Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPHs	Screen for potential TPHs in and around building. Soil samples were collected at one (1) locations.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential Metals in building area. Soil samples were collected at one (1) location.	Metals were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
31	Building 4015	VOCs	**Soil Vapor:** Soil vapor sampling was attempted at (1) location (Figure Q.3-1A). However, no soil vapor samples could be collected at this location due to the presence of shallow bedrock (i.e., less than 5 feet bgs) or insufficient flow from the soil vapor well to allow sample collection.	N/A	**N/A**	**N/A**
		SVOCs	Screened for potential SVOCs around building. Soil samples were collected at one (1) location.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPHs	Screen for potential TPHs in and around building. Soil samples were collected at one (1) locations.	No TPH was detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	**Chemical Use Area Name** (see Section 2 texts and tables for Site History)	**Potential Chemicals Used/Stored**	**Sampling Scope and Rationale** (see Figure Q.2-2 for sampling locations)	**Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?**	**Chemical Use Area sufficiently evaluated for risk assessment?**	**Is delineation sufficient to estimate soil volume in CMS?** (see Figure Q.5-1 for CMS area)
31	Building 4015 (continued)	PCBs	Screen for potential PCBs around former transformer. Soil samples collected at one (1) locations.	No PCBs were detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-4 and Q.3-8.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential Metals in building area. Soil samples were collected at one (1) location.	Aluminum, barium, and vanadium were detected above background and Ecological RBSLs in one sample. U5BS1069 at 0-1 ft. bgs Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
32	Debris Area 3005	VOCs	Screened for potential VOCs in the debris areas. Soil Vapor: Samples were not collected. Soil Matrix: Samples were at three (3) trench locations.	VOCs were detected in the samples collected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs in the debris area. Soil samples were at three (3) trench locations.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPHs	Screen for potential TPHs in the debris area. Soil samples were at three (3) trench locations.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential Metals in debris area. Soil samples were at three (3) trench locations.	Metals were detected above background and Ecological RBSLs in two samples. U5TS1500 at 0.5-1 ft. bgs (Mercury) U5TS1502 at 5-6 ft. bgs (Copper, Mercury, Silver, and Zinc) Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	**Chemical Use Area Name** (see Section 2 texts and tables for Site History)	**Potential Chemicals Used/Stored**	**Sampling Scope and Rationale** (see Figure Q.2-2 for sampling locations)	**Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?**	**Chemical Use Area sufficiently evaluated for risk assessment?**	**Is delineation sufficient to estimate soil volume in CMS?** (see Figure Q.5-1 for CMS area)
33	Building 4463	VOCs	Screened for potential VOCs around building. Soil vapor sampling was attempted at two (2) locations (Figure Q.3-1A). However, nosoil vapor samples could be collected at these locations due to the presence of shallow bedrock (i.e., less than 5 feet bgs) or insufficient flow from the soil vapor wells to allow sample collection. Soil samples were collected at one (1) location.	VOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs around building. Soil samples were collected at one (1) location.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPHs	Screen for potential TPHs in and around building. Soil samples were collected at one (1) locations.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential Metals in building area. Soil samples were collected at one (1) location.	Metals were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		PCBs	Screen for potential PCBs around former transformer area. Soil samples were collected at one (1) locations.	No PCBs were detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-4 and Q.3-8.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
35	Building 4461	VOCs	Screened for potential VOCs in and around building. <u>Soil Vapor:</u> Samples were collected from one (1) location. <u>Soil Matrix:</u> Samples were not collected.	No VOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	**Chemical Use Area Name** (see Section 2 texts and tables for Site History)	**Potential Chemicals Used/Stored**	**Sampling Scope and Rationale** (see Figure Q.2-2 for sampling locations)	**Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?**	**Chemical Use Area sufficiently evaluated for risk assessment?**	**Is delineation sufficient to estimate soil volume in CMS?** (see Figure Q.5-1 for CMS area)
35	Building 4461 (continued)	SVOCs	Screened for potential SVOCs in and around building. Soil samples were collected at one (1) location.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPHs	Screen for potential TPHs in and around building. Soil samples were collected at one (1) locations.	No TPH was detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential Metals in building area. Soil samples were collected at one (1) location.	Metals were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.5 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
36	Building 4628	VOCs	Screened for potential VOCs in and around building. <u>Soil Vapor:</u> Soil vapor samples were collected from one (1) location. <u>Soil Matrix:</u> Soil samples were not collected.	No VOCs were detected in any of the samples. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1A, Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs to in and around building. Soil samples were collected at one (1) location.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPHs	Screen for potential TPHs in and around building. Soil samples were collected at one (1) locations.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential Metals in building area. Soil samples were collected at one (1) location.	Aluminum was detected above background and Ecological RBSLs in one sample. U5BS1053 at 0-1 ft. bgs Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of aluminum impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	**Chemical Use Area Name** (see Section 2 texts and tables for Site History)	**Potential Chemicals Used/Stored**	**Sampling Scope and Rationale** (see Figure Q.2-2 for sampling locations)	**Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?**	**Chemical Use Area sufficiently evaluated for risk assessment?**	**Is delineation sufficient to estimate soil volume in CMS?** (see Figure Q.5-1 for CMS area)
37	Building 4662	VOCs	Screened for potential VOCs in and around building. Soil Vapor: Soil vapor sampling was attempted at one (1) location (Figure Q.3-1A). However, no vapor samples could be collected at this location due to the presence of shallow bedrock (i.e., less than 5 feet bgs) or insufficient flow from the soil vapor well to allow sample collection. Soil Matrix: Samples were collected from two (2) locations.	Soil Matrix: VOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs in and around building. Soil samples were collected at one (1) location.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPHs	Screen for potential TPHs in and around building. Soil samples were collected at one (1) locations.	No TPH was detected in any of the soil samples. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential Metals in building area. Soil samples were collected at three (3) locations.	Metals were detected above background and Ecological RBSLs in two samples. U5BS1403 at 0-1 ft. bgs (Barium) U5BS1005 at 0-1 ft. bgs (Aluminum, Barium, and Lead) Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
N/A	Drainage Channels	VOCs	Screened for potential VOCs in drainages. Soil Vapor: Samples were not collected. Soil Matrix: Samples were collected at two (2) locations.	Soil Matrix: VOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.1 and Figures Q.3-1B and Q.3-7.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screened for potential SVOCs in drainages. Soil samples were collected at two (2) locations.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.2 and Figures Q.3-2 and Q.3-8.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2A
Evaluation of Soil and Soil Vapor Sampling Results
DOE LF3 RFI Site

Chemical Use Area Number	**Chemical Use Area Name** (see Section 2 texts and tables for Site History)	**Potential Chemicals Used/Stored**	**Sampling Scope and Rationale** (see Figure Q.2-2 for sampling locations)	**Sampling Results Chemical Concentrations detected greater than background and/or risk screening levels?**	**Chemical Use Area sufficiently evaluated for risk assessment?**	**Is delineation sufficient to estimate soil volume in CMS?** (see Figure Q.5-1 for CMS area)
N/A	Drainage Channels (continued)	TPHs	Screen for potential TPHs in drainages. Soil samples were collected at two (2) locations.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.3 and Figures Q.3-3 and Q.3-8.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		PCBs	Screen for potential PCBs in drainages. Soil samples were collected at two (2) locations.	PCBs were detected but did not exceed their respective RBSLs. Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-4 and Q.3-8.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screened for potential metals in drainages. Soil samples were collected at four (4) locations.	Metals were detected above background and Ecological RBSLs in three samples. L7BS1003 at 0-1 ft. bgs (Aluminum and Barium) L8BS1003 at 0-1 ft. bgs (Cadmium, Silver, and Zinc) L8BS1400 at 0-1 ft. bgs (Silver) Discussion of results is presented in Section Q.3.4.2.4 and Figures Q.3-5, Q.3-9A, and Q.3-9B.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table Q.3-2B
Evaluation of Groundwater Sampling Results
DOE LF3 RFI Site

Analytical Group	Site Soil Impacts (Summary of relevant impacts)	Monitored in Groundwater?	Constituent detected in groundwater? (Above screening criteria?)	Site related?	Groundwater characterized sufficiently for risk assessment?
VOCs	Benzene and toluene were detected above Residential and/or Ecological RBSLs in soil vapor samples. Benzene and xylenes were detected above Residential RBSLs in soil samples.	**Yes.** Monitored at PZ-005, PZ-104 and PZ-105 in NSGW. There are no CFOU wells at the site.	**Yes.** TCE was detected above its groundwater screening level in samples collected from PZ-005, PZ-104, and PZ-105. Acetone, 1,1,2-trichloro-1,2,2-trifluoroethane, cis-1,2-dichloroethene, and tetrachlorethene were detected at concentrations below their respective screening levels.	**No.** The VOCs that were detected and exceeded screening levels in soil are benzene, toluene, and xylenes, which do not correlate with the VOCs that were detected in NSGW at the site. TCE is the primary VOC of concern in NSGW at the DOE LF3 Site.	**NSGW - Yes.** **CFOU Groundwater** [1]
SVOCs	n-Nitrosodimethylamine, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, and Indeno(1,2,3-cd)pyrene concentrations were detected above their respective Residential RBSLs. Phenanthrene was detected above its Ecological RBSL.	**Yes.** Monitored in PZ-104 in NSGW.	**Yes.** Bis(2-Ethylhexyl) phthalate was detected above its groundwater screening level in a sample collected from PZ-104. Diethyl phthalate was detected at low level concentrations below any screening levels.	**No.** The SVOCs that were detected and exceeded screening levels in soil do not correlate with the SVOCs that were detected in NSGW at the site.	**NSGW - Yes.** **CFOU Groundwater** [1]
TPHs	Diesel range organics was detected above its Residential RBSL.	**Yes.** Monitored at PZ-005 and PZ-104 in NSGW.	**No.** TPH was not detected in any of the NSGW samples collected.	**N/A**	**NSGW - Yes.** **CFOU Groundwater** [1]
PCBs	Aroclor 1260 was detected above its Eco RBSL.	**No.**	**N/A**	**N/A**	**NSGW - Yes.** [2] **CFOU Groundwater** [1]
Metals	A variety of metals were detected above background concentrations in soil samples. See Section Q.3.4.2.5 for further information.	**Yes.** Monitored at PZ-005, PZ-104 and PZ-105 in NSGW. There are no CFGW wells at the site.	**Yes.** Dissolved metals including copper, molybdenum, selenium, and vanadium were detected above screening levels.	**Possibly.** Metals in soil may migrate into NSGW but are more likely to be bound in soil. Copper, selenium, and vanadium, which were detected above screening levels in NSGW, were also detected above screening levels in soil.	**NSGW - Yes.** **CFOU Groundwater** [1]
Energetics	1,2-dinitrobenzene were detected in two samples but did not exceed any screening levels	**Yes.** Monitored at PZ-104.	**No.** Energetics were not detected in samples collected.	**N/A**	**NSGW - Yes.** **CFOU Groundwater** [1]

Table Q.3-2B
Evaluation of Groundwater Sampling Results
DOE LF3 RFI Site

Analytical Group	**Site Soil Impacts** (Summary of relevant impacts)	**Monitored in Groundwater?**	**Constituent detected in groundwater?** (Above screening criteria?)	**Site related?**	**Groundwater characterized sufficiently for risk assessment?**

Notes:
1. Chatsworth Formation Groundwater (CFOU Groundwater) is discussed further in Appendix B and will be evaluated for risk assessment purposes in the CFOU RFI Report.
2. Although PCBs have not been monitored in NSGW at the Boeing Area IV Leach Field Site, NSGW is not expected to have been impacted by PCBs due to the high affinity of PCBs for soil.
3. NSGW - Near Surface Groundwater

Table Q.3-3A
Data Screening and Statistical Summary for Soil
DOE LF3 RFI Site

		Screening Levels			Detect Data Summary						
Constituent	**Units**	**Residential RBSL**	**Ecological RBSL**	**Background**	**Number of Samples**	**Number of Detects**	**Minimum Detected Value**	**Maximum Detected Value**	**Number of Detects > Residential RBSL**	**Number of Detects > Ecological RBSL**	**Number of Detects > Background SL**
Energetics											
1,2-Dinitrobenzene	mg/kg				2	2	3.7	3.8			
1,3-Dinitrobenzene	mg/kg		0.75		10						
2,4,6-Trinitrotoluene	mg/kg		0.21		10						
2,4-diamino-6-nitrotoluene	mg/kg				7						
2,4-Dinitrotoluene	mg/kg		0.43		11						
2,6-diamino-4-nitrotoluene	mg/kg				7						
2,6-Dinitrotoluene	mg/kg		1.71		11						
2-Amino-4,6-Dinitrotoluene	mg/kg		0.43		10						
2-Nitrotoluene	mg/kg		0.43		10						
3-Nitrotoluene	mg/kg		0.43		10						
4-Am-2,6-DNT	mg/kg		0.43		10						
4-Nitrotoluene	mg/kg		0.43		10						
HMX	mg/kg	3100	64		10						
Nitrobenzene	mg/kg	29	2		11						
Nitroglycerin	mg/kg				7						
PETN	mg/kg				7						
RDX	mg/kg	6.9	43		10						
sym-Trinitrobenzene	mg/kg		11		10						
Tetryl	mg/kg		28		10						
Geotech											
Bulk Density	pcf				1	1	109	109			
Hydraulic Conductivity	cm/sec				1	1	0.000001	0.000001			
Porosity, Total	%				1	1	35.6	35.6			
Specific gravity	No Units				1	1	2.71	2.71			
volumetric saturation (air)	%				1	1	97.1	97.1			
Hydrocarbons											
Diesel Range Hydrocarbons	mg/kg				6	3	41	14000			
Diesel Range Organics (C12-C14)	mg/kg	1400			54	1	3.6	3.6			
Diesel Range Organics (C14-C20)	mg/kg	1400			20	3	70	480			
Diesel Range Organics (C15-C20)	mg/kg	1400			54	16	1.46	15.85			
Diesel Range Organics (C20-C30)	mg/kg	1400			20	7	4.6	1000			
Diesel Range Organics (C21-C30)	mg/kg	1400			54	27	1.5	860			
Diesel Range Organics (C8-C11)	mg/kg	1.1			41						
Gasoline Range Organics (C4-C12)	mg/kg	1.1			2						
Gasoline Range Organics (C6-C12)	mg/kg	1.1			4						
Gasoline Range Organics (C8-C11)	mg/kg	1.1			20						
Kerosene Range Organics (C11-C14)	mg/kg	1400			20	2	27	94			
Oil content	mg/kg				2						
Oil Range Organics (C25-C36)	mg/kg				4	2	86	184			
Stoddard Solvent	mg/kg				2						
Total Petroleum Hydrocarbons	mg/kg				5	1	19	19			
Total Petroleum Hydrocarbons (as Jet Fuel)	mg/kg				2						
Total Petroleum Hydrocarbons (as Kerosene)	mg/kg				4						
Waste Oil	mg/kg				2						
Inorganics											
% Solids	%				13	13	82.1	94.5			
Moisture	%				89	89	3.345	27.3			
Perchlorate	mg/kg	9.1	0.000024		14						

Table Q.3-3A
Data Screening and Statistical Summary for Soil
DOE LF3 RFI Site

		Screening Levels			Detect Data Summary						
Constituent	**Units**	**Residential RBSL**	**Ecological RBSL**	**Background**	**Number of Samples**	**Number of Detects**	**Minimum Detected Value**	**Maximum Detected Value**	**Number of Detects > Residential RBSL**	**Number of Detects > Ecological RBSL**	**Number of Detects > Background SL**
pH	pH Units				36	36	5.555	10.3			
Total Solids	%				89	89	80	98			
Metals											
Aluminum	mg/kg	75000	12	20000	99	99	8840	29450		99	39
Antimony	mg/kg	30	0.095	8.7	49	8	0.315	2.7		8	
Arsenic	mg/kg	0.095	1.9	15	71	71	2	9.85	71	71	
Barium	mg/kg	15000	15	140	96	96	43.6	290		96	20
Beryllium	mg/kg	150	5	1.1	71	71	0.465	1.5			23
Boron	mg/kg	15000	6.76	9.7	69	37	1.2	11.7		4	2
Cadmium	mg/kg	39	0.0045	1	76	64	0.033	1.5		64	5
Calcium	mg/kg				6	6	2370	4690			
Chromium	mg/kg	3400	930	36.8	71	71	14.3	40.75			1
Cobalt	mg/kg	1500	8.9	21	71	71	4.3	14.4		25	
Copper	mg/kg	3000	1.1	29	71	71	6.7	41.6		71	2
Iron	mg/kg			28000	6	6	17800	26700			
Lead	mg/kg	150	0.013	34	74	74	3.2	123.45		74	1
Lithium	mg/kg	1521.66006		37	57	57	9.3	35.5			
Magnesium	mg/kg				6	6	3490	6250			
Manganese	mg/kg	1800	59	495	6	6	205	567		6	1
Mercury	mg/kg	23	0.1	0.09	77	57	0.004	6.7		12	12
Molybdenum	mg/kg	380	0.11	5.3	62	42	0.11	2.3		41	
Nickel	mg/kg	1500	0.1	29	71	71	8.6	32.1		71	1
Organic Lead	mg/kg				2						
Potassium	mg/kg			6400	63	63	1130	5300			
Selenium	mg/kg	380	0.17	0.655	84	39	0.2	2.03		39	9
Silver	mg/kg	380	0.54	0.79	71	47	0.029	6.6125		8	6
Sodium	mg/kg			110	63	48	64.3	730			39
Thallium	mg/kg	6.1	2.9	0.46	71	45	0.22	1.0625			2
Vanadium	mg/kg	76	1.5	62	71	71	24.1	67.95		71	2
Zinc	mg/kg	23000	21	110	75	75	34.1	333		75	3
Zirconium	mg/kg			8.6	57	57	1.1	7.185			
PCBs											
Aroclor 1016	mg/kg	3.9	1.6		33						
Aroclor 1221	mg/kg	0.35	1.6		33						
Aroclor 1232	mg/kg	0.35	0.077		33						
Aroclor 1242	mg/kg	0.35	0.079		33	1	0.0045	0.0045			
Aroclor 1248	mg/kg	0.35	0.0114		33						
Aroclor 1254	mg/kg	0.35	0.077		33	6	0.0014	0.0213			
Aroclor 1260	mg/kg	0.35	0.077		33	12	0.005	0.3295		5	
SVOC											
1-Methyl naphthalene	mg/kg	230			51	2	0.00567	0.0164			
2,4,5-Trichlorophenol	mg/kg	5700	9		3						
2,4,6-Trichlorophenol	mg/kg	10	10		3						
2,4-Dichlorophenol	mg/kg	170	1.3		3						
2,4-Dimethylphenol	mg/kg	1100	110		3						
2,4-Dinitrophenol	mg/kg	110	0.59		3						
2-Chloronaphthalene	mg/kg		530		3						
2-Chlorophenol	mg/kg	290	21		3						
2-Methylnaphthalene	mg/kg	230	210		58	2	0.0076	0.0142			

Table Q.3-3A
Data Screening and Statistical Summary for Soil
DOE LF3 RFI Site

		Screening Levels			Detect Data Summary						
Constituent	Units	Residential RBSL	Ecological RBSL	Background	Number of Samples	Number of Detects	Minimum Detected Value	Maximum Detected Value	Number of Detects > Residential RBSL	Number of Detects > Ecological RBSL	Number of Detects > Background SL
2-Nitroaniline	mg/kg		11		3						
2-Nitrophenol	mg/kg		11		3						
3,3'-Dichlorobenzidine	mg/kg		1.3		3						
3-Nitroaniline	mg/kg		5.9		3						
4,6-Dinitro-o-cresol	mg/kg	5.7	11		3						
4-Bromophenyl phenyl ether	mg/kg		4.3		3						
4-Chlorophenylphenyl ether	mg/kg		1.3		3						
4-Nitrophenol	mg/kg		7		3						
Acenaphthene	mg/kg	3400	2.46		58	8	0.00039	0.716			
Acenaphthylene	mg/kg	1700	370		58	2	0.0014	0.00854			
Anthracene	mg/kg	17000	2.4		58	13	0.00022	1.38			
Benzo(a)anthracene	mg/kg	0.6	5.6		58	13	0.00019	2.19	1		
Benzo(a)pyrene	mg/kg	0.06	5.6		58	16	0.00017	2.08	2		
Benzo(b)fluoranthene	mg/kg	0.6	5.6		57	21	0.00022	2.21	1		
Benzo(ghi)perylene	mg/kg		6.4		58	12	0.00033	0.822			
Benzo(k)fluoranthene	mg/kg	0.6	5.8		48	4	0.0011	0.913	1		
Benzoic acid	mg/kg	230000	4.4		1						
Benzyl alcohol	mg/kg	17000	4.4		3						
bis(2-Chloroethoxy)methane	mg/kg		150		3						
bis(2-Chloroethyl) ether	mg/kg	0.29	150		3						
bis(2-Chloroisopropyl) ether	mg/kg	2300	150		3						
bis(2-Ethylhexyl) phthalate	mg/kg	250	4.9		41	8	0.0054	0.365			
Butyl benzyl phthalate	mg/kg	11000	340		47						
Carbazole	mg/kg	36	34		1						
Chrysene	mg/kg	6	2.4		58	21	0.00028	2.02			
Dibenzo(a,h)anthracene	mg/kg	0.17	5.6		58	6	0.00096	0.0622			
Dibenzofuran	mg/kg	110	62		3						
Diethyl phthalate	mg/kg	46000	6940		40	3	0.002	0.00961			
Dimethyl phthalate	mg/kg	570000	4.4		53	2	0.00073	0.0014			
Di-n-butyl phthalate	mg/kg	5700	0.49		40	5	0.0013	0.008225			
Di-n-octyl phthalate	mg/kg	2300	39		54	3	0.0046	0.17			
Fluoranthene	mg/kg	2300	38		58	23	0.00032	6.19			
Fluorene	mg/kg	2300	1.6		58	8	0.00027	0.566			
Hexachlorobenzene	mg/kg	0.4	0.34		3						
Hexachlorocyclopentadiene	mg/kg	340	13		3						
Hexachloroethane	mg/kg	18	2.1		3						
Indeno(1,2,3-cd)pyrene	mg/kg	0.6	5.8		58	9	0.00059	0.8	1		
Isophorone	mg/kg	750	320		3						
m+p Cresol	mg/kg	290	110		1						
Naphthalene	mg/kg	6	210		60	3	0.00042	0.002			
n-Nitrosodimethylamine	mg/kg	0.045	20		57	3	0.0017	0.115	1		
n-Nitrosodi-n-propylamine	mg/kg	0.1	28		3						
n-Nitrosodiphenylamine	mg/kg	80	20		3						
o-Cresol	mg/kg	2867.0661	110		3						
p-Chloroaniline	mg/kg		4.4		3						
p-Chloro-m-cresol	mg/kg		21		3						
p-Cresol	mg/kg	290	4.3		2						
Pentachlorophenol	mg/kg	8.8	6		3						
Phenanthrene	mg/kg	1700	1.3		58	20	0.00039	4.83		1	

Table Q.3-3A
Data Screening and Statistical Summary for Soil
DOE LF3 RFI Site

		Screening Levels			Detect Data Summary						
Constituent	**Units**	**Residential RBSL**	**Ecological RBSL**	**Background**	**Number of Samples**	**Number of Detects**	**Minimum Detected Value**	**Maximum Detected Value**	**Number of Detects > Residential RBSL**	**Number of Detects > Ecological RBSL**	**Number of Detects > Background SL**
Phenol	mg/kg	18000	5		3						
p-Nitroaniline	mg/kg		3.3		3						
Pyrene	mg/kg	1700	18		56	21	0.00026	4.92			
VOC											
1,1,1,2-Tetrachloroethane	mg/kg	0.00025	76		26						
1,1,1-Trichloroethane	mg/kg	0.49	4300		26						
1,1,2,2-Tetrachloroethane	mg/kg	0.0014	6		26						
1,1,2-Trichloro-1,2,2-trifluoroethane	mg/kg	16	583		23						
1,1,2-Trichloroethane	mg/kg	0.0012	8.3		26						
1,1-Dichloroethane	mg/kg	0.0016	210		26						
1,1-Dichloroethene	mg/kg	0.023	10.7		26	3	0.00087	0.0022			
1,1-Dichloropropene	mg/kg		22		18						
1,2,3-Trichlorobenzene	mg/kg	0.124604521	20		17						
1,2,3-Trichloropropane	mg/kg	0.000051	12		18						
1,2,4-Trichlorobenzene	mg/kg	0.124604521	20		19						
1,2,4-Trimethylbenzene	mg/kg	0.035	64		26						
1,2-Dibromo-3-chloropropane	mg/kg	0.029	22		26						
1,2-Dibromoethane	mg/kg		25		18						
1,2-Dichlorobenzene	mg/kg	1.8	370		27						
1,2-Dichloroethane	mg/kg	0.0005	76		26						
1,2-Dichloropropane	mg/kg		250		26						
1,3,5-Trimethylbenzene	mg/kg	0.036	64		26						
1,3-Dichlorobenzene	mg/kg	1.7	160		27						
1,3-Dichloropropane	mg/kg		22		18						
1,4-Dichlorobenzene	mg/kg	0.01	20		27						
2-Chloro-1,1,1-trifluoroethane	mg/kg				15						
2-Chloroethylvinyl ether	mg/kg	9.56905E-06	0.73		23						
2-Hexanone	mg/kg		1220		18						
Acetone	mg/kg	51	43		26	2	0.00277	0.0062			
Acrolein	mg/kg		230		2						
Acrylonitrile	mg/kg		0.43		2						
Benzene	mg/kg	0.00013	110		30	1	0.028	0.028	1		
Bromobenzene	mg/kg		110		18						
Bromochloromethane	mg/kg		25		18						
Bromodichloromethane	mg/kg	0.00031	15		26						
Bromoform	mg/kg		38		26						
Bromomethane	mg/kg		25		26						
Carbon Disulfide	mg/kg	0.067695411	47		3						
Carbon Tetrachloride	mg/kg	0.000042	1.5		26						
Chlorobenzene	mg/kg	0.097	40		26						
Chloroethane	mg/kg		190		26						
Chloroform	mg/kg	0.00077	11		26						
Chloromethane	mg/kg		25		26						
Chlorotrifluoroethylene	mg/kg		10.7		15						
cis-1,2-Dichloroethene	mg/kg	0.014	68		26						
cis-1,3-Dichloropropene	mg/kg		22		26						
Cumene	mg/kg	0.382558451	210		18						
Dibromochloromethane	mg/kg		46		18						
Dibromomethane	mg/kg		25		18						

Table Q.3-3A
Data Screening and Statistical Summary for Soil
DOE LF3 RFI Site

		Screening Levels			Detect Data Summary						
Constituent	Units	Residential RBSL	Ecological RBSL	Background	Number of Samples	Number of Detects	Minimum Detected Value	Maximum Detected Value	Number of Detects > Residential RBSL	Number of Detects > Ecological RBSL	Number of Detects > Background SL
Dichlorodifluoromethane	mg/kg	0.015	64		26						
Diisopropyl ether	mg/kg				1						
Ethylbenzene	mg/kg	1.2	210		30	2	0.39	0.52			
Hexachlorobutadiene	mg/kg	9.2	0.85		20						
Methyl ethyl ketone	mg/kg	62	2540		26						
Methyl isobutyl ketone (MIBK)	mg/kg	19.63756975	2540		18						
Methyl tert-butyl ether	mg/kg		120		18						
Methylene chloride	mg/kg	0.004	25		26	3	0.0015	0.0034			
m-Xylene & p-Xylene	mg/kg	0.15	64		24						
n-Butylbenzene	mg/kg		210		18						
n-Propylbenzene	mg/kg	0.203267508	210		18						
o-Chlorotoluene	mg/kg	1222.098214	160		18						
o-Xylene	mg/kg	0.19	64		24						
p-Chlorotoluene	mg/kg	1222.098214	160		18						
p-Cymene	mg/kg		64		18						
sec-Butylbenzene	mg/kg	76.76404578	210		18						
sec-Dichloropropane	mg/kg		22		18						
Styrene	mg/kg	7.2	427		18	6	0.000267	0.000417			
tert-Amyl methyl ether	mg/kg				1						
tert-Butyl alcohol	mg/kg				1						
tert-Butyl ethyl ether	mg/kg				1						
tert-Butylbenzene	mg/kg		210		18						
Tetrachloroethene	mg/kg	0.00043	6		26						
Toluene	mg/kg	0.3	3.4		30	2	0.0036	0.024			
trans-1,2-Dichloroethene	mg/kg	0.016	970		26						
trans-1,3-Dichloropropene	mg/kg		4.4		26						
Trichloroethene	mg/kg	0.0022	3		26						
Trichlorofluoromethane	mg/kg	0.11	300		26						
Trichlorotrifluorethane	mg/kg				1						
Vinyl acetate	mg/kg		500		2						
Vinyl chloride	mg/kg	0.0000096	0.73		26						
Xylenes, Total	mg/kg	0.15	64		24				2		
Xylenes, Total	mg/kg	0.15	64		6	2	0.52	1.2	2		

Table Q.3-3B
Data Screening and Statistical Summary for Soil Vapor
DOE LF3 RFI Site

		Screening Levels		Detect Data Summary					
Constituent	**Units**	**Residential RBSL**	**Ecological RBSL**	**Number of Samples**	**Number of Detects**	**Minimum Detected Value**	**Maximum Detected Value**	**Number of Detects > Residential RBSL**	**Number of Detects > Ecological RBSL**
VOC									
1,1,1,2-Tetrachloroethane	ug/L	0.048		22					
1,1,1-Trichloroethane	ug/L	640	38	22					
1,1,2,2-Tetrachloroethane	ug/L	0.048		22					
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/L	8800	91	22					
1,1,2-Trichloroethane	ug/L	0.17	0.057	22					
1,1-Dichloroethane	ug/L	1.7	36	22					
1,1-Dichloroethene	ug/L	58	0.6	22					
1,2-Dichloroethane	ug/L	0.13	42	22					
Benzene	ug/L	0.095	0.57	22	2	0.045	0.1	1	
Carbon Tetrachloride	ug/L	0.063	0.63	22					
Chloroethane	ug/L		992	22					
Chloroform	ug/L	0.5	0.24	22					
cis-1,2-Dichloroethene	ug/L	10	1.9	22					
Dichlorodifluoromethane	ug/L	58	91	22					
Ethylbenzene	ug/L	290	23	22	2	0.06	0.14		
Methylene chloride	ug/L	2.7	0.87	22					
m-Xylene & p-Xylene	ug/L		16	22	2	0.24	0.62		
o-Xylene	ug/L	29	16	22	3	0.07	0.18		
Tetrachloroethene	ug/L	0.45232	24	22					
Toluene	ug/L	110	0.084	22	2	0.19	0.63		2
trans-1,2-Dichloroethene	ug/L	20	1.9	22					
Trichloroethene	ug/L	1.4	6.4	22	1	0.1	0.1		
Trichlorofluoromethane	ug/L	200	90.9	22					
Vinyl chloride	ug/L	0.035	0.56	22					
VOC in vapor screen (All ND)	ug/L			4					
Xylenes, Total	ug/L		16	22	3	0.08	0.8		

Table Q.3-3C
Data Screening and Statistical Summary for Solids
DOE LF3 RFI Site

		Detect Data Summary			
Constituent	**Units**	**Number of Samples**	**Number of Detects**	**Minimum Detected Value**	**Maximum Detected Value**
Geotech					
Bulk Density	pcf	1	1	134.6	134.6
Hydraulic Conductivity	cm/sec	1	1	0.00016	0.00016
Porosity, Total	%	1	1	19.3	19.3
Specific gravity	No Units	1	1	2.67	2.67
volumetric saturation (air)	%	1	1	60.8	60.8
Inorganics					
Moisture	%	1	1	5.4	5.4

Table Q.4-1
Chemicals of Potential Concern for Human Health
DOE LF3 RFI Site

Medium	Depth (ft.)	Chemical	Exceeds Background? (Y/N)	Selected as COPC?	Reason for Exclusion
Soil	0-2	1,1-Dichloroethene		Y	
Soil	0-2	1,2-Dinitrobenzene		Y	
Soil	0-2	1-Methyl naphthalene		Y	
Soil	0-2	2-Methylnaphthalene		Y	
Soil	0-2	Acenaphthene		Y	
Soil	0-2	Acenaphthylene		Y	
Soil	0-2	Acetone		Y	
Soil	0-2	Aluminum	Y	Y	
Soil	0-2	Anthracene		Y	
Soil	0-2	Antimony	N	N	Below Background
Soil	0-2	Aroclor 1242		N	< 5% Detection
Soil	0-2	Aroclor 1254		Y	
Soil	0-2	Aroclor 1260		Y	
Soil	0-2	Arsenic	N	N	Below Background
Soil	0-2	Barium	Y	Y	
Soil	0-2	Benzo(a)anthracene		Y	
Soil	0-2	Benzo(a)pyrene		Y	
Soil	0-2	Benzo(b)fluoranthene		Y	
Soil	0-2	Benzo(ghi)perylene		Y	
Soil	0-2	Benzo(k)fluoranthene		Y	
Soil	0-2	Beryllium	Y	Y	
Soil	0-2	bis(2-Ethylhexyl) phthalate		Y	
Soil	0-2	Boron	N	N	Below Background
Soil	0-2	Cadmium	Y	Y	
Soil	0-2	Chromium	Y	Y	
Soil	0-2	Chrysene		Y	
Soil	0-2	Cobalt	Y	Y	
Soil	0-2	Copper	Y	Y	
Soil	0-2	Dibenzo(a,h)anthracene		Y	
Soil	0-2	Diesel Range Hydrocarbons (C15-C20)		N	See BTEX, PAHs
Soil	0-2	Dimethyl phthalate		Y	
Soil	0-2	Di-n-butyl phthalate		Y	
Soil	0-2	Di-n-octyl phthalate		N	< 5% Detection
Soil	0-2	Fluoranthene		Y	
Soil	0-2	Fluorene		Y	
Soil	0-2	Indeno(1,2,3-cd)pyrene		Y	
Soil	0-2	Iron	N	N	Below Background
Soil	0-2	Kerosene Range Hydrocarbons (C12-C14)		N	< 5% Detection
Soil	0-2	Lead	N	N	Below Background
Soil	0-2	Lithium	N	N	Below Background
Soil	0-2	Lubricating Oil Range Hydrocarbons (C20-C30)		N	See BTEX, PAHs
Soil	0-2	Lubricating Oil Range Hydrocarbons (C21-C30)		N	See BTEX, PAHs
Soil	0-2	Manganese	N	N	Below Background
Soil	0-2	Mercury	Y	Y	Below Background
Soil	0-2	Methylene chloride		Y	Below Background
Soil	0-2	Molybdenum	N	N	Below Background
Soil	0-2	Naphthalene		Y	
Soil	0-2	Nickel	Y	Y	
Soil	0-2	n-Nitrosodimethylamine		Y	
Soil	0-2	Phenanthrene		Y	
Soil	0-2	Pyrene		Y	
Soil	0-2	Selenium	N	N	Below Background
Soil	0-2	Silver	N	N	Below Background
Soil	0-2	Styrene		Y	
Soil	0-2	Thallium	N	N	Below Background
Soil	0-2	Total Petroleum Hydrocarbons		N	See BTEX, PAHs
Soil	0-2	Vanadium	Y	Y	
Soil	0-2	Zinc	Y	Y	
Soil	0-2	Zirconium	N	N	Below Background
Soil	0-10	1,1-Dichloroethene		Y	
Soil	0-10	1,2-Dinitrobenzene		Y	
Soil	0-10	1-Methyl naphthalene		N	< 5% Detection
Soil	0-10	2-Methylnaphthalene		N	< 5% Detection
Soil	0-10	Acenaphthene		Y	
Soil	0-10	Acenaphthylene		N	< 5% Detection
Soil	0-10	Acetone		Y	

Table Q.4-1
Chemicals of Potential Concern for Human Health
DOE LF3 RFI Site

Medium	Depth (ft.)	Chemical	Exceeds Background? (Y/N)	Selected as COPC?	Reason for Exclusion
Soil	0-10	Aluminum	Y	Y	
Soil	0-10	Anthracene		Y	
Soil	0-10	Antimony	N	N	Below Background
Soil	0-10	Aroclor 1242		N	< 5% Detection
Soil	0-10	Aroclor 1254		Y	
Soil	0-10	Aroclor 1260		Y	
Soil	0-10	Arsenic	N	N	Below Background
Soil	0-10	Barium	N	N	Below Background
Soil	0-10	Benzene		N	< 5% Detection
Soil	0-10	Benzo(a)anthracene		Y	
Soil	0-10	Benzo(a)pyrene		Y	
Soil	0-10	Benzo(b)fluoranthene		Y	
Soil	0-10	Benzo(ghi)perylene		Y	
Soil	0-10	Benzo(k)fluoranthene		Y	
Soil	0-10	Beryllium	Y	Y	
Soil	0-10	bis(2-Ethylhexyl) phthalate		Y	
Soil	0-10	Boron	N	N	Below Background
Soil	0-10	Cadmium	N	N	Below Background
Soil	0-10	Chromium	Y	Y	
Soil	0-10	Chrysene		Y	
Soil	0-10	Cobalt	Y	Y	
Soil	0-10	Copper	Y	Y	
Soil	0-10	Dibenzo(a,h)anthracene		Y	
Soil	0-10	Diesel Range Organics		N	See BTEX, PAHs
Soil	0-10	Diesel Range Hydrocarbons (C14-C20)		N	See BTEX, PAHs
Soil	0-10	Diesel Range Hydrocarbons (C15-C20)		N	See BTEX, PAHs
Soil	0-10	Diethyl phthalate		Y	
Soil	0-10	Dimethyl phthalate		N	< 5% Detection
Soil	0-10	Di-n-butyl phthalate		Y	
Soil	0-10	Di-n-octyl phthalate		Y	
Soil	0-10	Ethylbenzene		Y	
Soil	0-10	Fluoranthene		Y	
Soil	0-10	Fluorene		Y	
Soil	0-10	Indeno(1,2,3-cd)pyrene		Y	
Soil	0-10	Iron	N	N	Below Background
Soil	0-10	Kerosene Range Hydrocarbons (C12-C14)		N	< 5% Detection
Soil	0-10	Kerosene Range Hydrocarbons (C11-C14)		N	See BTEX, PAHs
Soil	0-10	Lead	N	N	Below Background
Soil	0-10	Lithium	N	N	Below Background
Soil	0-10	Lubricating Oil Range Hydrocarbons (C20-C30)		N	See BTEX, PAHs
Soil	0-10	Lubricating Oil Range Hydrocarbons (C21-C30)		N	See BTEX, PAHs
Soil	0-10	Lubricating Oil Range Hydrocarbons (C25-C36)		N	See BTEX, PAHs
Soil	0-10	Manganese	N	N	Below Background
Soil	0-10	Mercury	Y	Y	
Soil	0-10	Methylene chloride		Y	
Soil	0-10	Molybdenum	N	N	Below Background
Soil	0-10	Naphthalene		N	< 5% Detection
Soil	0-10	Nickel	Y	Y	
Soil	0-10	n-Nitrosodimethylamine		Y	
Soil	0-10	Phenanthrene		Y	
Soil	0-10	Pyrene		Y	
Soil	0-10	Selenium	N	N	Below Background
Soil	0-10	Silver	N	N	Below Background
Soil	0-10	Styrene		Y	
Soil	0-10	Thallium	N	N	Below Background
Soil	0-10	Toluene		Y	
Soil	0-10	Total Petroleum Hydrocarbons		N	See BTEX, PAHs
Soil	0-10	Vanadium	Y	Y	
Soil	0-10	Xylenes, Total		Y	
Soil	0-10	Zinc	N	N	Below Background
Soil	0-10	Zirconium	N	N	Below Background
Soil Vapor	0-10	Benzene		Y	
Soil Vapor	0-10	Ethylbenzene		Y	
Soil Vapor	0-10	m-Xylene & p-Xylene		N	See Xylenes, Total
Soil Vapor	0-10	o-Xylene		N	See Xylenes, Total

Table Q.4-1
Chemicals of Potential Concern for Human Health
DOE LF3 RFI Site

Medium	Depth (ft.)	Chemical	Exceeds Background? (Y/N)	Selected as COPC?	Reason for Exclusion
Soil Vapor	0-10	Toluene		Y	
Soil Vapor	0-10	Trichloroethene		N	< 5% Detection
Soil Vapor	0-10	Xylenes, Total		Y	
Groundwater	-	1,1,2-Trichloro-1,2,2-trifluoroethane		Y	
Groundwater	-	Acetone		Y	
Groundwater	-	Aluminum		Y	
Groundwater	-	Antimony, Dissolved	N	N	Below Background
Groundwater	-	Arsenic, Dissolved	N	N	Below Background
Groundwater	-	Barium	N	N	Below Background
Groundwater	-	Barium, Dissolved	N	N	Below Background
Groundwater	-	bis(2-Ethylhexyl) phthalate		Y	
Groundwater	-	Boron, Dissolved	N	N	Below Background
Groundwater	-	Bromide		Y	
Groundwater	-	Chromium	N	N	Below Background
Groundwater	-	Chromium, Dissolved	N	N	Below Background
Groundwater	-	cis-1,2-Dichloroethene		Y	
Groundwater	-	Copper	Y	Y	
Groundwater	-	Copper, Dissolved	N	N	Selected higher of Total/Dissolved
Groundwater	-	Diethyl phthalate		Y	
Groundwater	-	Fluoride	N	N	Below Background
Groundwater	-	Iron	N	N	Below Background
Groundwater	-	Lead, Dissolved	N	N	Below Background
Groundwater	-	Manganese	N	N	Below Background
Groundwater	-	Molybdenum, Dissolved	Y	Y	
Groundwater	-	Nickel, Dissolved	N	N	Below Background
Groundwater	-	Nitrate-NO3		Y	
Groundwater	-	Selenium, Dissolved	Y	Y	
Groundwater	-	Silver	Y	Y	
Groundwater	-	Strontium, Dissolved	N	N	Below Background
Groundwater	-	Tetrachloroethene		Y	
Groundwater	-	Trichloroethene		Y	
Groundwater	-	Vanadium, Dissolved	Y	Y	
Groundwater	-	Zinc, Dissolved	N	N	Below Background

Table Q.4-2
Human Health Risk Estimates[1]
DOE LF3 RFI Site

Receptor	Soil Media[2]					Groundwater[3]				Total for Site Media[4]			
	HI Range	CD[5]	Risk Range	CD	HI Range	CD	Risk Range	CD	HI Range	CD	Risk Range	CD
Future Adult Recreator	0.000002 - 0.00007		1E-08 - 3E-06	a	NA - NA		NA - NA		<0.01 - <0.01		1E-08 - 3E-06	a
Future Child Recreator	0.00008 - 0.0004		2E-07 - 3E-06	a	NA - NA		NA - NA		<0.01 - <0.01		2E-07 - 3E-06	a
Future Adult Resident	0.03 - 0.08		2E-07 - 5E-06	a	2 - 3	c	8E-06 - 3E-05	b, c	2 - 3	c	8E-06 - 4E-05	a, b, c
Future Child Resident	0.3 - 0.7		1E-06 - 9E-06	a	7 - 11	c, d	2E-05 - 3E-05	b, c	7 - 12	c, d	2E-05 - 4E-05	a, b, 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 exposure routes, including incidental ingestion, dermal contact, and dust inhalation.
3. Groundwater media risk estimates are for domestic use of shallow groundwater.
4. Includes combined exposure from 1) direct contact with soil, 2) inhalation of indoor and ambient air vapors originating from soil gas, subsurface soil, and groundwater, and 3) domestic use of shallow groundwater.
5. Chemical risk drivers are those COPCs detected onsite with an HI > 1 or risk > 1x10-6. Only major risk contributors listed if cumulative HI >> 1 or cancer risk >> 1x10-6.

a = Benzo(a)pyrene
b = Tetrachloroethene
c = Trichloroethene
d = Nitrate-N

CD = Chemical risk driver
COPC = Chemical of potential concern
HI = Hazard index
NA = Not Applicable

Table Q.4-3
Human Health Risk Assessment Uncertainty Analysis
DOE LF3 RFI Site

Assessment Element	Uncertainty	Magnitude of Impact	Direction of Impact
COPC Selection	Several inorganics were selected as a COPC since it could not be demonstrated to be consistent with background concentrations through the Wilcoxon Rank Sum test. For site data sets that are small, uncertainty is introduced into the comparisons.	Moderate	Conservative
	Benzene, ethylbenzene, toluene, total xylenes, and TCE were selected as soil vapor COPCs since they were directly detected in soil vapor. Acetone, naphthalene, and styrene were also selected as soil vapor COPCs because they were detected in soil and/or groundwater but not analyzed for in soil vapor.	Moderate	Conservative
	Petroleum hydrocarbons were not selected as COPCs since TPH-related constituents (BTEX and PAHs) were analyzed for.	Low	Realistic
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 recreational, which has lower risks than for urban residential. If land use is assumed agricultural, risk estimates may be higher.	Moderate	Uncertain
	Risk estimates for fruit and vegetable consumption are based on conservative models that are based on associations with physical-chemical properties, such as Koc.	Moderate	Conservative
	Groundwater monitoring data and comparison concentrations (i.e., background) are filtered samples (i.e., dissolved concentrations) as per agency-approved groundwater monitoring work plan. Although dissolved concentrations represent the concentrations that may migrate, the total concentration in groundwater may be greater when there are significant amount of suspended solids present (i.e., total concentration).	Moderate	Realistic
EPC Calculations	EPCs are based on some data that are over 10 years old. In these cases available analytical data may not accurately reflect current site conditions. Source concentrations assumed constant over time. Chemical concentrations may decline as a result of migration or degradation.	Low	Conservative
	Use of upper confidence limits and maximum detected concentrations will likely overestimate site risks.	Low	Conservative
	Soil vapor exposure point concentration for acetone, naphthalene, and styrene are estimated using soil to soil vapor partitioning extrapolations, introducing some degree of uncertainty.	Moderate	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 EPC because samples were collected in areas with the highest likelihood to detect the highest concentrations at the site.	Moderate	Conservative
	The maximum detected concentration of each COPC detected in groundwater was used as the EPC.	Moderate	Conservative

Table Q.4-3
Human Health Risk Assessment Uncertainty Analysis
DOE LF3 RFI Site

Assessment Element	Uncertainty	Magnitude of Impact	Direction of Impact
EPC Calculations	The extrapolation of soil Aroclor 1254 and Aroclor 1260 concentrations to individual PCB congener concentrations introduces some uncertainty into the EPC estimates for the PCB congeners.	Low	Conservative
	Vapor migration into indoor air has been estimated using a model which is being validated for the site. Migration estimates may be changed once the model validation is complete.	Moderate	Uncertain
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
	Not all slope factors represent the same degree of certainty. All are subject to change as new evidence becomes available. Some slope factors derived by OEHHA and considerably more conservative that corresponding factors derived by USEPA (e.g. arsenic, PCBs)	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	No dermal toxicity values are available, oral toxicity factors are used for the dermal route.	Moderate	Conservative
	High degree of uncertainty in extrapolation of dose-response data from laboratory animals to humans.	High	Conservative

Notes:
BTEX - benzene, toluene, ethylbenzene, and xylenes
COPC - chemical of potential concern
EPC - exposure point concentration
Koc - organic carbon sorption/adsorption coefficient
OEHHA - Office of Environmental Health Hazard Assessment
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
TPH - total petroleum hydrocarbons
UCL - upper confidence limit
USEPA - United States Environmental Protection Agency

Table Q.4-4
Chemicals of Ecological Concern - Soil
DOE LF3 RFI Site

Preferred Analyte Name	Range of HQs - RME Exposure (Refined Calculations)							Identification of COECs								
	Terrestrial Plant	Soil Invertebrate	Hermit Thrush	Red-Tailed Hawk	Deer Mouse	Bobcat	Mule Deer	Terrestrial Plants	Soil Invertebrates	Hermit Thrush	Red-Tailed Hawk	Deer Mouse	Bobcat	Mule Deer	COEC	Rationale
Aluminum	**410**	**8.2**	No TRV -- **23**	No TRV -- <1	**140** -- **1400**	<1 -- **1.0**	**4.6** -- **46**	**154**	**3.1**	-- -- **8.5**	-- -- <1	**49** -- **486**	<1 -- <1	**1.7** -- **17**	No	-USEPA guidance indicates no risk from aluminum when pH is greater than 5.5. -site pH ranged from 5.56 to 10.3.
Barium	<1	<1	**1.5** -- **2.9**	<1 -- <1	Not CPEC -- Not CPEC	<1 -- <1	<1 -- <1	<1	<1	<1 -- **1.5**	<1 -- <1	n/a -- n/a	<1 -- <1	<1 -- <1	No	-Maximum site concentration is below maximum background concentration. -Only one receptor showed potential risks (hermit thrush). -Incremental risks were close to one for the thrush and were <1 for all other receptors.
Cadmium	<1	<1	<1 -- **23**	<1 -- <1	Not CPEC -- Not CPEC	<1 -- <1	<1 -- <1	<1	<1	<1 -- <1	<1 -- <1	n/a -- n/a	<1 -- <1	<1 -- <1	No	-RME site concentration below RME background concentration. -All estimated risk due to background concentrations.
Chromium	<1	<1	**6.4** -- **32**	<1 -- <1	No TRV -- <1	No TRV -- <1	No TRV -- <1	<1	<1	**1.7** -- **8.6**	<1 -- <1	-- -- <1	-- -- <1	-- -- <1	No	-RME and maximum site concentrations are similar to background RME and maximum concentrations. -Estimated risks exceeded one for hermit thrush only. All other receptor HQs<1 -Incremental risks were <1 for all receptors except the thrush.
Copper	<1	<1	<1 -- **15**	<1 -- <1	<1 -- **6.6**	<1 -- <1	<1 -- <1	<1	<1	<1 -- **3.1**	<1 -- <1	<1 -- <1	<1 -- <1	<1 -- <1	No	-CTE and RME site concentrations are similar to the CTE and RME background concentrations. -Estimated risks exceeded Low TRVs for only two receptors (hermit thrush and deer mouse). -Incremental low HQs <1 for all receptors except hermit thrush.
Mercury	**3.9**	<1	<1 -- **1.3**	<1 -- <1	<1 -- <1	<1 -- <1	<1 -- <1	**3.7**	<1	<1 -- **1.3**	<1 -- <1	<1 -- <1	<1 -- <1	<1 -- <1	No	-Estimated risks are driven by single high detect (6.7 mg/kg) at location L7BS1404S01. -Estimated risks exceeded low TRVs for terrestrial plant and hermit thrush and HQs were close to one for the thrush.
Nickel	<1	<1	<1 -- **12**	<1 -- <1	<1 -- **171**	<1 -- <1	<1 -- **6.1**	<1	<1	<1 -- **2.4**	<1 -- <1	<1 -- **33**	<1 -- <1	<1 -- **1.2**	No	-Maximum site concentration below maximum background concentration. -Estimated risks exceeded Low TRVs for hermit thrush, deer mouse, and mule deer. -No High TRVs exceeded. -Incremental low HQs were greater than 1 for hermit thrush, deer mouse, and mule deer.
Vanadium	<1	<1	No TRV -- <1	No TRV -- <1	**3.0** -- **30**	<1 -- <1	<1 -- <1	<1	<1	-- -- <1	-- -- <1	<1 -- **7.4**	<1 -- <1	<1 -- <1	No	-Maximum site concentration close to maximum background concentration. -Estimated risks exceeded TRVs for only one receptor (deer mouse). -Incremental low HQs were <1 for High TRV and >1 for Low TRV.
Zinc	<1	<1	<1 -- **3.3**	<1 -- <1	Not CPEC -- Not CPEC	<1 -- <1	<1 -- <1	<1	<1	<1 -- <1	<1 -- <1	Not CPEC -- Not CPEC	<1 -- <1	<1 -- <1	No	-Estimated risks are driven by single high detect (333 mg/kg) at location L8BS1003S01. -Only 3 resutls exceeded the maximum bacdgroupn value. -Estimated risks exceeded Low TRVs for a single receptor (hermit thrush), all other HQs were <1.
1,2-Dinitrobenzene	No TRV	<1	No TRV -- No TRV	No TRV -- No TRV	**1.4** -- **5.9**	<1 -- <1	<1 -- <1	n/a	n/a	n/a -- n/a	n/a -- n/a	n/a -- n/a	n/a -- n/a	n/a -- n/a	Yes	-Estimated risks exceeded high and low TRVs for deer mouse.
Aroclor 1260	<1	<1	<1 -- **2.9**	<1 -- <1	<1 -- **1.9**	<1 -- <1	<1 -- <1	n/a	n/a	n/a -- n/a	n/a -- n/a	n/a -- n/a	n/a -- n/a	n/a -- n/a	Yes	-Estimated risks exceeded low TRVs for hermit thrush and deer mouse.
PCB_TEQ_Bird	No TRV	<1	**1.8** -- **18**	<1 -- <1	Not CPEC -- Not CPEC	Not CPEC -- Not CPEC	Not CPEC -- Not CPEC	n/a	n/a	n/a -- n/a	n/a -- n/a	n/a -- n/a	n/a -- n/a	n/a -- n/a	Yes	-Estimated risks exceeded high and low TRVs for hermit thrush.
PCB_TEQ_Mammal	No TRV	<1	Not CPEC -- Not CPEC	Not CPEC -- Not CPEC	**5.4** -- **54**	<1 -- <1	<1 -- <1	n/a	n/a	n/a -- n/a	n/a -- n/a	n/a -- n/a	n/a -- n/a	n/a -- n/a	Yes	-Estimated risks exceeded high and low TRVs for deer mouse.

Notes:
n/a - not applicable
HQs listed are based on Refined Screen
Low hazard quotient = EPC/High TRV
High hazard quotient = EPC/Low TRV
COEC - chemical of ecological concern
CPEC - chemical of potential ecological concern
CTE - central tendency exposure
HQ - hazard quotient
RME - reasonable maximum exposure
TRV - toxicity reference value

Table Q.4-5
Ecological Risk Assessment Uncertainty Analysis
DOE LF3 RFI Site

Assessment Element	Uncertainty	Magnitude of Impact	Direction of Impact
Problem Formulation			
Fate and Transport	It is assumed that chemical concentrations will not change over time, and that concentrations are constant during the exposure duration. Natural attenuation and/or other degradation processes may be significant in some areas resulting in an over-estimation of exposure.	Moderate	Over-estimation of exposure/risk
Data Collection/Analysis	Variability in analyses, laboratories, representativeness of samples, sampling errors, and homogeneity of the sample matrix can influence quality and quantity of data used in the risk assessment. Data were validated, but historical sampling programs may not have had the same standards as more recent ones.	Unknown	Over- or under-estimation of exposure/risk
Data Collection/Analysis	Detection Limits. Historical data were noted to have overly high detection limits, especially in regard to metals. Recent sampling was designed to have detection limits meeting ESLs. However, as data are combined into the EPCs, high detection limits may influence the resulting mean and 95UCLs.	Moderate	Over-estimation of exposure/risk
Data Collection/Analysis	Surface water samples were not collected from surface drainages. Potential exposure and risk to aquatic receptors could not be evaluated.	Moderate	Under-estimation of exposure/risk
Representative Species	Representative species were selected to reduce uncertainty; however, differences among species including physiology, reproductive biology, and/or foraging habits can result in different exposures and sensitivities for different receptors.	Low	Over- or under-estimation of exposure/risk
CPEC Selection	Background Comparison. Background evaluation was based on the WRS test. For some inorganics, the WRS test indicated that the site exceeded background, but site maximum, CTE, and RME concentrations were similar to or below background maximum, CTE, and/or RME concentrations.	Low	Over-estimation of exposure/risk
CPEC Selection	VOC Comparison. VOCs that were detected in soil but were not analyzed for in soil gas were retained as CPECs under the matrix "Modeled Soil Vapor". Concentrations were modeled from soil concentrations using SRAM Appendix G Equation 18.	Low	Over-estimation of exposure/risk
CPEC Selection	SQL Comparison. Chemicals that were never detected at the site were included as CPECs if they met the criteria in the SQL screening process: a) SQL>ESL b) at least 5 samples were collected c) at least 2 other chemicals in the same chemical class were detected.	Low	Over-estimation of exposure/risk
Exposure Pathway Analysis	Dermal and inhalation (for surface-dwelling animals) exposure pathways were not quantified.	Low	Under-estimation of exposure/risk
Analysis			
Wildlife Exposure Factors	Assumptions regarding exposure - likelihood, contact with contaminated media, concentrations at exposure points, and frequency/duration of contact are based on available information and assumptions of wildlife habits at the SSFL. Assumptions tend to simplify actual site conditions and may over- or under-estimate actual exposure.	Moderate	Over- or under-estimation of exposure/risk
Bioaccumulation Factors	Site-specific data on CPEC concentrations in wildlife foods were used to derive BAFs for a limited number of CPECs (SRAM 2005). For the remaining CPECs, literature-based BAFs and regression models were used to estimate bioaccumulation. The suitability of these bioaccumulation models to conditions at the site is unknown. Therefore, concentrations of CPECs in biota present at the site and, consequently, the dietary exposures of birds and mammals, may be either higher or lower than values estimated in the Group 5 ERAs.	Moderate	Over- or under-estimation of exposure/risk

Table Q.4-5
Ecological Risk Assessment Uncertainty Analysis
DOE LF3 RFI Site

Assessment Element	Uncertainty	Magnitude of Impact	Direction of Impact
Bioavailability	Bioavailability of CPECs was assumed to be 100 percent. This likely overestimates risk to receptors at the site.	Low	Over-estimation of exposure/risk
Area Use Factors	Area use factors (AUFs) of less than 1 were applied to exposure estimates for wide-ranging receptors (red-tailed hawk, bobcat, and mule deer) in the "refined" assessment to account for the foraging range of the receptor. Use of the site may be greater or less than that predicted by the AUF.	Low	Over- or under-estimation of exposure/risk
Exposure Point Concentrations	CTE EPC. CTE EPC is based on the arithmetic mean per the SRAM (MWH 2005). This assumes normal distribution. In some cases the CTE was >RME and/or CTE was >Maximum detect. The mean (CTE) could be biased high by higher detection limits from historic data. The RME EPC was used for the CTE EPC when the CTE was >RME or CTE was >Maximum.	Moderate	Over-estimation of exposure/risk
Exposure Point Concentrations	RME EPC. The RME EPC is the 95UCL, unless the 95UCL exceeds the maximum detect in which case the maximum detect is used as the RME EPC. Use of the maximum detect is considered to be a likely overestimation of the representative exposure point concentration because samples were collected in areas likely to have the highest concentrations at the site.	Moderate	Over-estimation of exposure/risk
Exposure Point Concentrations	The extrapolation of soil Aroclor 1254 and Aroclor 1260 concentrations to individual dioxin-like PCB congener concentrations introduces some uncertainty into the EPC estimates for the PCB congeners.	Low	Over- or under-estimation of exposure/risk
Exposure Point Concentrations	Soil vapor concentrations extrapolated from soil concentrations were used to calculate soil vapor EPC.	Moderate	Over- or under-estimation of exposure/risk
Exposure Point Concentrations	Estimation of soil vapor concentrations overstates actual burrow concentrations: 1) Model is conservative. 2) Air flow in burrows is not accounted for. 3) Model does not account for attenuation between depth to soil and 0-6 ft bgs interval for burrows.	Moderate	Over- or under-estimation of exposure/risk
Toxicity Reference Values	Toxicity data were not available for all CPECs or media considered in the Group 5 ERAs. CPECs for which toxicity data were unavailable were not evaluated, or surrogate toxicity data were used. Risks may be overestimated or underestimated.	Moderate	Over- or under-estimation of exposure/risk
Toxicity Reference Values	Literature-derived toxicity data from laboratory studies were the only toxicity data used to evaluate risk to all receptor groups. Effects observed in laboratory species were assumed to be indicative of effects that would occur in wild species. The suitability of this assumption is unknown. Therefore, risk may be either overestimated or underestimated.	Moderate	Over- or under-estimation of risks

Table Q.4-5
Ecological Risk Assessment Uncertainty Analysis
DOE LF3 RFI Site

Assessment Element	Uncertainty	Magnitude of Impact	Direction of Impact
Toxicity Reference Values	There is uncertainty in extrapolation of dose-response data from laboratory animals to other wildlife.	Moderate	Over- or under-estimation of risks
Toxicity Reference Values	Use of standardized uncertainty factors to estimate chronic NOAEL-equivalent TRVs.	Moderate	Over- or under-estimation of risks
Toxicity Reference Values	Use of chronic NOAEL-equivalent TRVs may overestimate risk.	High	Over-estimation of exposure/risk
Toxicity Reference Values	TRVs based on high dose laboratory exposures (LD50) were adjusted to a NOAEL-equivalent TRV. The more variables that are normalized using uncertainty factors, the greater the uncertainty in the resulting value.	Moderate	Over-estimation of exposure/risk
Toxicity Reference Values	Sources of TRVs occasionally apply different uncertainty factors than those used in the SRAM to adjust a study to what they label a "Chronic NOAEL". When details of the study were available, SRAM-specified uncertainty factors were used. If the details of the study were not presented or were not sufficiently complete to make a determination, then the interpretations made by the source document were used.	Low	Over- or under-estimation of risks
Risk Characterization			
Risk Estimation	Potential ecological risks were quantified using the HQ approach. The magnitude of the HQ indicates potential for ecological risk, but is not an exact estimation of risk. For example, the actual risk from a chemical with an HQ of 70 could be less than that for a chemical with an HQ of 20 because of uncertainties involved in estimating exposure, selection of effects criteria (TRVs), or field conditions affecting exposure.	Moderate	Over- or under-estimation of risks
Risk Estimation	Data necessary to estimate potential risks from all pathways for all chemicals in the food-chain uptake model were not always available. For these chemicals and/or areas, the food-chain uptake model was completed using the available data.	Moderate	Under-estimation of exposure/risk
Risk Estimation	Risks estimated for exposure to some inorganics may represent a background risk, rather than a site-related risk. Although the WRS test sometimes indicated that the site exceeded background, the Maximum, CTE, and/or RME EPC concentrations, it was sometimes found that site values were less than or comparable to the background Maximum, CTE, and/or RME concentrations.	Moderate	Over- or under-estimation of exposure/risk
Risk Description	The soluble and toxic forms of aluminum are only present in soil under soil pH values of less than 5.5 (USEPA 2003), and the average pH for the soils at the Group 5 sites exceeds 5.5. Aluminum, while evaluated in the ERA as a CPEC and identified as a risk driver, most likely does not cause effects to the various ecological receptors due to the soil pH range.	Moderate	Over-estimation of exposure/risk

Notes:
BAF - bioaccumulation factor
CPEC - chemical of potential ecological concern
CTE - central tendency exposure
EPC - exposure point concentration
ERA - ecological risk assessment
ESL - ecological screening level
LD50 - lethal doses to 50% of test animals
NOAEL - no observed adverse effect level
RME - reasonable maximum exposure
SQL - sample quantitation limit
TRV - toxicity reference value
UCL - upper confidence limit on the mean
VOC - volatile organic chemical
WRS - Wilcoxon Rank Sum test

Table Q.5-1
Surficial Media Site Action Recommendations
DOE LF3 RFI Site

Chemical Use Area	Chemical Use Area Name	CMS Area [1,3]	Recommended for further consideration in CMS based on:				
			Residential Receptor [2]	Recreational Receptor [2]	Ecological Receptor [2]		
					Soil Results		
					Any HQ>1?	COEC	Rationale
1	Building 4353	NFA	HRA COC:	HRA COC:	Aluminum	No	ERA-1
2	Building 4363	NFA			Barium	No	ERA-2
3	Building 4373	NFA	***Near Surface Groundwater***	***Soil Results***	Cadmium	No	ERA-14
4	Building 4383	NFA	***Results***	Benzo(a)pyrene	Chromium	No	ERA-6
5	Buildings 4375, 4874, and 4875	NFA	Nitrate-NO3		Copper	No	ERA-15
6	Substation 4707	NFA	Tetrachloroethene,		Mercury	No	ERA-16
7	Building 4374	NFA	Trichloroethene		Nickel	No	ERA-2
8	Substation 4883 A	NFA			Vanadium	No	ERA-19
9	Building 4055	NFA			Zinc	No	ERA-18
10	Building 4462	DOELF3-1	***Soil Results***		1,2-Dinitrobenzene	Yes	ERA-3
11	UT-75	NFA	Benzo(a)pyrene		Aroclor 1260	Yes	ERA-3
12	UST (north of Building 4363)	NFA			PCB_TEQ_Bird	Yes	ERA-4
13	UT-72	NFA			PCB_TEQ_Mammal	Yes	ERA-4
14	UT-12 (UT-55)	NFA					
15	Building 4353 Leach Field	NFA					
16	Building 4363 Leach Field	NFA					
17	Building 4373 Leach Field	NFA					
18	Building 4383 Leach Field	NFA					
19	Substation 4760 A	NFA					
20	Substation 4755	NFA					
21	Transformer Pole X14	NFA					
22	Substation 4762 B	DOELF3-2					
23	Substation 4760 B	NFA					
24	Substation 4883 B	NFA					
25	Substation 4853	NFA					
26	Transformer Pole A324	NFA					
27	Building 4473	NFA					
28	Building 4854	NFA					
29	Building 4863	NFA			***Soil Vapor Results***		
30	Building 4873	NFA			Any HQ>1?	COEC	Rationale
31	Building 4015	NFA			None	None	ERA-5
32	Debris Area 3005	NFA					
33	Building 4463	NFA					
34	Substation 4780	NFA					
35	Building 4461	NFA					
36	Building 4628	NFA					
37	Building 4662	NFA					

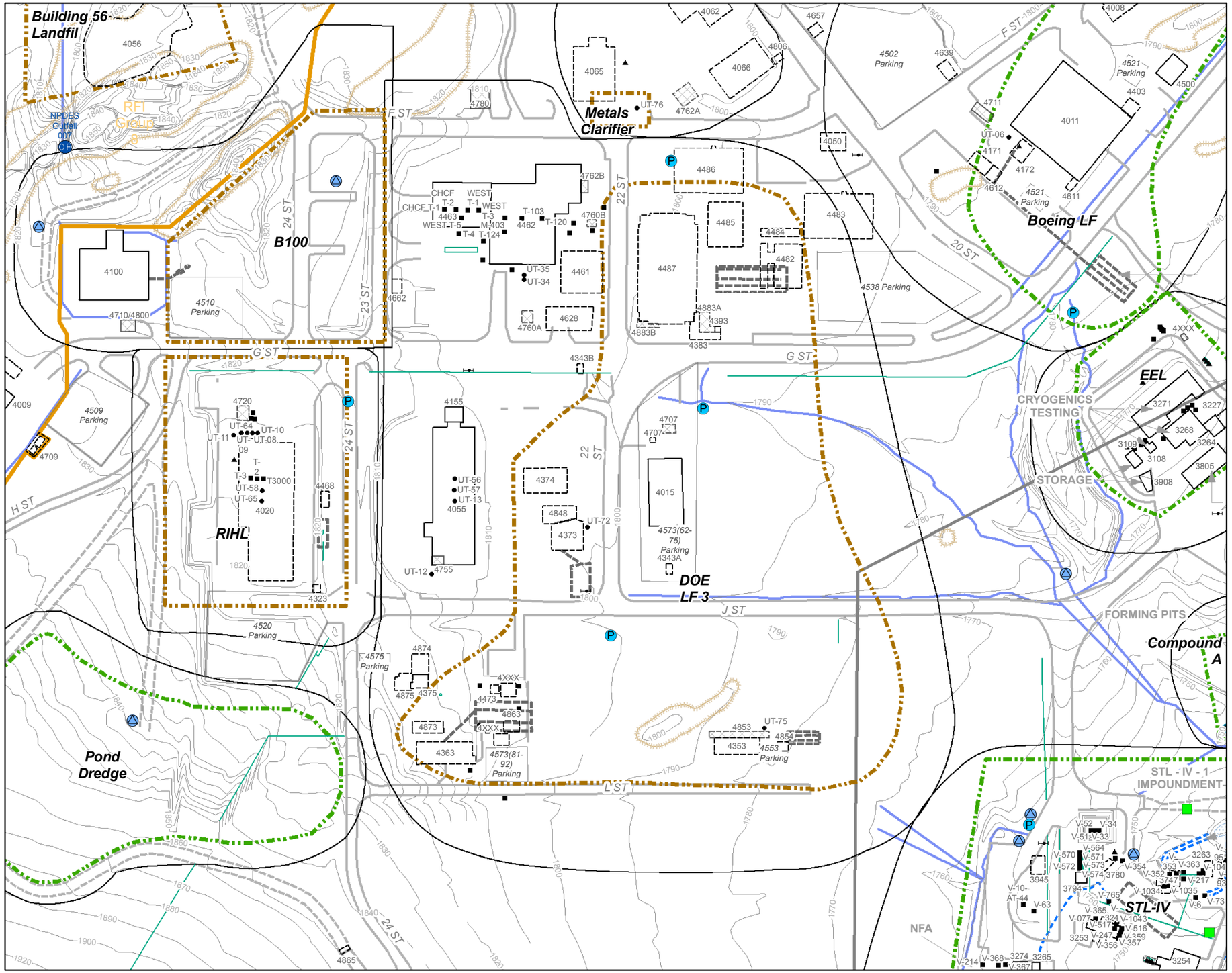
Notes:
1. NFA - Indicates area is recommended for No Further Action (NFA) for the CUA; not recommended for CMS evaluation.
2. CMS recommendations are based on compounds considered risk drivers (excess cancer risk > 1 x 10-6 or hazard index > 1) and/or significant risk contributors.
3. CMS Areas are numbered in sequence. Extent of CMS Areas shown on Figure Q.5-1 are approximate and reflect site action recommendations based on characterization and risk assessment results inclusive for all receptors (See Section Q.5).

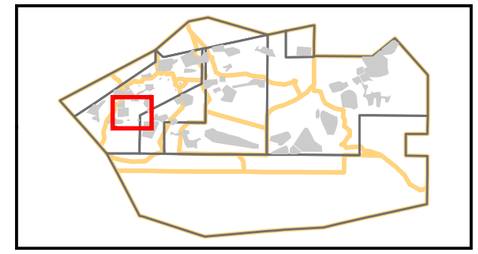
ERA-1	USEPA guidance indicates no risk from aluminum when pH is greater than 5.5. Site pH >5.5.
ERA-2	Site maximum concentration is below background maximum concentration. Site RME is similar to background RME.
ERA-3	Estimated risks and or incremental risks >1 for 1 or more receptors. Magnitude of exceedance indicate potential risk.
ERA-4	Estimated risks >1 for 1 or more receptors and chemical class hazard index>1. NOTE- eposure point concentrations were extrapolated from Aroclor 1254 and 1260 (not directly measured).
ERA-5	No chemicals of potential ecological concern exceeded Low or High TRVs under either the CTE or RME scenarios.
ERA-6	Site RME and Maximum concentrations are similar to background RME and Maximum concentrations. Incremental risk <1 for all receptors except hermit thrush.
ERA-14	Site RME concentration is below background RME concentration All estimated risk is due to background.
ERA-15	Site CTE similar to background CTE concentration. All incremental HQs<1 with exception of hermit thrush.
ERA-16	Estimated risks are driven by single high detect (6.7 mg/kg) at location L7BS1404S01. HQs >1 only for terrestrial plants and hermit thrush and HQ for thrush was close to 1.
ERA-18	Estimated risks are driven by single high detect (333 mg/kg) at location L8BS1003S01.Only 3 resutls exceeded the maximum background value. -Estimated risks exceeded Low TRVs for a single receptor (hermit thrush), all other HQs were <1.
ERA-19	Site CTE concentration similar to background CTE. Deer mouse on receptor with HQs>1.

Table Q.5-2
Summary of Site Surficial Media CMS Recommendations
DOE LF3 RFI Site

CMS Area	Description	Chemical Risk Drivers and Contributors	Rationale
DOELF3 - 1	Southeast Corner of Building 4462	Benzo(a)pyrene in soil	Primary chemical contributor to the excess lifetime cancer risk (4×10^{-5}) calculated for the site for future potential residential and recreational receptors.
DOELF3 - 2	Northeast Corner of Building 4462 at Substation 4762B	Aroclor 1260 in soil	Hazard quotients greater than 1 calculated in the ecological risk assessment.

Figures





Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Pipe
- Surface Drainage Divide
- Leachfield
- Pond
- Groundwater Monitoring Well
- Piezometer
- Groundwater Extraction Well
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- Road - Asphalt
- Roads - Dirt
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Rocks
- Streams

Site Location
DOE LF3 RFI Site

Date: October 29, 2008

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1 inch equals 150 feet

0 150 300 Feet

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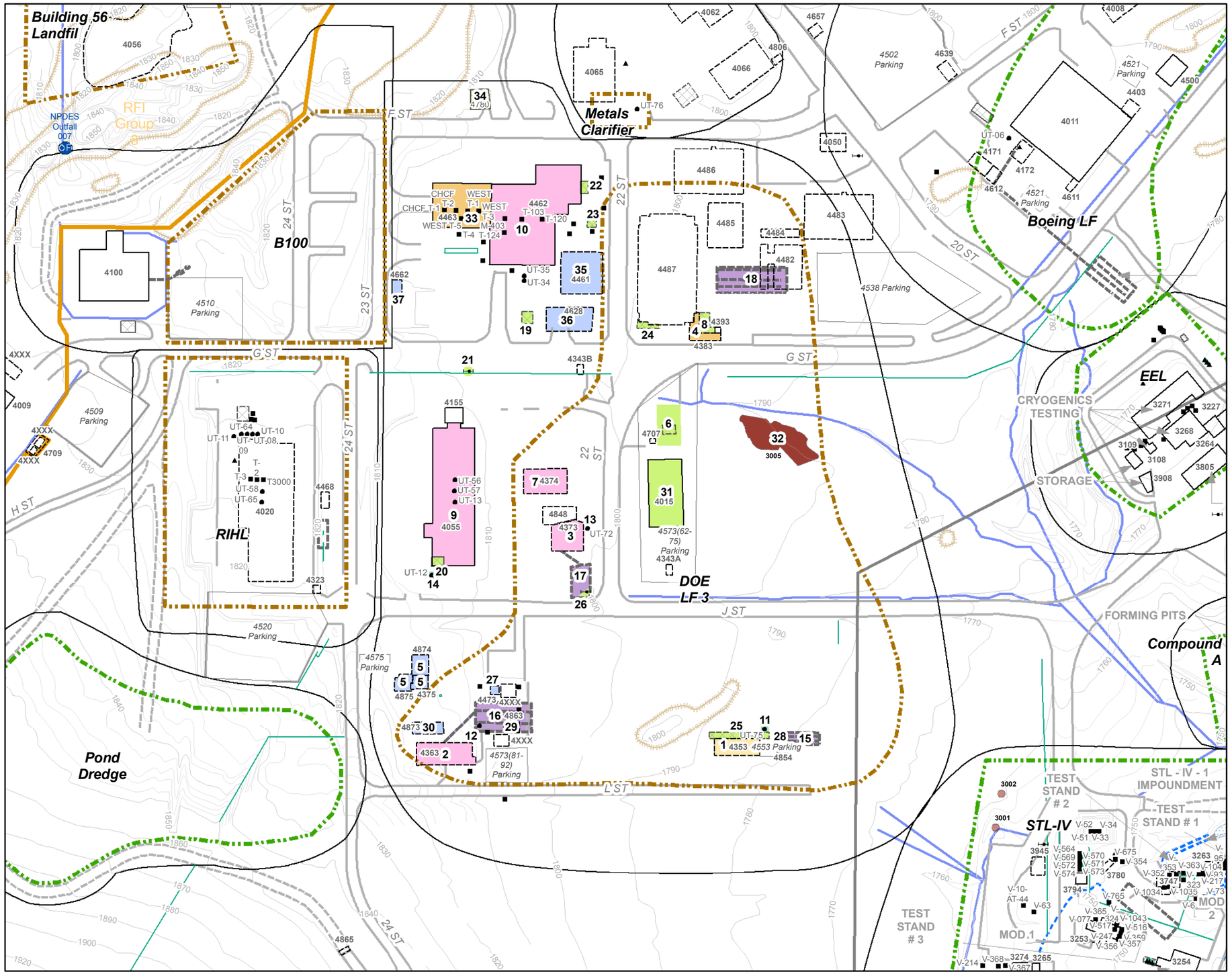
Figure Q.1-1



Chemical Use

- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

Multiple Use Key

ACB - Acids and Bases
ASB - Asbestos
DEB - Debris
DIOX - Dioxins and Furans
ENC - Energetic Constituents
FRM - Formaldehyde
LCF - Leach Field
MET - Metals
NMIC - Non-metal Inorganic Constituents
OPCB - Oil/PCBs
PET - Petroleum
PRP - Propellants
SLV - Solvents
SVOC - SVOCs

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Leachfield
- Pipe
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- Surface Drainage Divide
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Waste Debris Area

Chemical Use Areas
DOE LF3 RFI Site

Date: September 18, 2008 **WORKING DRAFT**

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1 inch equals 150 feet

0 150 300 Feet

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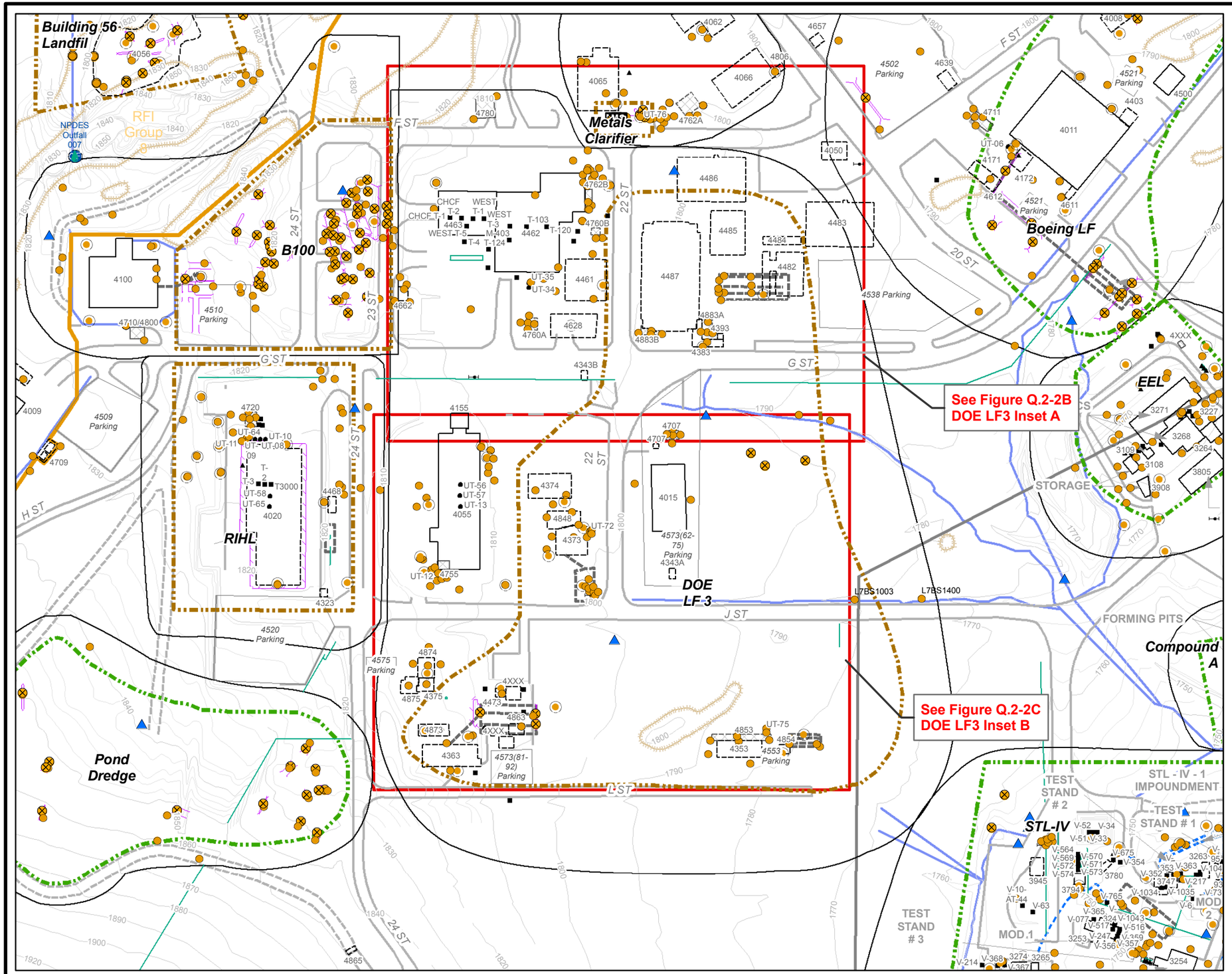
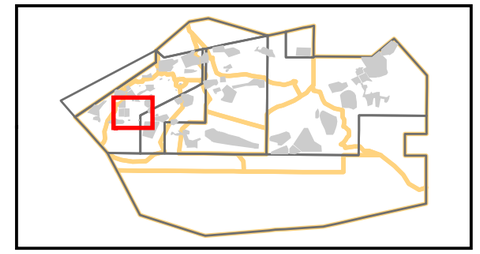
Figure Q.2-1





Sample Type

- Soil
- Soil - Composite
- Soil - Sediment
- Soil - Surface
- Air - Soil Vapor
- SV points that were not sampled due to refusal or poor air flow
- Air
- Groundwater
- Groundwater - Lysimeter
- Groundwater - Spring
- Water - Artificial
- Water - Discharge
- Water - Surface
- Water - Surface (Seep)
- B — Biological
- MO — Other
- MS — Sump

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Trench
- Leachfield
- Pipe
- Surface Drainage Divide
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary

Sample Locations
DOE LF3 RFI Site

Date: November 06, 2008 WORKING DRAFT

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1 inch equals 150 feet

0 150 300 Feet

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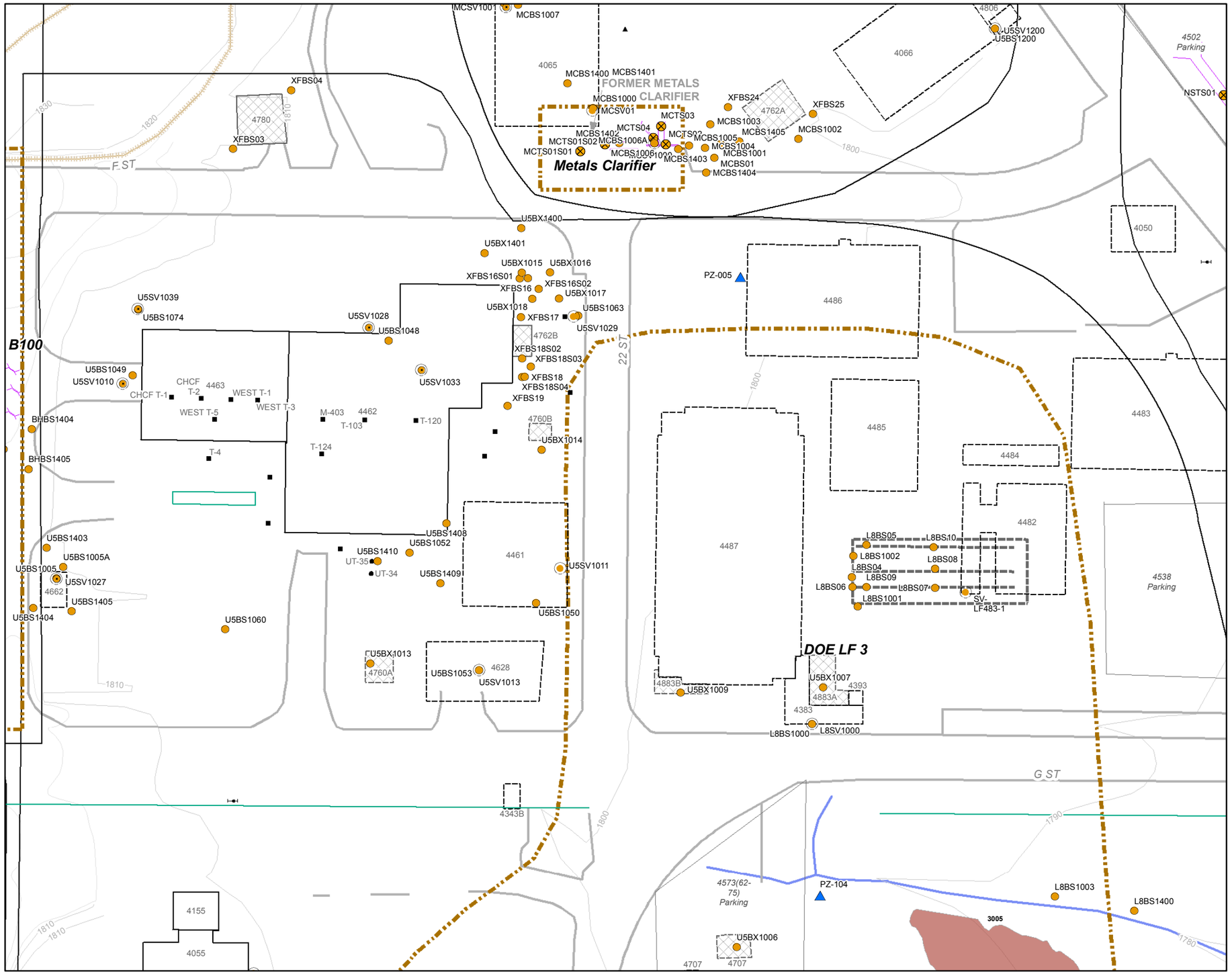
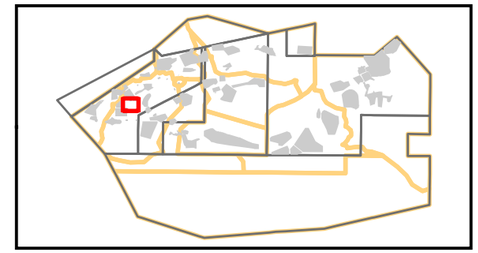
Figure Q.2-2A





Sample Type

- Soil
- Soil - Composite
- Soil - Sediment
- Soil - Surface
- Air - Soil Vapor
- SV points that were not sampled due to refusal or poor air flow
- Air
- Groundwater
- Groundwater - Lysimeter
- Groundwater - Spring
- Water - Artificial
- Water - Discharge
- Water - Surface
- Water - Surface (Seep)
- B Biological
- MO Other
- MS Sump

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Trench
- Leachfield
- Pipe
- Surface Drainage Divide
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary

Sample Locations
Inset A
DOE LF3 RFI Site

Date: October 30, 2008 WORKING DRAFT

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1 inch equals 60 feet

0 60 120 Feet

SANTA SUSANA FIELD LABORATORY

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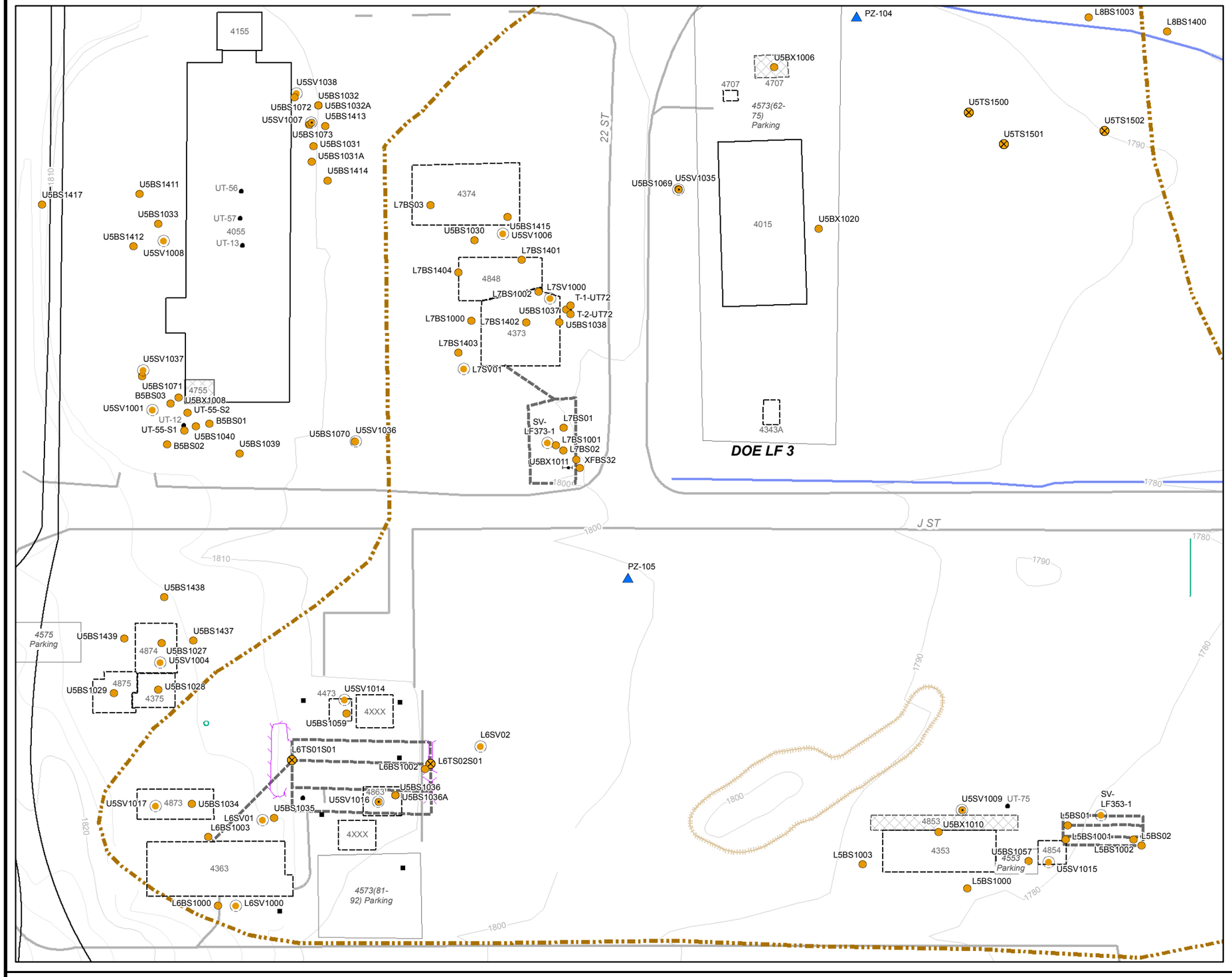
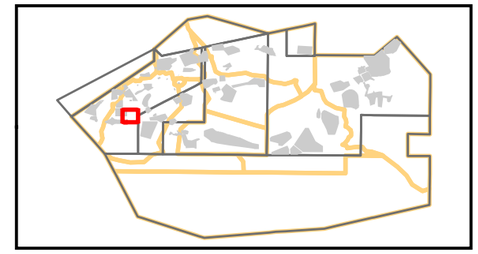
Figure Q.2-2B





Sample Type

- Soil
- Soil - Composite
- Soil - Sediment
- Soil - Surface
- Air - Soil Vapor
- SV points that were not sampled due to refusal or poor air flow
- Air
- Groundwater
- Groundwater - Lysimeter
- Groundwater - Spring
- Water - Artificial
- Water - Discharge
- Water - Surface
- Water - Surface (Seep)
- Biological
- Other
- Sump

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Trench
- Leachfield
- Pipe
- Surface Drainage Divide
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary

Sample Locations Inset B DOE LF3 RFI Site

Date: October 30, 2008 **WORKING DRAFT**

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1 inch equals 60 feet

0 60 120 Feet

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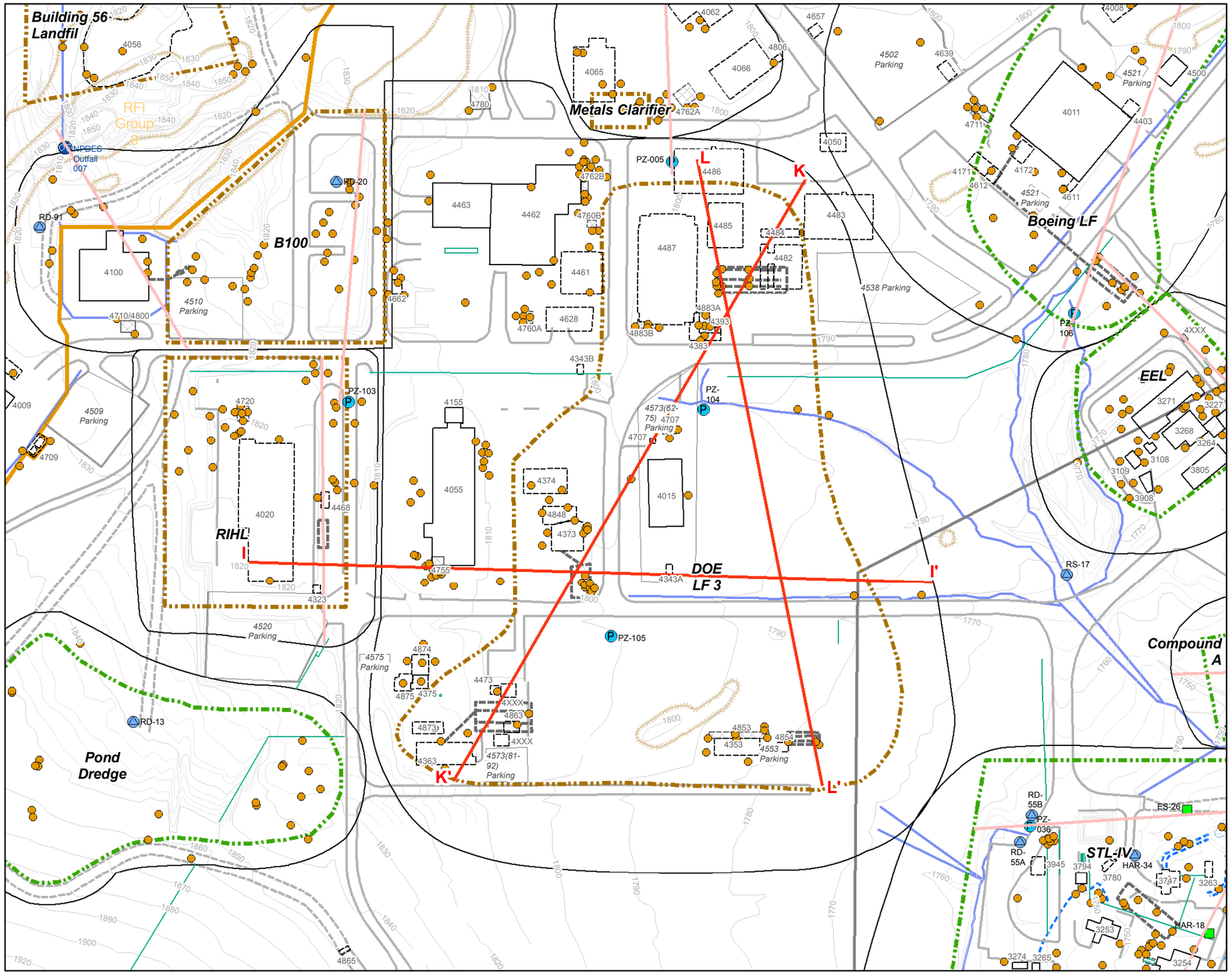
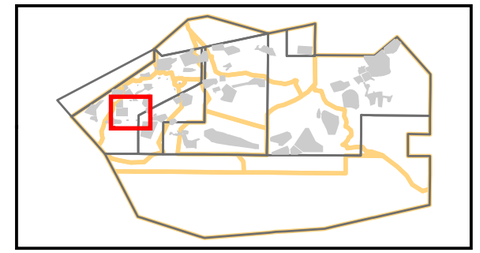
Figure Q.2-2C





Cross-section Line

Basemap Legend

- Soil Boring
- Confirmation Sample
- Groundwater Monitoring Well
- Piezometer
- Groundwater Extraction Well
- Abandoned Groundwater Monitoring Well
- Leachfield
- Pipe
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary

DOE LF3 Cross Section Locations
I-I', K-K', and L-L'

Date: September 18, 2008 WORKING DRAFT

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1 inch equals 150 feet

0 150 300 Feet

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Figure Q.2-3A

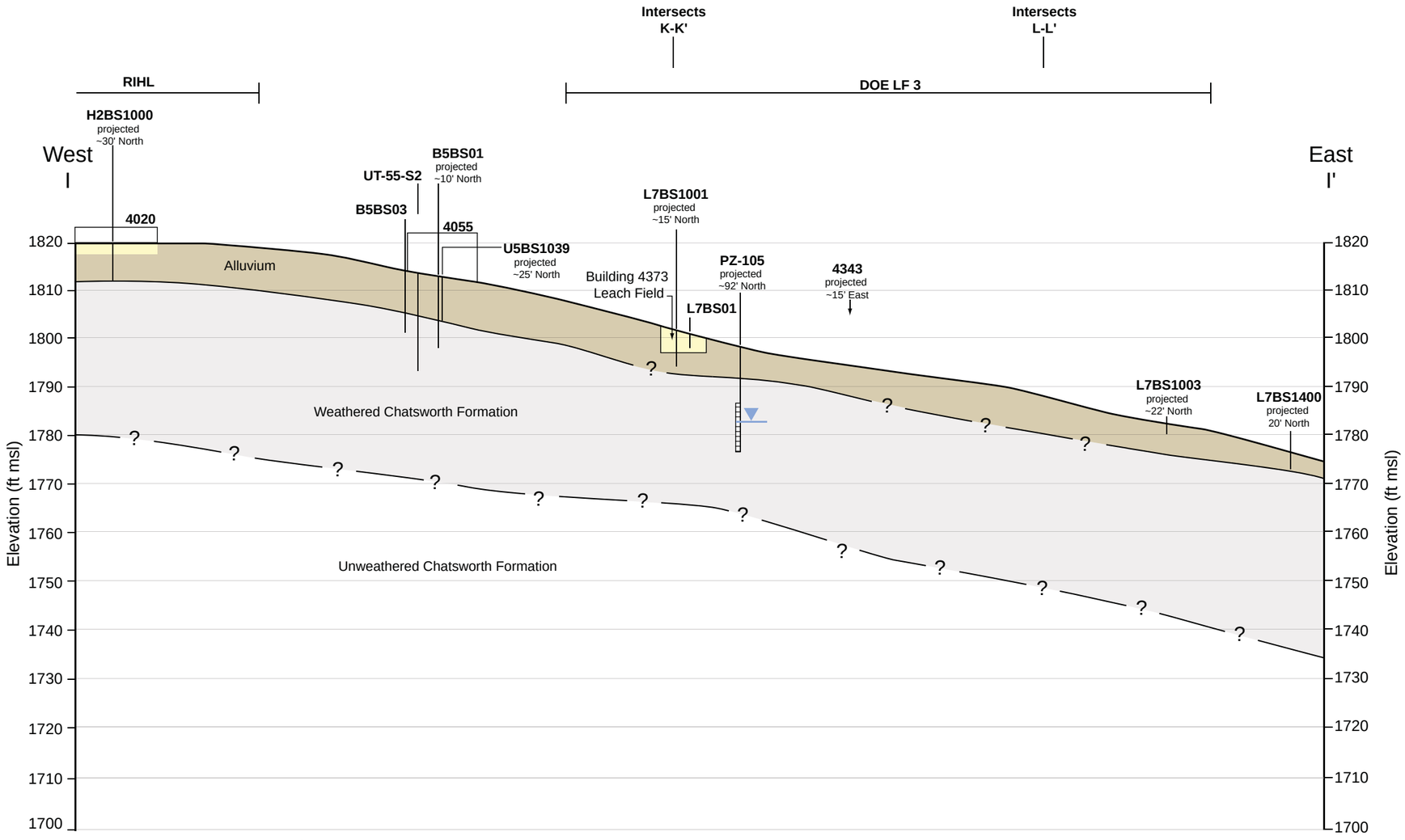

FIGURE Q.2-3B
Surficial Cross Section I-I'
DOE LF3
Santa Susana Field Laboratory

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ES072007017SCO362070.FP.5A.05.BO CrossSect_II.ai 9/08

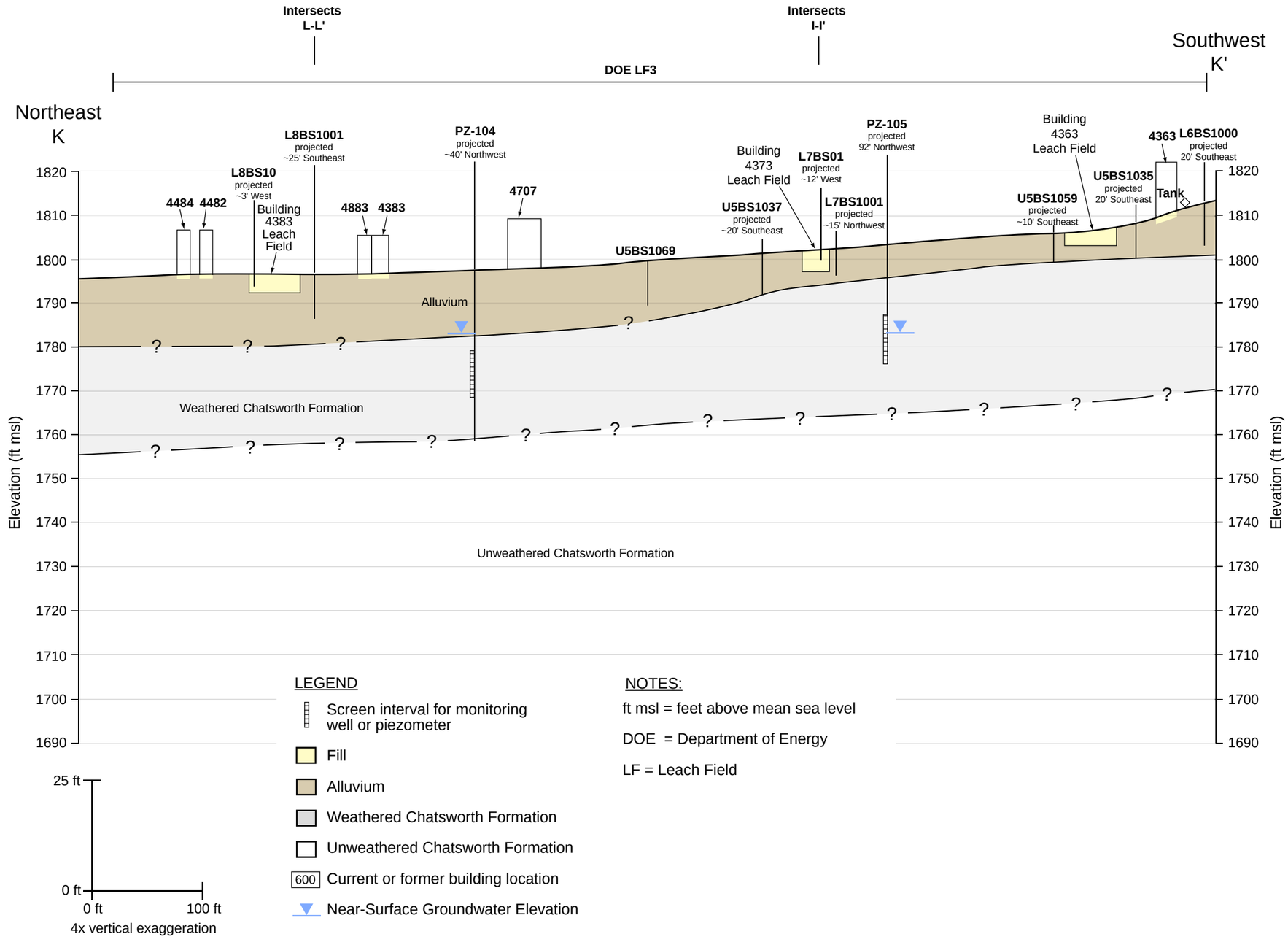

FIGURE Q.2-3C
Cross Section K-K'
DOE LF3
Santa Susana Field Laboratory

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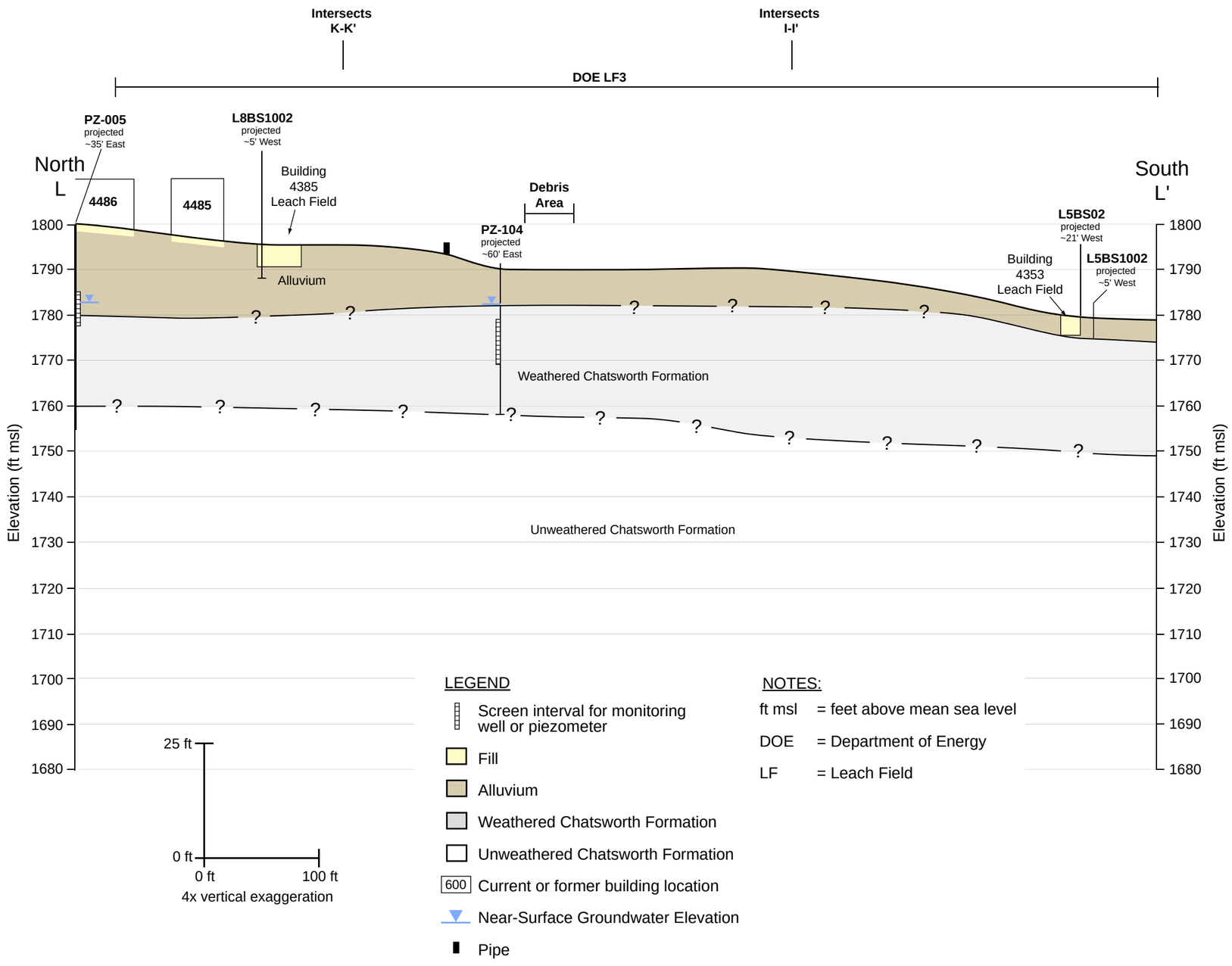
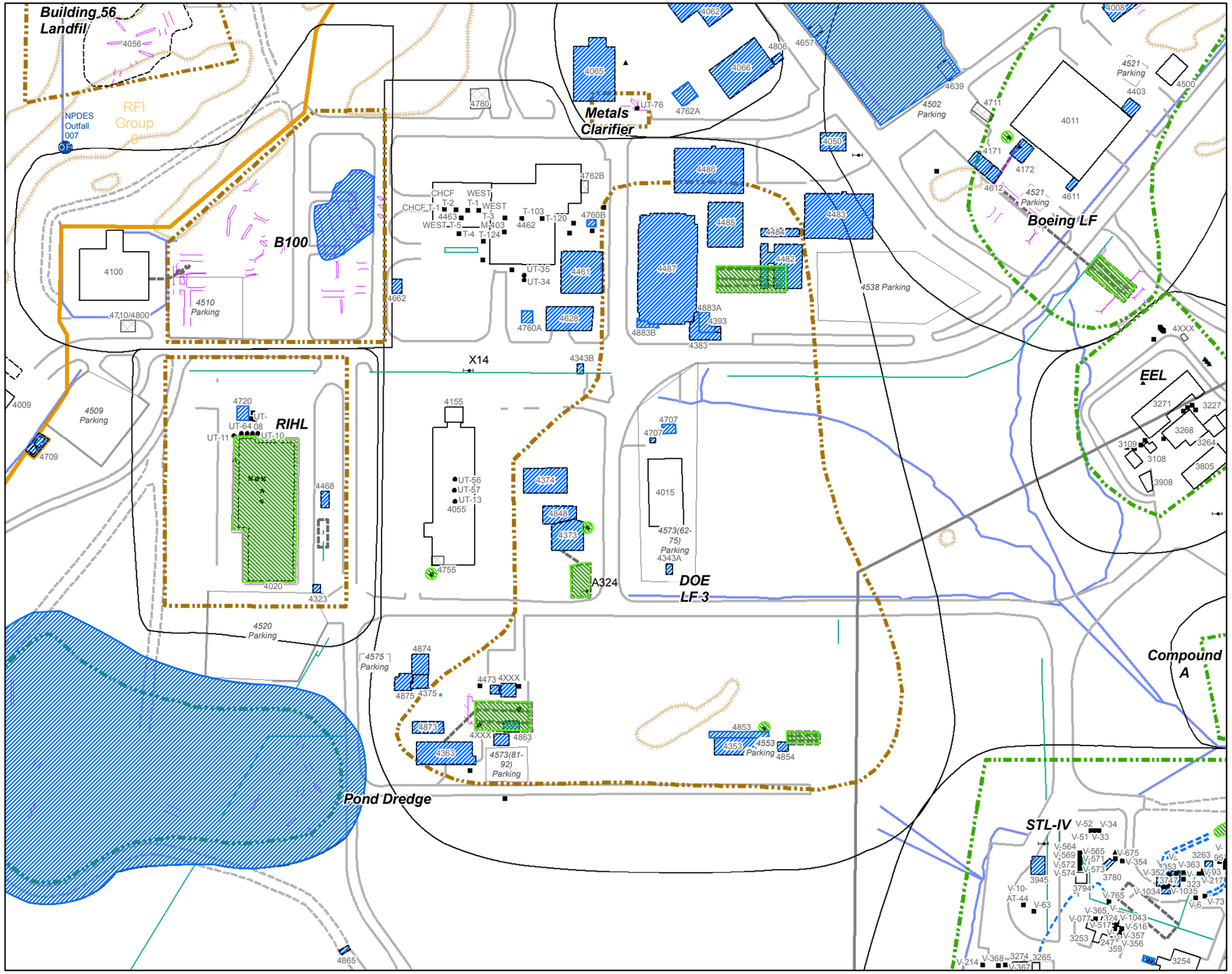
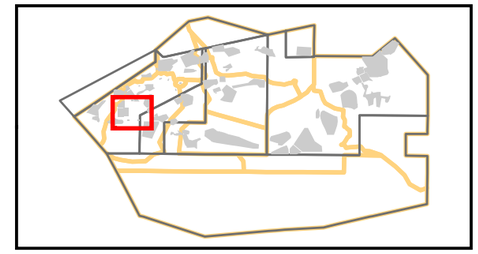


FIGURE Q.2-3D
Surficial Cross Section L-L'
DOE LF3
Santa Susana Field Laboratory





Approximate Areas of Soil Disturbance

- Grading
- Excavation - Backfill

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Pipe
- Surface Drainage Divide
- Leachfield
- Pond
- Excavation
- Trench
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- Road - Asphalt
- Roads - Dirt
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Rocks
- Streams

Soil Disturbance Area DOE LF3 RFI Site

Date: November 06, 2008

WORKING DRAFT

\\..MapFiles\RFI_05\RFI_Report\RFIGrp5_SoilDist_BL_PLTS_v2.mxd

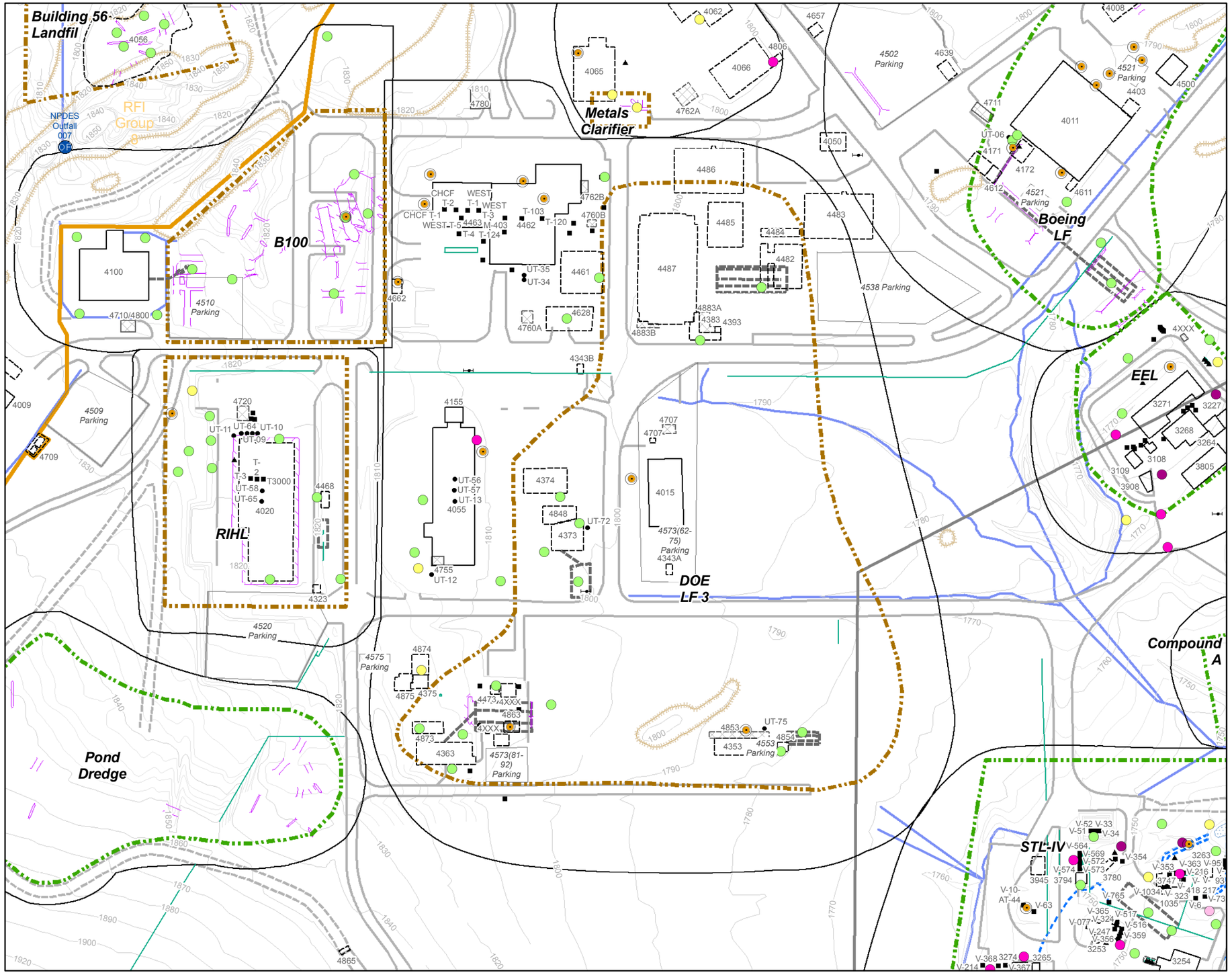
1 inch equals 150 feet

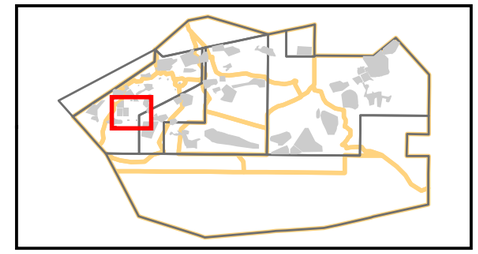
0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure Q.2-4





VOCs in Soil Vapor

- Exceeds Residential RBSL + Eco RBSL
- Exceeds Eco RBSL
- Exceeds Residential RBSL
- Detect, Below All Screening Levels
- Non-detect
- SV points that were not sampled due to refusal or poor air flow

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Trench
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary

VOCs in Soil Vapor
DOE LF3 RFI Site

Date: November 03, 2008

WORKING DRAFT

\\..RFI_05\RFI_Report\CDot_BL_PLTS\RFIGrp5_CDotVOCsSVpr_BL_PLTS.mxd

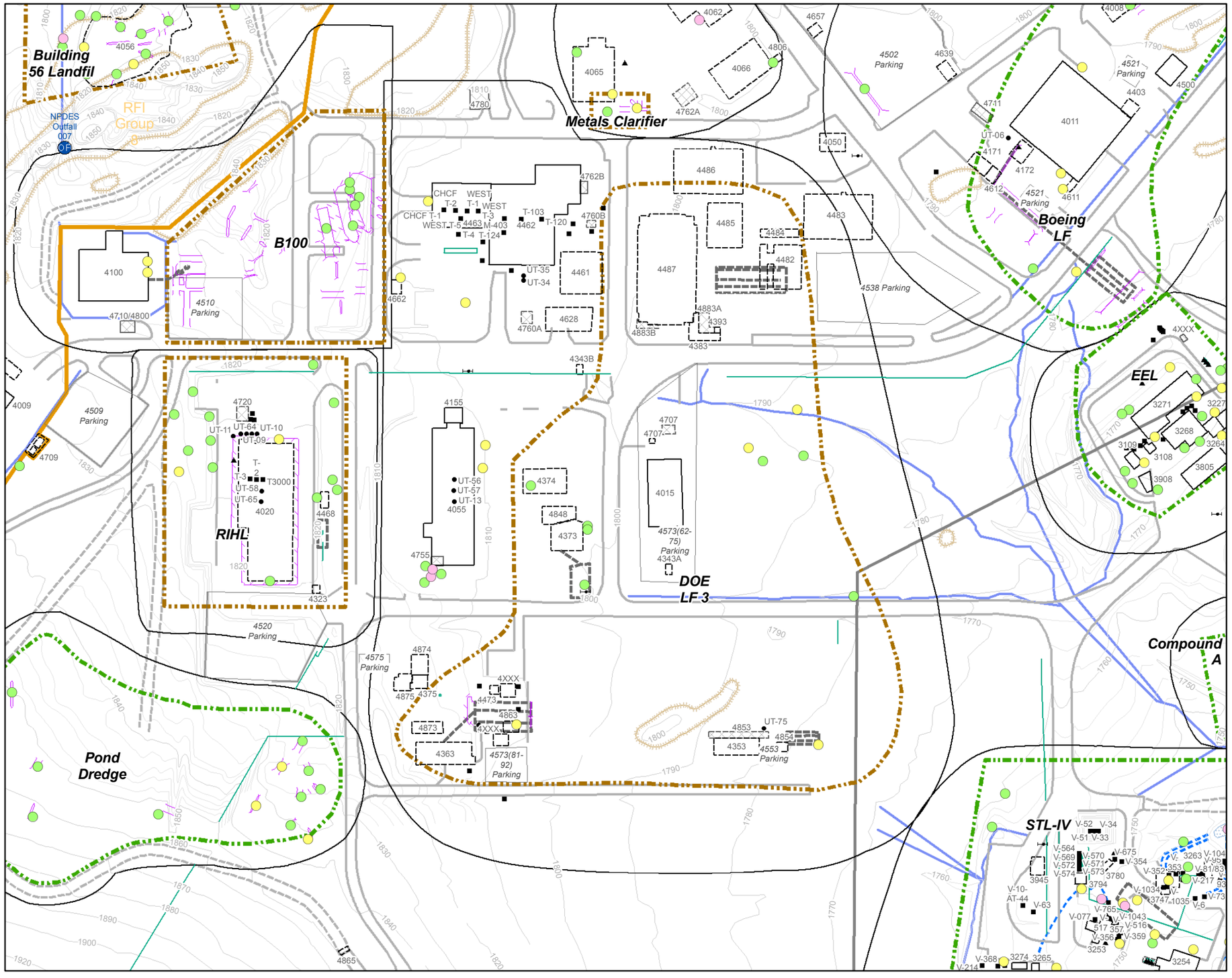
1 inch equals 150 feet

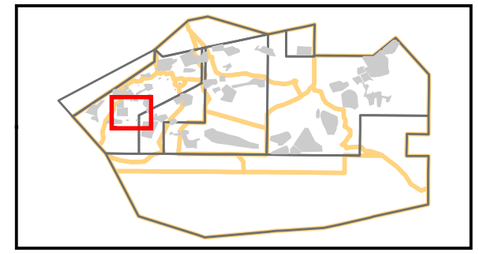
0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure Q.3-1A





VOCs in Soil

- Exceeds Residential RBSL + Eco RBSL
- Exceeds Residential RBSL
- Detect, Below All Screening Levels
- Non-detect

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond

VOCs in Soil
DOE LF3 RFI Site

Date: October 30, 2008

WORKING DRAFT

\\..RFI_05\RFI_Report\CDot_BL_PLTS\RFIGrp5_CDotVOCsSoil_BL_PLTS.mxd

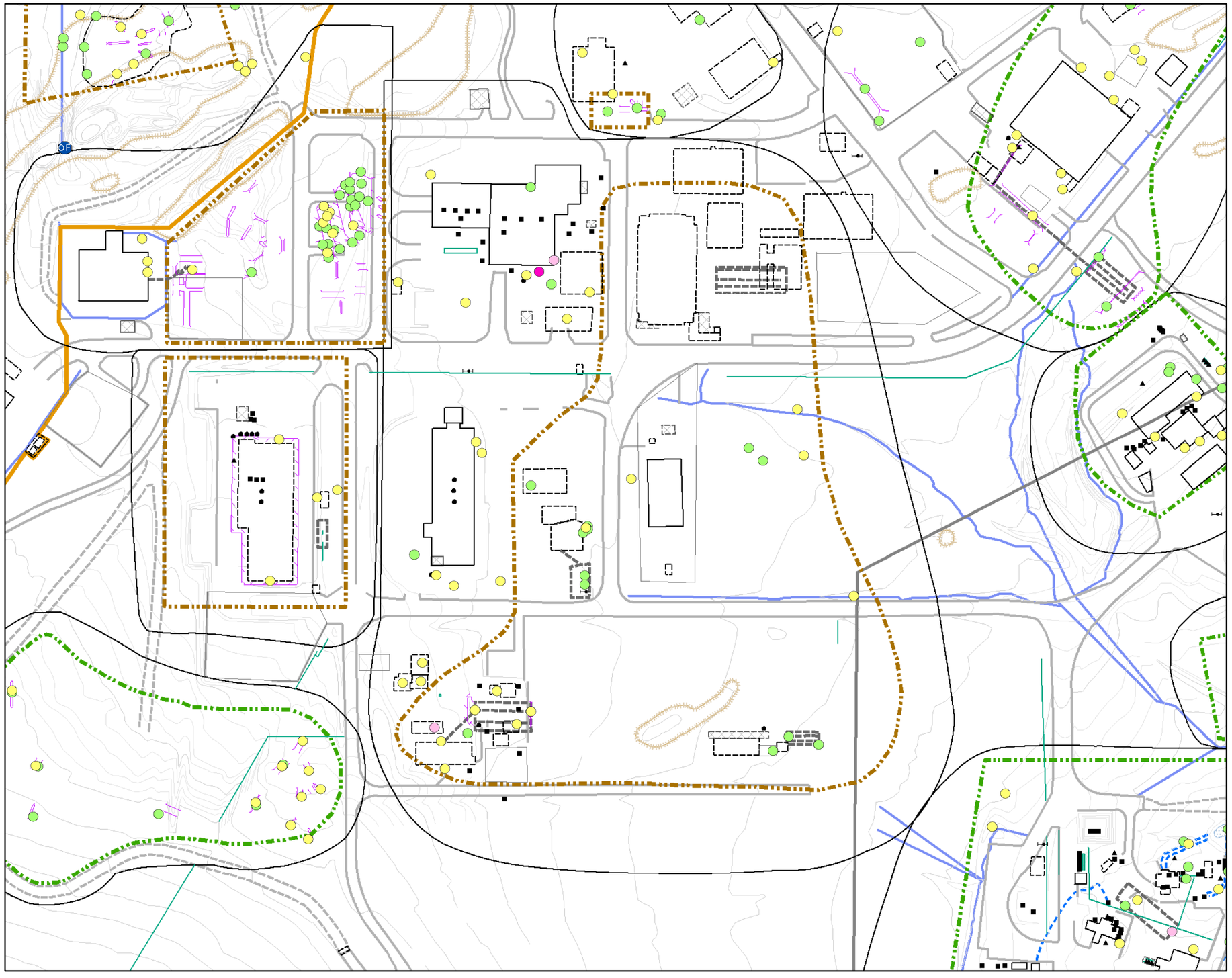
1 inch equals 150 feet

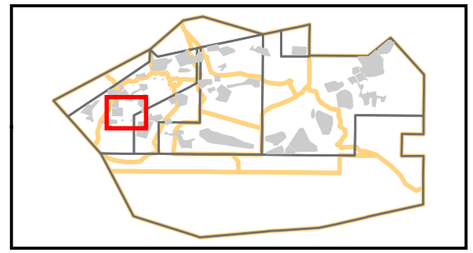
0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure Q.3-1B





SVOCs in Soil

- Exceeds Residential RBSL + Eco RBSL
- Exceeds Eco RBSL
- Exceeds Residential RBSL
- Detect, Below All Screening Levels
- Non-detect

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond

SVOCs in Soil
Compound A Facility RFI Site

Date: September 16, 2008 WORKING DRAFT

\\..RFI_05\RFISites\ColorDot_BL\RFISites_CDotSVCsSoil_BL_PLTS.mxd

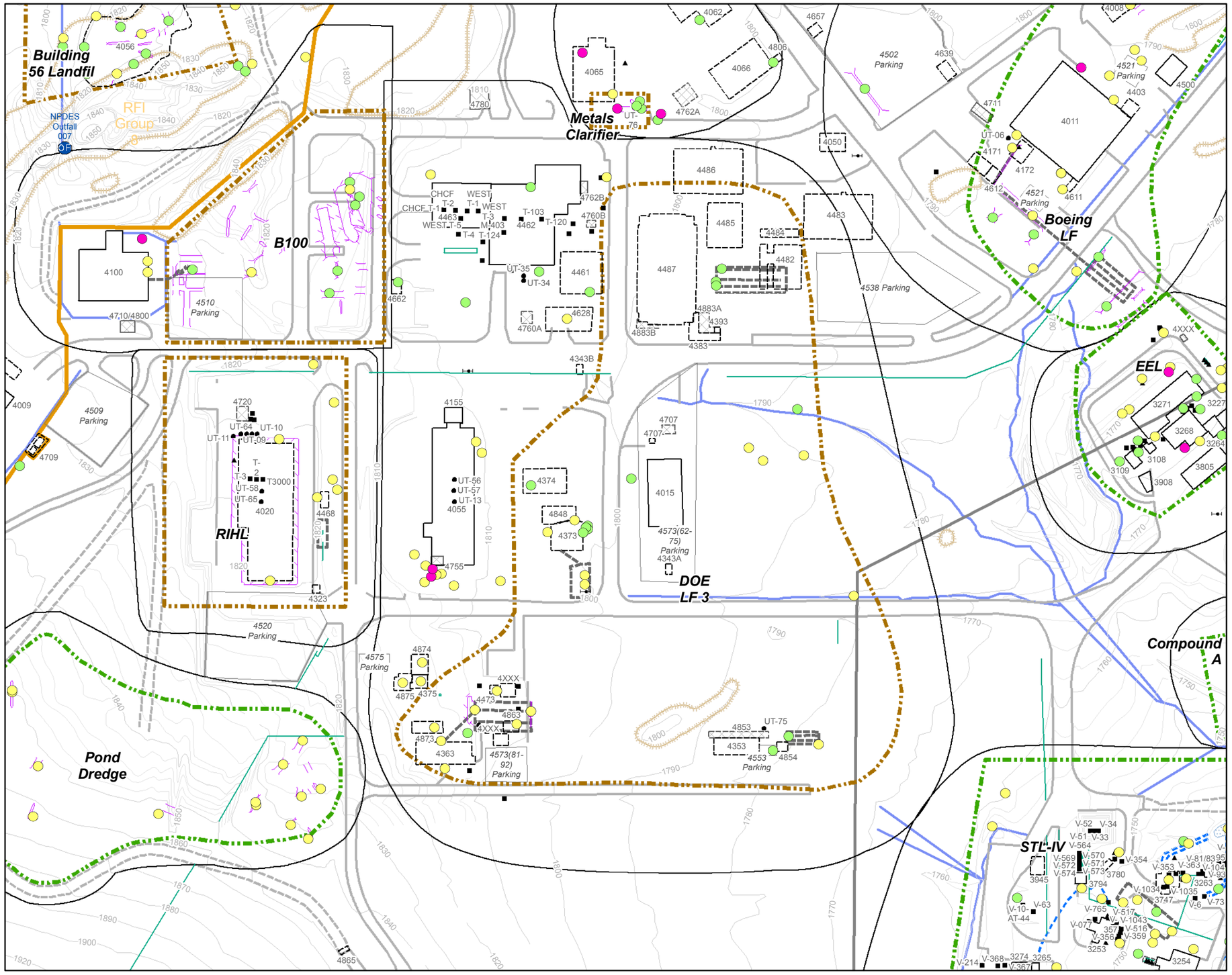
1 inch equals 150 feet

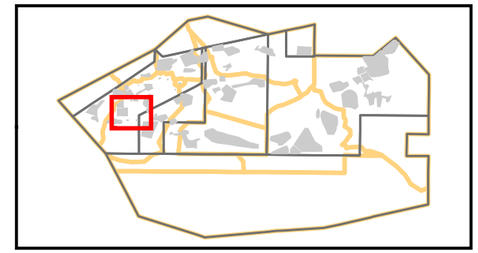
0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure Q.3-2





TPH in Soil

- Exceeds Residential RBSL
- Detect, Below Residential RBSL
- Non-detect

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond

TPH in Soil
DOE LF3 RFI Site

September 19, 2008

WORKING DRAFT

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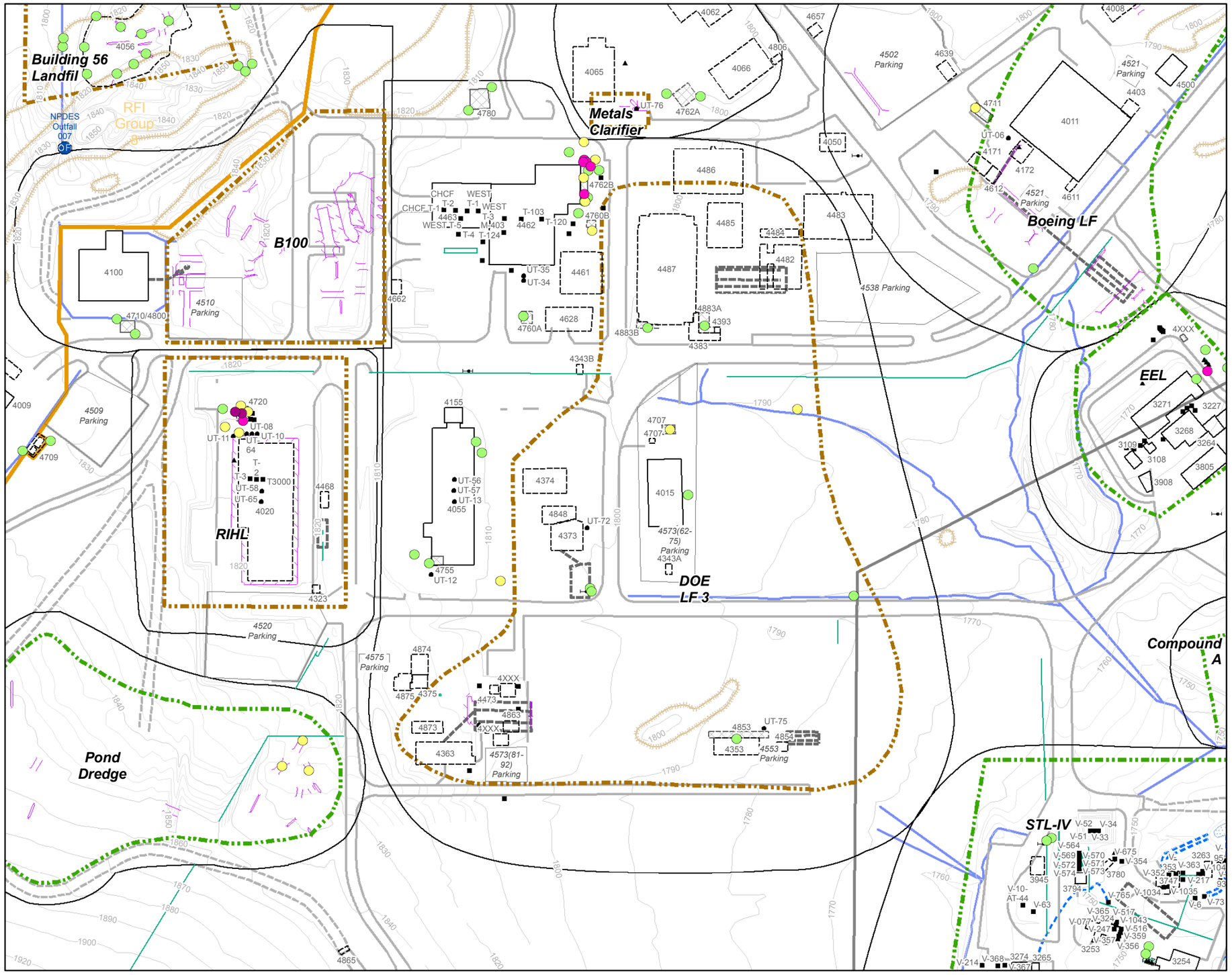
1 inch equals 150 feet

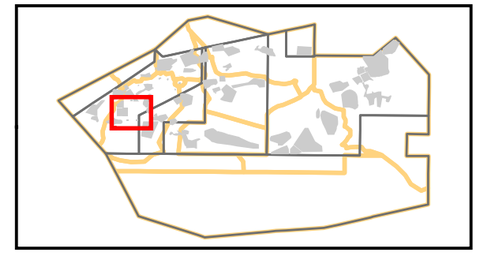
0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure Q.3-3





PCBs in Soil

- Exceeds Residential RBSL + Eco RBSL
- Exceeds Eco RBSL
- Detect, Below All Screening Levels
- Non-detect

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond

PCBs in Soil
DOE LF3 RFI Site

Date: September 16, 2008 WORKING DRAFT

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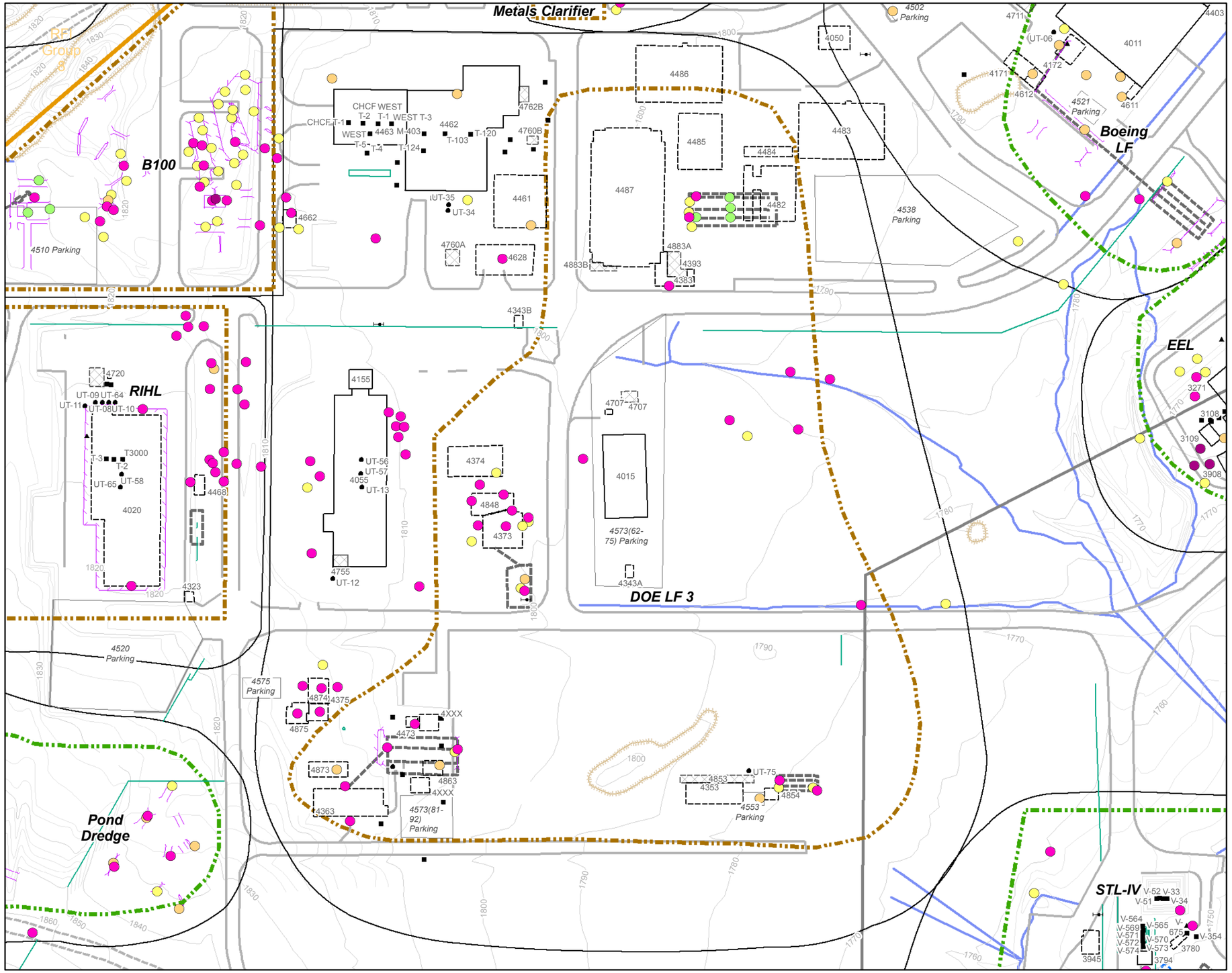
1 inch equals 150 feet

0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure Q.3-4



Metals in Soil

- Exceeds Background + Residential RBLS + Eco RBLS
- Exceeds Background + Eco RBSL
- Exceeds Background
- Dectect, Below Background Concentration
- Non-detect

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary

Metals in Soil
DOE LF3 RFI Site

Date: September 11, 2008 WORKING DRAFT

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1 inch equals 120 feet

0 120 240 Feet

SANTA SUSANA FIELD LABORATORY

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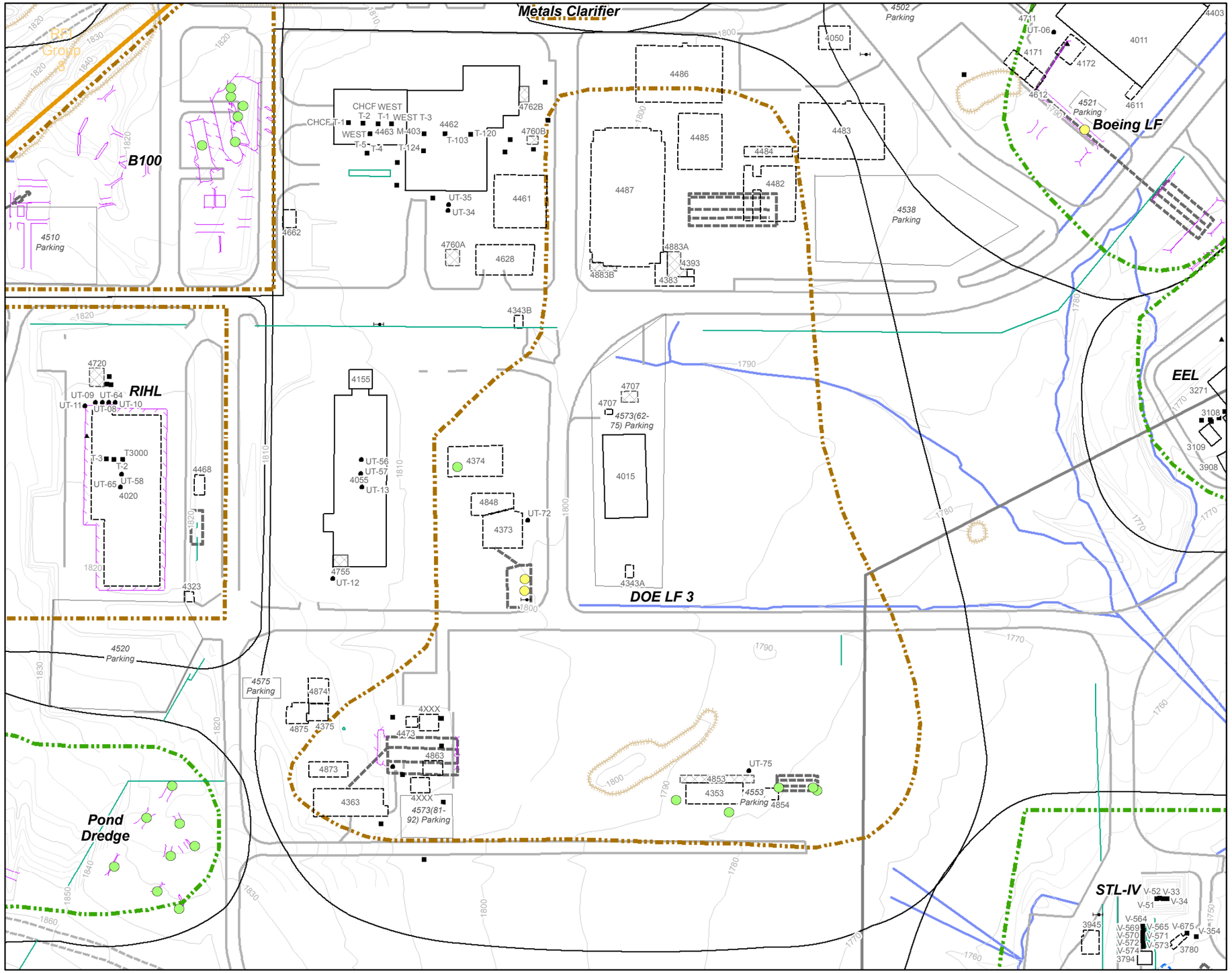
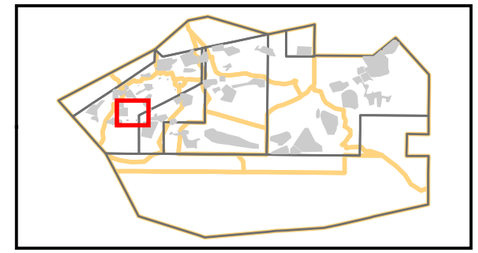
Figure Q.3-5





Energetics in Soil

- Detect, Below All Screening Levels
- Non-detect

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary

Energetics in Soil
DOE LF3 RFI Site

Date: September 11, 2008 **WORKING DRAFT**

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1 inch equals 120 feet

0 120 240 Feet

SANTA SUSANA FIELD LABORATORY

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Figure Q.3-6

Soil Sample Locations

- Soil Sample Location With Detected VOCs Data
- Soil Sample Location Not Analyzed for VOCs Data
- Soil Sample Location With No Detected VOCs Data

Data Box Information

Sample Location ID: **B9BS01**

- 1.00 — Depth in Feet
- Primary — Sample Type
- B9BS01S01 — Unique Sample Identifier
- 7/10/2005 — Date

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 and [-]	Analysis not conducted
[#]	If more than one result per sample depth, the maximum is presented, with number of results in backets.

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

Detect	Non-Detect	
12.05	<0.06	Exceeds Background (Metals + Dioxins Only)
12.05	<0.06	Exceeds Res RBSL or Exceeds Background + Res RBSL (Metals +Dioxins Only)
12.05	<0.06	Exceeds Eco RBSL or Exceeds Background + Eco RBSL (Metals + Dioxins Only)
12.05	<0.06	Exceeds Res RBSL + Eco RBSL or Exceeds Background + Res RBSL + Eco RBSL (Metals + Dioxins Only)

= 2008 Data

= Pre-2008 Data

Basemap Legend

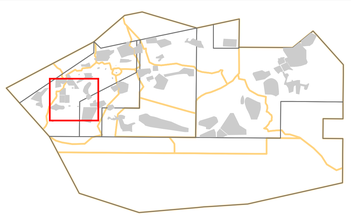
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Road - Asphalt
- Roads - Dirt
- Rocks
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

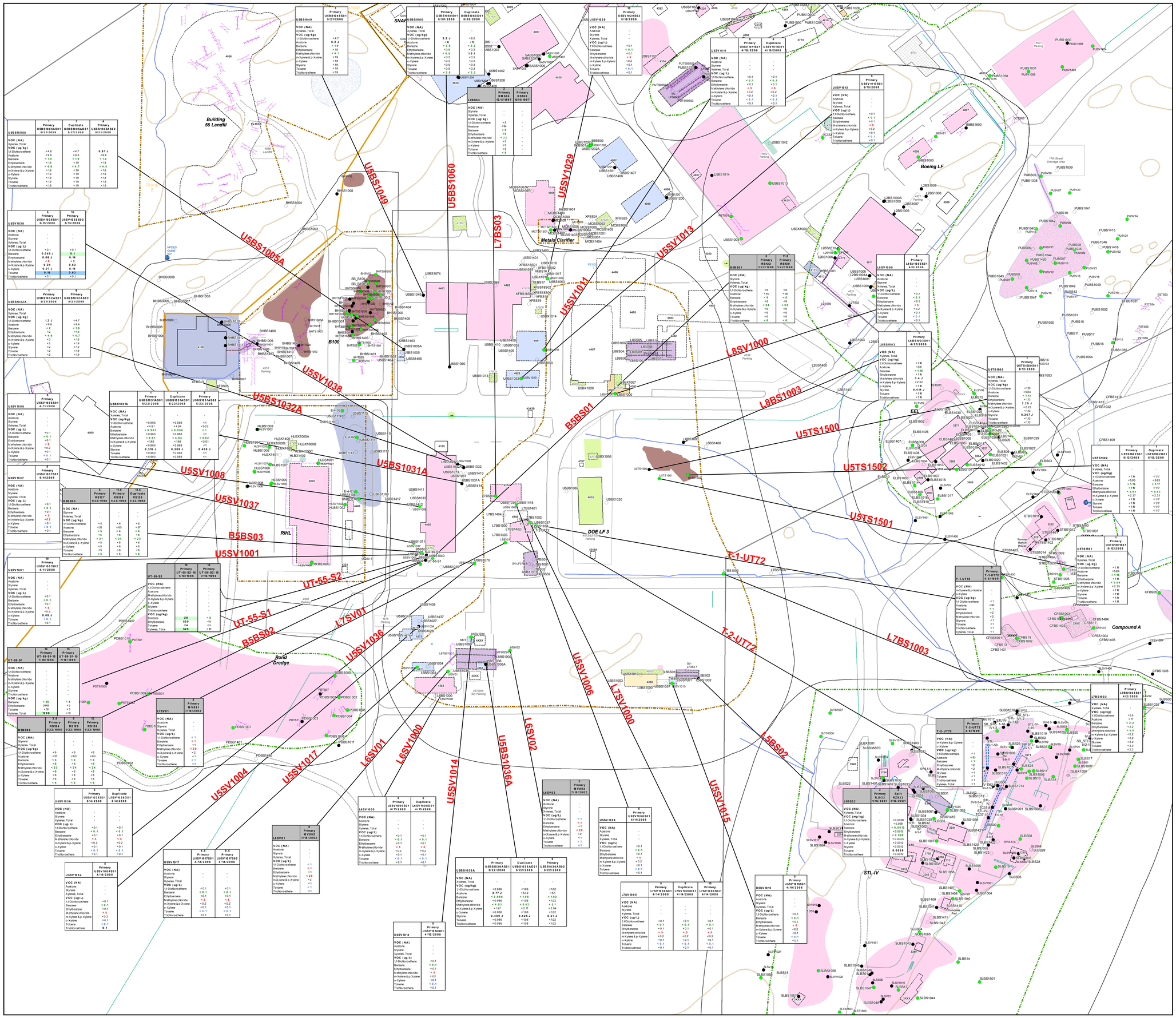
\\MapFiles\RFI_05\RFI_Report\SpiderDiagram\RFIGrp5_SpiderDiagram_EL.mxd

0 140

1 inch equals 70 feet

Feet





SANTA SUSANA FIELD LABORATORY

CH2MHILL

VOCs Data Results
DOE LF3 RFI Site

FIGURE Q.3-7

Soil Sample Locations

- Soil Sample Location With Detected SVOCs, TPH, and PCBs Data
- Soil Sample Location Not Analyzed for SVOCs, TPH, and PCBs Data
- Soil Sample Location With No Detected SVOCs, TPH, and PCBs Data

Data Box Information

Sample Location ID	1.00	Depth in Feet
B9BS01	Primary	Sample Type
	B9BS01S01	Unique Sample Identifier
	7/10/2005	Date

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 and [-]	Analysis not conducted
[#]	If more than one result per sample depth, the maximum is presented, with number of results in backets.

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

Detect	Non-Detect	
12.05	<0.06	Exceeds Background (Metals + Dioxins Only)
12.05	<0.06	Exceeds Res RBSL or Exceeds Background + Res RBSL (Metals +Dioxins Only)
12.05	<0.06	Exceeds Eco RBSL or Exceeds Background + Eco RBSL (Metals + Dioxins Only)
12.05	<0.06	Exceeds Res RBSL + Eco RBSL or Exceeds Background + Res RBSL + Eco RBSL (Metals + Dioxins Only)

= 2008 Data

= Pre-2008 Data

Basemap Legend

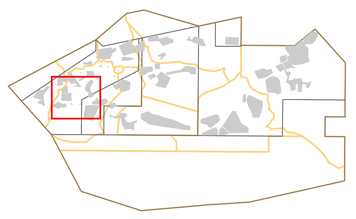
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Road - Asphalt
- Roads - Dirt
- Rocks
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- Investigation Boundary
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

\\MapFiles\RFI_05\RFI_Report\SpiderDiagram\RFIGrp5_SpiderDiagram_EL.mxd

1 inch equals 70 feet

0 140

Feet



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SANTA SUSANA FIELD LABORATORY

SVOCs, TPH, and PCBs Data Results DOE LF3 RFI Site

FIGURE Q.3-8A

Soil Sample Locations

- Soil Sample Location With Detected SVOCs, TPH, and PCBs Data
- Soil Sample Location Not Analyzed for SVOCs, TPH, and PCBs Data
- Soil Sample Location With No Detected SVOCs, TPH, and PCBs Data

Data Box Information

Sample Location ID – B9BS01; 1.00 – Depth in Feet; Primary – Sample Type; B9BS01S01 – Unique Sample Identifier; 7/10/2005 – Date

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 and [-]	Analysis not conducted
[#]	If more than one result per sample depth, the maximum is presented, with number of results in backets.

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

Detect	Non-Detect	
12.05	<0.06	Exceeds Background (Metals + Dioxins Only)
12.05	<0.06	Exceeds Res RBSL or Exceeds Background + Res RBSL (Metals +Dioxins Only)
12.05	<0.06	Exceeds Eco RBSL or Exceeds Background + Eco RBSL (Metals + Dioxins Only)
12.05	<0.06	Exceeds Res RBSL + Eco RBSL or Exceeds Background + Res RBSL + Eco RBSL (Metals + Dioxins Only)

= 2008 Data

= Pre-2008 Data

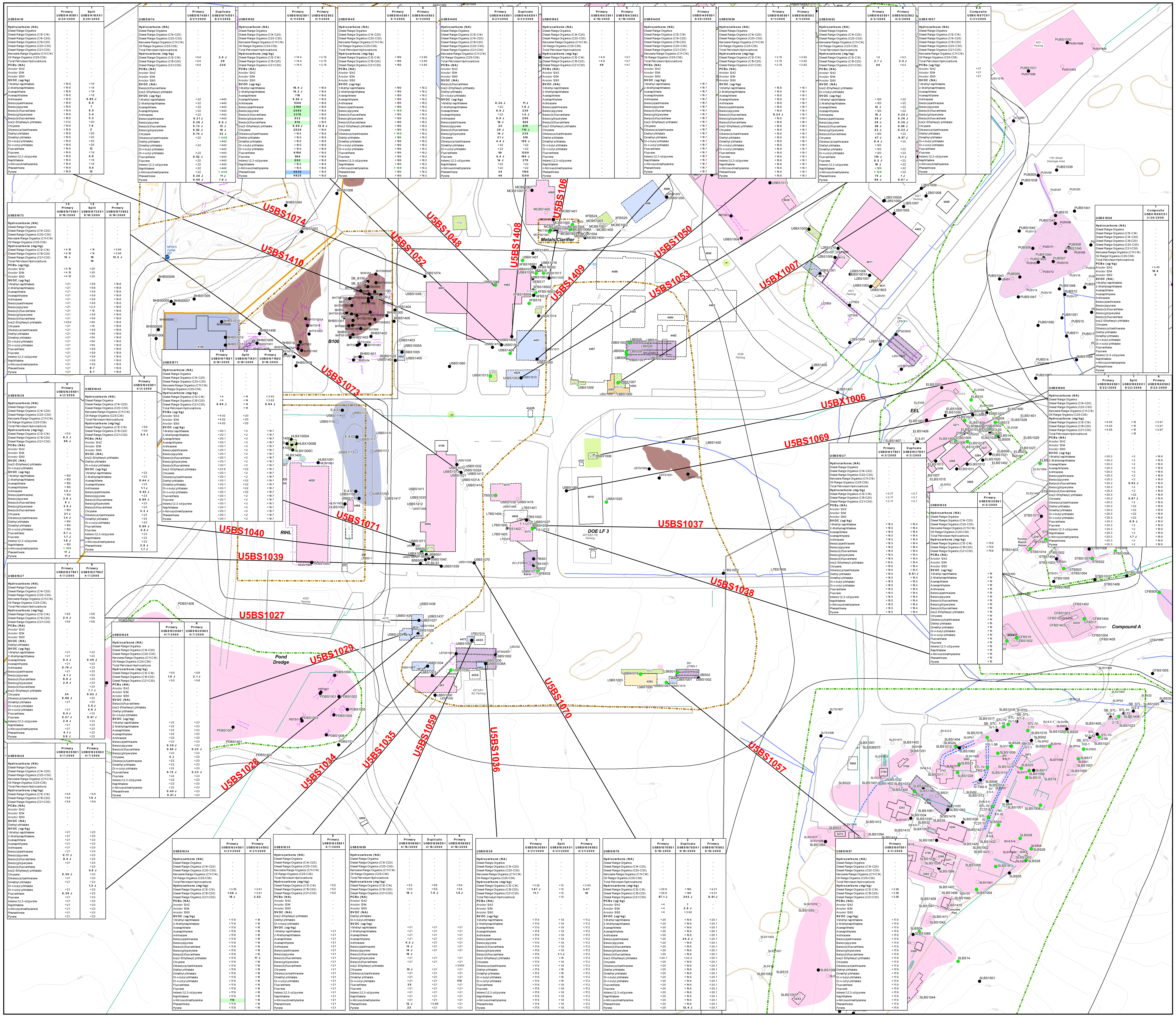
Basemap Legend

Building - Existing; Building - Removed; Building - Not Yet Determined; Road - Asphalt; Roads - Dirt; Rocks; RFI Site - Boeing; RFI Site - DOE; RFI Site - NASA; Investigation Boundary; RFI Group Boundary; Administrative Area; Property Boundary

Debris; Multiple Use; Solvent; Petroleum; Oil/PCBs; Metals; Energetic Constituents; Propellants; Leach Field; Non-metal Inorganic Constituents; Screening for Potential Impacts

\\MapFiles\RFI_05\RFI_Report\SpiderDiagram\RFIGrp5_SpiderDiagram_EL.mxd

1 inch equals 70 feet — 0 140 Feet



U5BS1410

U5BS1410	1 Primary U5BS1410S01 5/20/2008	1 Split U5BS1410X01 5/20/2008
Hydrocarbons (NA)		
Diesel Range Organics	-	-
Diesel Range Organics (C12-C14)	-	-
Diesel Range Organics (C14-C20)	-	-
Diesel Range Organics (C15-C20)	-	-
Diesel Range Organics (C20-C30)	-	-
Diesel Range Organics (C21-C30)	-	-
Kerosene Range Organics (C11-C14)	-	-
Oil Range Organics (C25-C36)	-	-
Total Petroleum Hydrocarbons	-	-
PCBs (NA)		
Aroclor 1242	-	-
Aroclor 1254	-	-
Aroclor 1260	-	-
SVOC (ug/kg)		
1-Methyl naphthalene	<19.9	<1.9
2-Methylnaphthalene	<19.9	<1.9
Acenaphthene	<19.9	<1.9
Acenaphthylene	<19.9	<1.9
Anthracene	<19.9	0.99 J
Benzo(a)anthracene	<19.9	6.4
Benzo(a)pyrene	<19.9	7
Benzo(b)fluoranthene	<19.9	8.5
Benzo(ghi)perylene	<19.9	3.4
Benzo(k)fluoranthene	<19.9	3.3
bis(2-Ethylhexyl) phthalate	<31.2	<20
Chrysene	<19.9	7.9
Dibenzo(a,h)anthracene	<19.9	2
Diethyl phthalate	<19.9	<20
Dimethyl phthalate	<19.9	<20
Di-n-butyl phthalate	<19.9	<20
Di-n-octyl phthalate	<19.9	<20
Fluoranthene	<19.9	12
Fluorene	<19.9	<1.9
Indeno(1,2,3-cd)pyrene	<19.9	4.8
Naphthalene	<19.9	<1.9
n-Nitrosodimethylamine	<19.9	<1.9
Phenanthrene	<19.9	5.5
Pyrene	<19.9	12

U5BS1074

U5BS1074	1 Primary U5BS1074S01 5/21/2008	1 Duplicate U5BS1074D01 5/21/2008
Hydrocarbons (NA)		
Diesel Range Organics	-	-
Diesel Range Organics (C14-C20)	-	-
Diesel Range Organics (C20-C30)	-	-
Kerosene Range Organics (C11-C14)	-	-
Oil Range Organics (C25-C36)	-	-
Total Petroleum Hydrocarbons	-	-
Hydrocarbons (mg/kg)		
Diesel Range Organics (C12-C14)	<5.4	3.6 J
Diesel Range Organics (C15-C20)	<5.4	29
Diesel Range Organics (C21-C30)	<5.4	230
PCBs (NA)		
Aroclor 1242	-	-
Aroclor 1254	-	-
Aroclor 1260	-	-
SVOC (NA)		
Benzo(k)fluoranthene	-	-
bis(2-Ethylhexyl) phthalate	-	-
SVOC (ug/kg)		
1-Methyl naphthalene	<22	<440
2-Methylnaphthalene	<22	<440
Acenaphthene	<22	<440
Acenaphthylene	<22	<440
Anthracene	<22	<440
Benzo(a)anthracene	0.31 J	<440
Benzo(a)pyrene	0.36 J	8.8 J
Benzo(b)fluoranthene	0.73 J	13 J
Benzo(ghi)perylene	0.52 J	18 J
Chrysene	0.74 J	32 J
Dibenzo(a,h)anthracene	<22	<440
Diethyl phthalate	-	<440
Dimethyl phthalate	<22	<440
Di-n-butyl phthalate	-	<440
Di-n-octyl phthalate	<22	<440
Fluoranthene	0.52 J	<440
Fluorene	<22	<440
Indeno(1,2,3-cd)pyrene	<22	<440
Naphthalene	<22	<440
n-Nitrosodimethylamine	<22	<440
Phenanthrene	0.38 J	11 J
Pyrene	0.46 J	7.8 J

U5BS1052

U5BS1052	1 Primary U5BS1052S01 4/1/2008	6 Primary U5BS1052S02 4/1/2008
Hydrocarbons (NA)		
Diesel Range Organics	-	-
Diesel Range Organics (C14-C20)	-	-
Diesel Range Organics (C20-C30)	-	-
Kerosene Range Organics (C11-C14)	-	-
Oil Range Organics (C25-C36)	-	-
Total Petroleum Hydrocarbons	-	-
Hydrocarbons (mg/kg)		
Diesel Range Organics (C12-C14)	<74.4	<3.75
Diesel Range Organics (C15-C20)	<74.4	<3.75
Diesel Range Organics (C21-C30)	<74.4	<3.75
PCBs (NA)		
Aroclor 1242	-	-
Aroclor 1254	-	-
Aroclor 1260	-	-
SVOC (ug/kg)		
1-Methyl naphthalene	16.4 J	<18.8
2-Methylnaphthalene	14.2 J	<18.8
Acenaphthene	716	<18.8
Acenaphthylene	8.54 J	<18.8
Anthracene	1380	<18.8
Benzo(a)anthracene	2190	<18.8
Benzo(a)pyrene	2080	<18.8
Benzo(b)fluoranthene	2210	<18.8
Benzo(ghi)perylene	822	<18.8
Benzo(k)fluoranthene	913	<18.8
bis(2-Ethylhexyl) phthalate	6.65 J	13.9 J
Chrysene	2020	<18.8
Dibenzo(a,h)anthracene	<18.6	<18.8
Diethyl phthalate	<18.6	<18.8
Dimethyl phthalate	<18.6	<18.8
Di-n-butyl phthalate	<18.6	<18.8
Di-n-octyl phthalate	<18.6	<18.8
Fluoranthene	6190	<18.8
Fluorene	566	<18.8
Indeno(1,2,3-cd)pyrene	800	<18.8
Naphthalene	<18.6	<18.8
n-Nitrosodimethylamine	<18.6	<18.8
Phenanthrene	4830	<18.8
Pyrene	4920	<18.8

U5BS1048

U5BS1048	1 Primary U5BS1048S01 4/1/2008	6 Primary U5BS1048S02 4/1/2008
Hydrocarbons (NA)		
Diesel Range Organics	-	-
Diesel Range Organics (C14-C20)	-	-
Diesel Range Organics (C20-C30)	-	-
Kerosene Range Organics (C11-C14)	-	-
Oil Range Organics (C25-C36)	-	-
Total Petroleum Hydrocarbons	-	-
Hydrocarbons (mg/kg)		
Diesel Range Organics (C12-C14)	<189	<3.85
Diesel Range Organics (C15-C20)	<189	<3.85
Diesel Range Organics (C21-C30)	<189	<3.85
PCBs (NA)		
Aroclor 1242	-	-
Aroclor 1254	-	-
Aroclor 1260	-	-
SVOC (ug/kg)		
1-Methyl naphthalene	<189	<19.2
2-Methylnaphthalene	<189	<19.2
Acenaphthene	<189	<19.2
Acenaphthylene	<189	<19.2
Anthracene	<189	<19.2
Benzo(a)anthracene	<189	<19.2
Benzo(a)pyrene	<189	<19.2
Benzo(b)fluoranthene	<189	<19.2
Benzo(ghi)perylene	<189	<19.2
Benzo(k)fluoranthene	<189	<19.2
bis(2-Ethylhexyl) phthalate	<189	<19.2
Chrysene	<189	<19.2
Dibenzo(a,h)anthracene	<189	<19.2
Diethyl phthalate	<189	<19.2
Dimethyl phthalate	<189	<19.2
Di-n-butyl phthalate	<189	<19.2
Di-n-octyl phthalate	<189	<19.2
Fluoranthene	<189	<19.2
Fluorene	<189	<19.2
Indeno(1,2,3-cd)pyrene	<189	<19.2
Naphthalene	<189	<19.2
n-Nitrosodimethylamine	<189	<19.2
Phenanthrene	<189	<19.2
Pyrene	<189	<19.2

U5BS1408

U5BS1408	1 Primary U5BS1408S01 5/21/2008	1 Duplicate U5BS1408D01 5/21/2008
Hydrocarbons (NA)		
Diesel Range Organics	-	-
Diesel Range Organics (C12-C14)	-	-
Diesel Range Organics (C14-C20)	-	-
Diesel Range Organics (C15-C20)	-	-
Diesel Range Organics (C20-C30)	-	-
Diesel Range Organics (C21-C30)	-	-
Kerosene Range Organics (C11-C14)	-	-
Oil Range Organics (C25-C36)	-	-
Total Petroleum Hydrocarbons	-	-
PCBs (NA)		
Aroclor 1242	-	-
Aroclor 1254	-	-
Aroclor 1260	-	-
SVOC (NA)		
Benzo(k)fluoranthene	-	-
bis(2-Ethylhexyl) phthalate	-	-
Diethyl phthalate	-	-
Di-n-butyl phthalate	-	-
SVOC (ug/kg)		
1-Methyl naphthalene	0.34 J	11 J
2-Methylnaphthalene	<22	7.6 J
Acenaphthene	6.9 J	230
Acenaphthylene	<22	1.4 J
Anthracene	8.8 J	290
Benzo(a)anthracene	19 J	540
Benzo(a)pyrene	22	570
Benzo(b)fluoranthene	29 J	710 J
Benzo(ghi)perylene	14 J	230
Chrysene	21 J	510
Dibenzo(a,h)anthracene	4.4 J	120 J
Dimethyl phthalate	<22	<22
Di-n-octyl phthalate	<22	<22
Fluoranthene	50	1300
Fluorene	4.4 J	160 J
Indeno(1,2,3-cd)pyrene	14 J	270
Naphthalene	<22	<22
n-Nitrosodimethylamine	<22	<22
Phenanthrene	35	1100
Pyrene	46	1200

U5BS1063

U5BS1063	1 Primary U5BS1063S01 4/16/2008	6 Primary U5BS1063S02 4/16/2008
Hydrocarbons (NA)		
Diesel Range Organics	-	-
Diesel Range Organics (C14-C20)	-	-
Diesel Range Organics (C20-C30)	-	-
Kerosene Range Organics (C11-C14)	-	-
Oil Range Organics (C25-C36)	-	-
Total Petroleum Hydrocarbons	-	-
Hydrocarbons (mg/kg)		
Diesel Range Organics (C12-C14)	<4.8	<5.7
Diesel Range Organics (C15-C20)	<4.8	<5.7
Diesel Range Organics (C21-C30)	49	<5.7
PCBs (NA)		
Aroclor 1242	-	-
Aroclor 1254	-	-
Aroclor 1260	-	-
SVOC (NA)		
1-Methyl naphthalene	-	-
2-Methylnaphthalene	-	-
Acenaphthene	-	-
Acenaphthylene	-	-
Anthracene	-	-
Benzo(a)anthracene	-	-
Benzo(a)pyrene	-	-
Benzo(b)fluoranthene	-	-
Benzo(ghi)perylene	-	-
Benzo(k)fluoranthene	-	-
bis(2-Ethylhexyl) phthalate	-	-
Chrysene	-	-
Dibenzo(a,h)anthracene	-	-
Diethyl phthalate	-	-
Dimethyl phthalate	-	-
Di-n-butyl phthalate	-	-
Di-n-octyl phthalate	-	-
Fluoranthene	-	-
Fluorene	-	-
Indeno(1,2,3-cd)pyrene	-	-
Naphthalene	-	-
n-Nitrosodimethylamine	-	-
Phenanthrene	-	-
Pyrene	-	-

U5BS1409

U5BS1409	1 Primary U5BS1409S01 5/20/2008
Hydrocarbons (NA)	
Diesel Range Organics	-
Diesel Range Organics (C12-C14)	-
Diesel Range Organics (C14-C20)	-
Diesel Range Organics (C15-C20)	-
Diesel Range Organics (C20-C30)	-
Diesel Range Organics (C21-C30)	-
Kerosene Range Organics (C11-C14)	-
Oil Range Organics (C25-C36)	-
Total Petroleum Hydrocarbons	-
PCBs (NA)	
Aroclor 1242	-
Aroclor 1254	-
Aroclor 1260	-
SVOC (ug/kg)	
1-Methyl naphthalene	<18.7
2-Methylnaphthalene	<18.7
Acenaphthene	<18.7
Acenaphthylene	<18.7
Anthracene	<18.7
Benzo(a)anthracene	<18.7
Benzo(a)pyrene	<18.7
Benzo(b)fluoranthene	<18.7
Benzo(ghi)perylene	<18.7
Benzo(k)fluoranthene	<18.7
bis(2-Ethylhexyl) phthalate	<18.7
Chrysene	<18.7
Dibenzo(a,h)anthracene	<18.7
Diethyl phthalate	<18.7
Dimethyl phthalate	<18.7
Di-n-butyl phthalate	<18.7
Di-n-octyl phthalate	<18.7
Fluoranthene	<18.7
Fluorene	<18.7
Indeno(1,2,3-cd)pyrene	<18.7
Naphthalene	<18.7
n-Nitrosodimethylamine	<18.7
Phenanthrene	<18.7
Pyrene	<18.7

U5BS1050

U5BS1050	1 Primary U5BS1050S01 4/1/2008	6 Primary U5BS1050S02 4/1/2008
Hydrocarbons (NA)		
Diesel Range Organics	-	-
Diesel Range Organics (C14-C20)	-	-
Diesel Range Organics (C20-C30)	-	-
Kerosene Range Organics (C11-C14)	-	-
Oil Range Organics (C25-C36)	-	-
Total Petroleum Hydrocarbons	-	-
Hydrocarbons (mg/kg)		
Diesel Range Organics (C12-C14)	<3.75	<3.82
Diesel Range Organics (C15-C20)	<3.75	<3.82
Diesel Range Organics (C21-C30)	<3.75	<3.82
PCBs (NA)		
Aroclor 1242	-	-
Aroclor 1254	-	-
Aroclor 1260	-	-
SVOC (ug/kg)		
1-Methyl naphthalene	<18.8	<19.1
2-Methylnaphthalene	<18.8	<19.1
Acenaphthene	<18.8	<19.1
Acenaphthylene	<18.8	<19.1
Anthracene	<18.8	<19.1
Benzo(a)anthracene	<18.8	<19.1
Benzo(a)pyrene	<18.8	<19.1
Benzo(b)fluoranthene	9.24 J	<19.1
Benzo(ghi)perylene	<18.8	<19.1
Benzo(k)fluoranthene	<18.8	<19.1
bis(2-Ethylhexyl) phthalate	<18.8	<19.1
Chrysene	<18.8	<19.1
Dibenzo(a,h)anthracene	<18.8	<19.1
Diethyl phthalate	<18.8	<19.1
Dimethyl phthalate	<18.8	<19.1
Di-n-butyl phthalate	<18.8	<19.1
Di-n-octyl phthalate	<18.8	<19.1
Fluoranthene	<18.8	<19.1
Fluorene	<18.8	<19.1
Indeno(1,2,3-cd)pyrene	<18.8	<19.1
Naphthalene	<18.8	<19.1
n-Nitrosodimethylamine	<18.8	<19.1
Phenanthrene	<18.8	<19.1
Pyrene	<18.8	<19.1

U5BS1053

U5BS1053	1 Primary U5BS1053S01 4/2/2008	6 Primary U5BS1053S02 4/2/2008
Hydrocarbons (NA)		
Diesel Range Organics	-	-
Diesel Range Organics (C14-C20)	-	-
Diesel Range Organics (C20-C30)	-	-
Kerosene Range Organics (C11-C14)	-	-
Oil Range Organics (C25-C36)	-	-
Total Petroleum Hydrocarbons	-	-
Hydrocarbons (mg/kg)		
Diesel Range Organics (C12-C14)	<6	<5.3
Diesel Range Organics (C15-C20)	2.7 J	2.5 J
Diesel Range Organics (C21-C30)	85	<5.3
PCBs (NA)		
Aroclor 1242	-	-
Aroclor 1254	-	-
Aroclor 1260	-	-
SVOC (NA)		
bis(2-Ethylhexyl) phthalate	-	-
Di-n-butyl phthalate	-	-
SVOC (ug/kg)		
1-Methyl naphthalene	<120	<22
2-Methylnaphthalene	<120	<22
Acenaphthene	12 J	<22
Acenaphthylene	<120	<22
Anthracene	18 J	0.25 J
Benzo(a)anthracene	36 J	0.36 J
Benzo(a)pyrene	39 J	0.36 J
Benzo(b)fluoranthene	59 J	0.59 J
Benzo(ghi)perylene	23 J	0.33 J
Benzo(k)fluoranthene	<120	<22
Chrysene	47 J	0.57 J
Dibenzo(a,h)anthracene	6.4 J	<22
Diethyl phthalate	<120	-
Dimethyl phthalate	<120	<22
Di-n-octyl phthalate	<120	<22
Fluoranthene	110 J	1.1 J
Fluorene	8.3 J	<22
Indeno(1,2,3-cd)pyrene	18 J	<22
Naphthalene	<120	<22
n-Nitrosodimethylamine	<120	<22
Phenanthrene	74 J	1 J
Pyrene	98 J	0.87 J

U5BX1007

U5BX1007	0.5 Composite U5BX1007C01 3/31/2008
Hydrocarbons (NA)	
Diesel Range Organics	-
Diesel Range Organics (C12-C14)	-
Diesel Range Organics (C14-C20)	-
Diesel Range Organics (C15-C20)	-
Diesel Range Organics (C20-C30)	-
Diesel Range Organics (C21-C30)	-
Kerosene Range Organics (C11-C14)	-
Oil Range Organics (C25-C36)	-
Total Petroleum Hydrocarbons	-
PCBs (ug/kg)	
Aroclor 1242	<21
Aroclor 1254	<21
Aroclor 1260	<21
SVOC (NA)	
1-Methyl naphthalene	-
2-Methylnaphthalene	-
Acenaphthene	-
Acenaphthylene	-
Anthracene	-
Benzo(a)anthracene	-
Benzo(a)pyrene	-
Benzo(b)fluoranthene	-
Benzo(ghi)perylene	-
Benzo(k)fluoranthene	-
bis(2-Ethylhexyl) phthalate	-
Chrysene	-
Dibenzo(a,h)anthracene	-
Diethyl phthalate	-
Dimethyl phthalate	-
Di-n-butyl phthalate	-
Di-n-octyl phthalate	-
Fluoranthene	-
Fluorene	-
Indeno(1,2,3-cd)pyrene	-
Naphthalene	-
n-Nitrosodimethylamine	-
Phenanthrene	-
Pyrene	-

U5BS1073

U5BS1073	1.5 Primary U5BS1073S01 5/16/2008	1.5 Split U5BS1073X01 5/16/2008	6 Primary U5BS1073S02 5/16/2008
Hydrocarbons (NA)			
Diesel Range Organics	-	-	-
Diesel Range Organics (C14-C20)	-	-	-
Diesel Range Organics (C20-C30)	-	-	-
Kerosene Range Organics (C11-C14)	-	-	-
Oil Range Organics (C25-C36)	-	-	-
Hydrocarbons (mg/kg)			
Diesel Range Organics (C12-C14)	<4.18	<14	<3.94
Diesel Range Organics (C15-C20)	<4.18	<14	<3.94
Diesel Range Organics (C21-C30)	10 J	19	13.2 J
Total Petroleum Hydrocarbons	-	19	-
PCBs (ug/kg)			
Aroclor 1242	<4.19	<20	-
Aroclor 1254	<4.19	<20	-
Aroclor 1260	<4.19	<20	-
SVOC (ug/kg)			
1-Methyl naphthalene	<21	<5.9	<19.8
2-Methylnaphthalene	<21	<5.9	<19.8
Acenaphthene	<21	<5.9	<19.8
Acenaphthylene	<21	<5.9	<19.8
Anthracene	<21	<5.9	<19.8
Benzo(a)anthracene	<21	<5.9	<19.8
Benzo(a)pyrene	<21	<2.4	<19.8
Benzo(b)fluoranthene	<21	<10	<19.8
Benzo(ghi)perylene	<21	<5.9	<19.8
Benzo(k)fluoranthene	<21	<5.9	<19.8
bis(2-Ethylhexyl) phthalate	<25.4	<64	<19.8
Chrysene	<21	<10	<19.8
Dibenzo(a,h)anthracene	<21	<5.9	<19.8
Diethyl phthalate	<21	<64	<19.8
Dimethyl phthalate	<21	<64	<19.8
Di-n-butyl phthalate	<21	<64	<19.8
Di-n-octyl phthalate	<21	<64	<19.8
Fluoranthene	<21	<5.9	<19.8
Fluorene	<21	<5.9	<19.8
Indeno(1,2,3-cd)pyrene	<21	<5.9	<19.8
Naphthalene	<21	<5.9	<19.8
n-Nitrosodimethylamine	<21	<5.9	<19.8
Phenanthrene	<21	9.7	<19.8
Pyrene	<21	6.7	<19.8

U5BS1039

U5BS1039	8 Primary U5BS1039S01 4/2/2008
Hydrocarbons (NA)	
Diesel Range Organics	-
Diesel Range Organics (C14-C20)	-
Diesel Range Organics (C20-C30)	-
Kerosene Range Organics (C11-C14)	-
Oil Range Organics (C25-C36)	-
Total Petroleum Hydrocarbons	-
Hydrocarbons (mg/kg)	
Diesel Range Organics (C12-C14)	<5.5
Diesel Range Organics (C15-C20)	6.2 J
Diesel Range Organics (C21-C30)	86 J
PCBs (NA)	
Aroclor 1242	-
Aroclor 1254	-
Aroclor 1260	-
SVOC (NA)	
bis(2-Ethylhexyl) phthalate	-
Di-n-butyl phthalate	-
SVOC (ug/kg)	
1-Methyl naphthalene	<100
2-Methylnaphthalene	<100
Acenaphthene	<100
Acenaphthylene	<100
Anthracene	1.5 J
Benzo(a)anthracene	<100
Benzo(a)pyrene	3.6 J
Benzo(b)fluoranthene	8 J
Benzo(ghi)perylene	3.5 J
Benzo(k)fluoranthene	<100
Chrysene	21 J
Dibenzo(a,h)anthracene	1.4 J
Diethyl phthalate	<100
Dimethyl phthalate	<100
Di-n-octyl phthalate	<100
Fluoranthene	5.7 J
Fluorene	1.7 J
Indeno(1,2,3-cd)pyrene	1.6 J
Naphthalene	<100
n-Nitrosodimethylamine	<100
Phenanthrene	17 J
Pyrene	11 J

U5BS1040

U5BS1040	8 Primary U5BS1040S01 4/2/2008
Hydrocarbons (NA)	
Diesel Range Organics	-
Diesel Range Organics (C14-C20)	-
Diesel Range Organics (C20-C30)	-
Kerosene Range Organics (C11-C14)	-
Oil Range Organics (C25-C36)	-
Total Petroleum Hydrocarbons	-
Hydrocarbons (mg/kg)	
Diesel Range Organics (C12-C14)	<5.9
Diesel Range Organics (C15-C20)	<5.9
Diesel Range Organics (C21-C30)	5.4 J
PCBs (NA)	
Aroclor 1242	-
Aroclor 1254	-
Aroclor 1260	-
SVOC (NA)	
bis(2-Ethylhexyl) phthalate	-
Diethyl phthalate	-
Di-n-butyl phthalate	-
SVOC (ug/kg)	
1-Methyl naphthalene	<23
2-Methylnaphthalene	<23
Acenaphthene	0.44 J
Acenaphthylene	<23
Anthracene	1.1 J
Benzo(a)anthracene	0.53 J
Benzo(a)pyrene	<23
Benzo(b)fluoranthene	0.68 J
Benzo(ghi)perylene	<23
Benzo(k)fluoranthene	<23
Chrysene	2.3 J
Dibenzo(a,h)anthracene	<23
Dimethyl phthalate	<23
Di-n-octyl phthalate	<23
Fluoranthene	0.88 J
Fluorene	4.5 J
Indeno(1,2,3-cd)pyrene	<23
Naphthalene	<23
n-Nitrosodimethylamine	<23
Phenanthrene	2.6 J
Pyrene	1.7 J

U5BS1071

U5BS1071	1.5 Primary U5BS1071S01 5/16/2008	1.5 Split U5BS1071X01 5/16/2008	6 Primary U5BS1071S02 5/16/2008
Hydrocarbons (NA)			
Diesel Range Organics	-	-	-
Diesel Range Organics (C14-C20)	-	-	-
Diesel Range Organics (C20-C30)	-	-	-
Kerosene Range Organics (C11-C14)	-	-	-
Oil Range Organics (C25-C36)	-	-	-
Hydrocarbons (mg/kg)			
Diesel Range Organics (C12-C14)	<4	<14	<3.93
Diesel Range Organics (C15-C20)	<4	<14	<3.93
Diesel Range Organics (C21-C30)	6.94 J	<14	8.64 J
Total Petroleum Hydrocarbons	-	<14	-
PCBs (ug/kg)			
Aroclor 1242	<4.02	<20	-
Aroclor 1254	<4.02	<20	-
Aroclor 1260	<4.02	<20	-
SVOC (ug/kg)			
1-Methyl naphthalene	<20.1	<2	<19.7
2-Methylnaphthalene	<20.1	<2	<19.7
Acenaphthene	<20.1	<2	<19.7
Acenaphthylene	<20.1	<2	<19.7
Anthracene	<20.1	<2	<19.7
Benzo(a)anthracene	<20.1	<2	<19.7
Benzo(a)pyrene	<20.1	<2	<19.7
Benzo(b)fluoranthene	<20.1	<2	<19.7
Benzo(ghi)perylene	<20.1	<2	<19.7
Benzo(k)fluoranthene	<20.1	<2	<19.7
bis(2-Ethylhexyl) phthalate	<23.9	<22	<19.7
Chrysene	<20.1	<2	<19.7
Dibenzo(a,h)anthracene	<20.1	<2	<19.7
Diethyl phthalate	<20.1	<22	<19.7
Dimethyl phthalate	<20.1	<22	<19.7
Di-n-butyl phthalate	<20.1	<22	<19.7
Di-n-octyl phthalate	<20.1	<22	<19.7
Fluoranthene	<20.1	<2	<19.7
Fluorene	<20.1	<2	<19.7
Indeno(1,2,3-cd)pyrene	<20.1	<2	<19.7
Naphthalene	<20.1	<2	<19.7
n-Nitrosodimethylamine	<20.1	<2	<19.7
Phenanthrene	<20.1	<2	<19.7
Pyrene	<20.1	<2	<19.7

U5BX1006

U5BX1006	1 Composite U5BX1006C01 3/28/2008
Hydrocarbons (NA)	
Diesel Range Organics	-
Diesel Range Organics (C12-C14)	-
Diesel Range Organics (C14-C20)	-
Diesel Range Organics (C15-C20)	-
Diesel Range Organics (C20-C30)	-
Diesel Range Organics (C21-C30)	-
Kerosene Range Organics (C11-C14)	-
Oil Range Organics (C25-C36)	-
Total Petroleum Hydrocarbons	-
PCBs (ug/kg)	
Aroclor 1242	<3.45
Aroclor 1254	10.4
Aroclor 1260	9
SVOC (NA)	
1-Methyl naphthalene	-
2-Methylnaphthalene	-
Acenaphthene	-
Acenaphthylene	-
Anthracene	-
Benzo(a)anthracene	-
Benzo(a)pyrene	-
Benzo(b)fluoranthene	-
Benzo(ghi)perylene	-
Benzo(k)fluoranthene	-
bis(2-Ethylhexyl) phthalate	-
Chrysene	-
Dibenzo(a,h)anthracene	-
Diethyl phthalate	-
Dimethyl phthalate	-
Di-n-butyl phthalate	-
Di-n-octyl phthalate	-
Fluoranthene	-
Fluorene	-
Indeno(1,2,3-cd)pyrene	-
Naphthalene	-
n-Nitrosodimethylamine	-
Phenanthrene	-
Pyrene	-

U5BS1069

U5BS1069	1 Primary U5BS1069S01 5/22/2008	1 Split U5BS1069X01 5/22/2008	6 Primary U5BS1069S02 5/22/2008
Hydrocarbons (NA)			
Diesel Range Organics	-	-	-
Diesel Range Organics (C14-C20)	-	-	-
Diesel Range Organics (C20-C30)	-	-	-
Kerosene Range Organics (C11-C14)	-	-	-
Oil Range Organics (C25-C36)	-	-	-
Hydrocarbons (mg/kg)			
Diesel Range Organics (C12-C14)	<4.05	<15	<3.97
Diesel Range Organics (C15-C20)	<4.05	<15	<3.97
Diesel Range Organics (C21-C30)	<4.05	<15	<3.97
Total Petroleum Hydrocarbons	-	<15	-
PCBs (NA)			
Aroclor 1242	-	-	-
Aroclor 1254	-	-	-
Aroclor 1260	-	-	-
SVOC (ug/kg)			
1-Methyl naphthalene	<20.3	<2	<19.9
2-Methylnaphthalene	<20.3	<2	<19.9
Acenaphthene	<20.3	<2	<19.9
Acenaphthylene	<20.3	<2	<19.9
Anthracene	<20.3	<2	<19.9
Benzo(a)anthracene	<20.3	<2	<19.9
Benzo(a)pyrene	<20.3	<2	<19.9
Benzo(b)fluoranthene	<20.3	0.82 J	<19.9
Benzo(ghi)perylene	<20.3	<2	<19.9
Benzo(k)fluoranthene	<20.3	<2	<19.9
bis(2-Ethylhexyl) phthalate	<20.3	<22	<19.9
Chrysene	<20.3	0.67 J	<19.9
Dibenzo(a,h)anthracene	<20.3	<2	<19.9
Diethyl phthalate	<20.3	<22	<19.9
Dimethyl phthalate	<20.3	<22	<19.9
Di-n-butyl phthalate	<20.3	<22	<19.9
Di-n-octyl phthalate	<20.3	<22	<19.9
Fluoranthene	<20.3	0.9 J	<19.9
Fluorene	<20.3	<2	<19.9
Indeno(1,2,3-cd)pyrene	<20.3	<2	<19.9
Naphthalene	<20.3	<2	<19.9
n-Nitrosodimethylamine	<20.3	1.7 J	<19.9
Phenanthrene	<20.3	<2	<19.9
Pyrene	<20.3	<2	<19.9

U5BS1037

U5BS1037	8 Primary U5BS1037S01 4/3/2008	8 Duplicate U5BS1037D01 4/3/2008
Hydrocarbons (NA)		
Diesel Range Organics	-	-
Diesel Range Organics (C14-C20)	-	-
Diesel Range Organics (C20-C30)	-	-
Kerosene Range Organics (C11-C14)	-	-
Oil Range Organics (C25-C36)	-	-
Total Petroleum Hydrocarbons	-	-
Hydrocarbons (mg/kg)		
Diesel Range Organics (C12-C14)	<3.71	<3.7
Diesel Range Organics (C15-C20)	<3.71	<3.7
Diesel Range Organics (C21-C30)	<3.71	<3.7
PCBs (NA)		
Aroclor 1242	-	-
Aroclor 1254	-	-
Aroclor 1260	-	-
SVOC (ug/kg)		
1-Methyl naphthalene	<18.5	<18.4
2-Methylnaphthalene	<18.5	<18.4
Acenaphthene	<18.5	<18.4
Acenaphthylene	<18.5	<18.4
Anthracene	<18.5	<18.4
Benzo(a)anthracene	<18.5	<18.4
Benzo(a)pyrene	<18.5	<18.4
Benzo(b)fluoranthene	<18.5	<18.4
Benzo(ghi)perylene	<18.5	<18.4
Benzo(k)fluoranthene	<18.5	<18.4
bis(2-Ethylhexyl) phthalate	<19.9	<18.4
Chrysene	<18.5	<18.4
Dibenzo(a,h)anthracene	<18.5	<18.4
Diethyl phthalate	<18.5	9.61 J
Dimethyl phthalate	<18.5	<18.4
Di-n-butyl phthalate	<18.5	<18.4
Di-n-octyl phthalate	<18.5	<18.4
Fluoranthene	<18.5	<18.4
Fluorene	<18.5	<18.4
Indeno(1,2,3-cd)pyrene	<18.5	<18.4
Naphthalene	<18.5	<18.4
n-Nitrosodimethylamine	<18.5	<18.4
Phenanthrene	<18.5	<18.4
Pyrene	<18.5	<18.4

U5BS1038

U5BS1038	8 Primary U5BS1038S01 4/3/2008
Hydrocarbons (NA)	
Diesel Range Organics	-
Diesel Range Organics (C14-C20)	-
Diesel Range Organics (C20-C30)	-
Kerosene Range Organics (C11-C14)	-
Oil Range Organics (C25-C36)	-
Total Petroleum Hydrocarbons	-
Hydrocarbons (mg/kg)	
Diesel Range Organics (C12-C14)	<75.9
Diesel Range Organics (C15-C20)	<75.9
Diesel Range Organics (C21-C30)	<75.9
PCBs (NA)	
Aroclor 1242	-
Aroclor 1254	-
Aroclor 1260	-
SVOC (ug/kg)	
1-Methyl naphthalene	<19
2-Methylnaphthalene	<19
Acenaphthene	<19
Acenaphthylene	<19
Anthracene	<19
Benzo(a)anthracene	<19
Benzo(a)pyrene	<19
Benzo(b)fluoranthene	<19
Benzo(ghi)perylene	<19
Benzo(k)fluoranthene	<19
bis(2-Ethylhexyl) phthalate	<19
Chrysene	<19
Dibenzo(a,h)anthracene	<19
Diethyl phthalate	<19
Dimethyl phthalate	<19
Di-n-butyl phthalate	<19
Di-n-octyl phthalate	<19
Fluoranthene	<19
Fluorene	<19
Indeno(1,2,3-cd)pyrene	<19
Naphthalene	<19
n-Nitrosodimethylamine	<19
Phenanthrene	<19
Pyrene	<19

U5BS1027

U5BS1027	1 Primary U5BS1027S01 4/7/2008	6 Primary U5BS1027S02 4/7/2008
Hydrocarbons (NA)		
Diesel Range Organics	-	-
Diesel Range Organics (C14-C20)	-	-
Diesel Range Organics (C20-C30)	-	-
Kerosene Range Organics (C11-C14)	-	-
Oil Range Organics (C25-C36)	-	-
Total Petroleum Hydrocarbons	-	-
Hydrocarbons (mg/kg)		
Diesel Range Organics (C12-C14)	<5.5	<5.6
Diesel Range Organics (C15-C20)	2.4 J	<5.6
Diesel Range Organics (C21-C30)	<5.5	<5.6
PCBs (NA)		
Aroclor 1242	-	-
Aroclor 1254	-	-
Aroclor 1260	-	-
SVOC (NA)		
Diethyl phthalate	-	-
SVOC (ug/kg)		
1-Methyl naphthalene	<21	<23
2-Methylnaphthalene	<21	<23
Acenaphthene	0.4 J	0.48 J
Acenaphthylene	<21	<23
Anthracene	0.79 J	<23
Benzo(a)anthracene	<21	<23
Benzo(a)pyrene	4.1 J	<23
Benzo(b)fluoranthene	6.9 J	<23
Benzo(ghi)perylene	2.9 J	<23
Benzo(k)fluoranthene	-	<23
bis(2-Ethylhexyl) phthalate	-	7.7 J
Chrysene	24	0.92 J
Dibenzo(a,h)anthracene	0.96 J	<23
Dimethyl phthalate	<21	<23
Di-n-butyl phthalate	-	3.5 J
Di-n-octyl phthalate	<21	4.6 J
Fluoranthene	6.5 J	<23
Fluorene	0.27 J	0.57 J
Indeno(1,2,3-cd)pyrene	2.8 J	<23
Naphthalene	<21	<23
n-Nitrosodimethylamine	<21	<23
Phenanthrene	4.1 J	<23
Pyrene	5.8 J	<23

U5BS1029

U5BS1029	1 Primary U5BS1029S01 4/7/2008	6 Primary U5BS1029S02 4/7/2008
Hydrocarbons (NA)		
Diesel Range Organics	-	-
Diesel Range Organics (C14-C20)	-	-
Diesel Range Organics (C20-C30)	-	-
Kerosene Range Organics (C11-C14)	-	-
Oil Range Organics (C25-C36)	-	-
Total Petroleum Hydrocarbons	-	-
Hydrocarbons (mg/kg)		
Diesel Range Organics (C12-C14)	<5.5	<5.8
Diesel Range Organics (C15-C20)	1.8 J	2.1 J
Diesel Range Organics (C21-C30)	<5.5	<5.8
PCBs (NA)		
Aroclor 1242	-	-
Aroclor 1254	-	-
Aroclor 1260	-	-
SVOC (NA)		
Benzo(k)fluoranthene	-	-
bis(2-Ethylhexyl) phthalate	-	-
Diethyl phthalate	-	-
Di-n-butyl phthalate	-	-
SVOC (ug/kg)		
1-Methyl naphthalene	<22	<23
2-Methylnaphthalene	<22	<23
Acenaphthene	<22	<23
Acenaphthylene	<22	<23
Anthracene	<22	<23
Benzo(a)anthracene	<22	<23
Benzo(a)pyrene	0.35 J	<23
Benzo(b)fluoranthene	0.54 J	0.22 J
Benzo(ghi)perylene	<22	<23
Chrysene	4 J	<23
Dibenzo(a,h)anthracene	<22	<23
Dimethyl phthalate	<22	<23
Di-n-octyl phthalate	<22	<23
Fluoranthene	0.72 J	0.33 J
Fluorene	<22	<23
Indeno(1,2,3-cd)pyrene	<22	<23
Naphthalene	<22	<23
n-Nitrosodimethylamine	<22	<23
Phenanthrene	0.45 J	<23
Pyrene	0.51 J	<23

U5BS1028

U5BS1028	1 Primary U5BS1028S01 4/7/2008	6 Primary U5BS1028S02 4/7/2008
Hydrocarbons (NA)		
Diesel Range Organics	-	-
Diesel Range Organics (C14-C20)	-	-
Diesel Range Organics (C20-C30)	-	-
Kerosene Range Organics (C11-C14)	-	-
Oil Range Organics (C25-C36)	-	-
Total Petroleum Hydrocarbons	-	-
Hydrocarbons (mg/kg)		
Diesel Range Organics (C12-C14)	<5.4	<5.4
Diesel Range Organics (C15-C20)	<5.4	1.8 J
Diesel Range Organics (C21-C30)	<5.4	<5.4
PCBs (NA)		
Aroclor 1242	-	-
Aroclor 1254	-	-
Aroclor 1260	-	-
SVOC (NA)		
Diethyl phthalate	-	-
SVOC (ug/kg)		
1-Methyl naphthalene	<21	<23
2-Methylnaphthalene	<21	<23
Acenaphthene	<21	<23
Acenaphthylene	<21	<23
Anthracene	<21	<23
Benzo(a)anthracene	<21	<23
Benzo(a)pyrene	0.17 J	<23
Benzo(b)fluoranthene	0.4 J	<23
Benzo(ghi)perylene	<21	<23
Benzo(k)fluoranthene	-	<23
bis(2-Ethylhexyl) phthalate	-	5.8 J
Chrysene	0.36 J	<23
Dibenzo(a,h)anthracene	<21	<23
Dimethyl phthalate	<21	<23
Di-n-butyl phthalate	-	1.3 J
Di-n-octyl phthalate	<21	<23
Fluoranthene	0.39 J	<23
Fluorene	<21	<23
Indeno(1,2,3-cd)pyrene	<21	<23
Naphthalene	<21	<23
n-Nitrosodimethylamine	<21	<23
Phenanthrene	<21	<23
Pyrene	<21	<23

U5BS1034

U5BS1034	1 Primary U5BS1034S01 4/21/2008	6 Primary U5BS1034S02 4/21/2008
Hydrocarbons (NA)		
Diesel Range Organics	-	-
Diesel Range Organics (C14-C20)	-	-
Diesel Range Organics (C20-C30)	-	-
Kerosene Range Organics (C11-C14)	-	-
Oil Range Organics (C25-C36)	-	-
Total Petroleum Hydrocarbons	-	-
Hydrocarbons (mg/kg)		
Diesel Range Organics (C12-C14)	<3.55	<3.61
Diesel Range Organics (C15-C20)	1.46 J	<3.61
Diesel Range Organics (C21-C30)	15 J	3.82
PCBs (NA)		
Aroclor 1242	-	-
Aroclor 1254	-	-
Aroclor 1260	-	-
SVOC (ug/kg)		
1-Methyl naphthalene	<17.8	<18
2-Methylnaphthalene	<17.8	<18
Acenaphthene	<17.8	<18
Acenaphthylene	<17.8	<18
Anthracene	<17.8	<18
Benzo(a)anthracene	<17.8	<18
Benzo(a)pyrene	<17.8	<18
Benzo(b)fluoranthene	<17.8	<18
Benzo(ghi)perylene	<17.8	<18
Benzo(k)fluoranthene	<17.8	<18
bis(2-Ethylhexyl) phthalate	<17.8	17 J
Chrysene	<17.8	<18
Dibenzo(a,h)anthracene	<17.8	<18
Diethyl phthalate	<17.8	<18
Dimethyl phthalate	<17.8	<18
Di-n-butyl phthalate	<17.8	<18
Di-n-octyl phthalate	<17.8	<18
Fluoranthene	<17.8	<18
Fluorene	<17.8	<18
Indeno(1,2,3-cd)pyrene	<17.8	<18
Naphthalene	<17.8	<18
n-Nitrosodimethylamine	115	<18
Phenanthrene	<17.8	<18
Pyrene	<17.8	<18

U5BS1035

U5BS1035	6 Primary U5BS1035S01 4/7/2008
Hydrocarbons (NA)	
Diesel Range Organics	-
Diesel Range Organics (C14-C20)	-
Diesel Range Organics (C20-C30)	-
Kerosene Range Organics (C11-C14)	-
Oil Range Organics (C25-C36)	-
Total Petroleum Hydrocarbons	-
Hydrocarbons (mg/kg)	
Diesel Range Organics (C12-C14)	<5.2
Diesel Range Organics (C15-C20)	<5.2
Diesel Range Organics (C21-C30)	<5.2
PCBs (NA)	
Aroclor 1242	-
Aroclor 1254	-
Aroclor 1260	-
SVOC (NA)	
bis(2-Ethylhexyl) phthalate	-
Diethyl phthalate	-
Di-n-butyl phthalate	-
SVOC (ug/kg)	
1-Methyl naphthalene	<21
2-Methylnaphthalene	<21
Acenaphthene	<21
Acenaphthylene	<21
Anthracene	<21
Benzo(a)anthracene	<21
Benzo(a)pyrene	<21
Benzo(b)fluoranthene	<21
Benzo(ghi)perylene	<21
Benzo(k)fluoranthene	<21
Chrysene	<21
Dibenzo(a,h)anthracene	<21
Dimethyl phthalate	<21
Di-n-octyl phthalate	<21
Fluoranthene	<21
Fluorene	<21
Indeno(1,2,3-cd)pyrene	<21
Naphthalene	<21
n-Nitrosodimethylamine	<21
Phenanthrene	<21
Pyrene	<21

U5BS1059

U5BS1059	1 Primary U5BS1059S01 4/16/2008	1 Duplicate U5BS1059D01 4/16/2008	6 Primary U5BS1059S02 4/16/2008
Hydrocarbons (NA)			
Diesel Range Organics	-	-	-
Diesel Range Organics (C14-C20)	-	-	-
Diesel Range Organics (C20-C30)	-	-	-
Kerosene Range Organics (C11-C14)	-	-	-
Oil Range Organics (C25-C36)	-	-	-
Total Petroleum Hydrocarbons	-	-	-
Hydrocarbons (mg/kg)			
Diesel Range Organics (C12-C14)	<5.3	<5.6	<5.4
Diesel Range Organics (C15-C20)	<5.3	<5.6	<5.4
Diesel Range Organics (C21-C30)	19 J	7.8 J	1.5 J
PCBs (NA)			
Aroclor 1242	-	-	-
Aroclor 1254	-	-	-
Aroclor 1260	-	-	-
SVOC (NA)			
Diethyl phthalate	-	-	-
Di-n-butyl phthalate	-	-	-
SVOC (ug/kg)			
1-Methyl naphthalene	<21	<21	<21
2-Methylnaphthalene	<21	<21	<21
Acenaphthene	<21	<21	<21
Acenaphthylene	<21	<21	<21
Anthracene	4.3 J	<21	<21
Benzo(a)anthracene	13 J	<21	<21
Benzo(a)pyrene	14 J	<21	<21
Benzo(b)fluoranthene	18 J	-	-
Benzo(ghi)perylene	<21	<21	<21
Benzo(k)fluoranthene	<21	<21	<21
bis(2-Ethylhexyl) phthalate	-	-	<3300
Chrysene	15 J	<21	<21
Dibenzo(a,h)anthracene	<21	<21	<21
Dimethyl phthalate	<21	<21	<21
Di-n-octyl phthalate	<21	<21	170
Fluoranthene	25	<21	<21
Fluorene	<21	<21	<21
Indeno(1,2,3-cd)pyrene	<21	<21	<21
Naphthalene	<21	<21	<21
n-Nitrosodimethylamine	<21	<21	<21
Phenanthrene	12 J	<0.86	<21
Pyrene	23	<21	<21

U5BS1036

U5BS1036	1 Primary U5BS1036S01 4/21/2008	1 Split U5BS1036X01 4/21/2008	5 Primary U5BS1036S02 4/21/2008
Hydrocarbons (NA)			
Diesel Range Organics	-	-	-
Diesel Range Organics (C14-C20)	-	-	-
Diesel Range Organics (C20-C30)	-	-	-
Kerosene Range Organics (C11-C14)	-	-	-
Oil Range Organics (C25-C36)	-	-	-
Hydrocarbons (mg/kg)			
Diesel Range Organics (C12-C14)	<3.52	<13	<3.45
Diesel Range Organics (C15-C20)	1.67 J	<13	5.47
Diesel Range Organics (C21-C30)	11.1	<13	18
Total Petroleum Hydrocarbons	-	<13	-
PCBs (NA)			
Aroclor 1242	-	-	-
Aroclor 1254	-	-	-
Aroclor 1260	-	-	-
SVOC (ug/kg)			
1-Methyl naphthalene	<17.6	<18	<17.2
2-Methylnaphthalene	<17.6	<18	<17.2
Acenaphthene	<17.6	<18	<17.2
Acenaphthylene	<17.6	<18	<17.2
Anthracene	<17.6	<18	<17.2
Benzo(a)anthracene	<17.6	<18	<17.2
Benzo(a)pyrene	<17.6	<18	<17.2
Benzo(b)fluoranthene	<17.6	<18	<17.2
Benzo(ghi)perylene	<17.6	<18	<17.2
Benzo(k)fluoranthene	<17.6	1.1 J	<17.2
bis(2-Ethylhexyl) phthalate	<17.6	<19	<17.2
Chrysene	<17.6	<18	<17.2
Dibenzo(a,h)anthracene	<17.6	<18	<17.2
Diethyl phthalate	<17.6	<19	<17.2
Dimethyl phthalate	<17.6	<19	<17.2
Di-n-butyl phthalate	<17.6	<19	<17.2
Di-n-octyl phthalate	<17.6	<19	<17.2
Fluoranthene	<17.6	<18	<17.2
Fluorene	<17.6	<18	<17.2
Indeno(1,2,3-cd)pyrene	<17.6	<18	<17.2
Naphthalene	<17.6	<18	<17.2
n-Nitrosodimethylamine	<17.6	<18	<17.2
Phenanthrene	<17.6	<18	<17.2
Pyrene	<17.6	<18	<17.2

U5BS1070

U5BS1070	2 Primary U5BS1070S01 5/16/2008	2 Duplicate U5BS1070D01 5/16/2008	6 Primary U5BS1070S02 5/16/2008
Hydrocarbons (NA)			
Diesel Range Organics	-	-	-
Diesel Range Organics (C14-C20)	-	-	-
Diesel Range Organics (C20-C30)	-	-	-
Kerosene Range Organics (C11-C14)	-	-	-
Oil Range Organics (C25-C36)	-	-	-
Total Petroleum Hydrocarbons	-	-	-
Hydrocarbons (mg/kg)			
Diesel Range Organics (C12-C14)	<39.9	<196	<4.01
Diesel Range Organics (C15-C20)	<39.9	<196	<4.01
Diesel Range Organics (C21-C30)	57.1 J	343 J	6.51 J
PCBs (ug/kg)			
Aroclor 1242	<4	7	-
Aroclor 1254	<4	2.6 J	-
Aroclor 1260	<4	<3.92	-
SVOC (ug/kg)			
1-Methyl naphthalene	<20	<19.6	<20.1
2-Methylnaphthalene	<20	<19.6	<20.1
Acenaphthene	<20	<19.6	<20.1
Acenaphthylene	<20	<19.6	<20.1
Anthracene	<20	<19.6	<20.1
Benzo(a)anthracene	<20	24.2 J	<20.1
Benzo(a)pyrene	<20	<19.6	<20.1
Benzo(b)fluoranthene	<20	<19.6	<20.1
Benzo(ghi)perylene	<20	<19.6	<20.1
Benzo(k)fluoranthene	<20	<19.6	<20.1
bis(2-Ethylhexyl) phthalate	<24.7	<22.3	<20.1
Chrysene	<20	<19.6	<20.1
Dibenzo(a,h)anthracene	<20	<19.6	<20.1
Diethyl phthalate	<20	<19.6	<20.1
Dimethyl phthalate	<20	<19.6	<20.1
Di-n-butyl phthalate	<20	<19.6	<20.1
Di-n-octyl phthalate	<20	<19.6	<20.1
Fluoranthene	<20	<19.6	<20.1
Fluorene	<20	<19.6	<20.1
Indeno(1,2,3-cd)pyrene	<20	<19.6	<20.1
Naphthalene	<20	<19.6	<20.1
n-Nitrosodimethylamine	<20	<19.6	<20.1
Phenanthrene	<20	<19.6	<20.1
Pyrene	<20	12.4 J	<20.1

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Hydrocarbons (NA)	
Diesel Range Organics	-
Diesel Range Organics (C14-C20)	-
Diesel Range Organics (C20-C30)	-
Kerosene Range Organics (C11-C14)	-
Oil Range Organics (C25-C36)	-
Total Petroleum Hydrocarbons	-
Hydrocarbons (mg/kg)	
Diesel Range Organics (C12-C14)	<3.56
Diesel Range Organics (C15-C20)	<3.56
Diesel Range Organics (C21-C30)	<3.56
PCBs (NA)	
Aroclor 1242	-
Aroclor 1254	-
Aroclor 1260	-
SVOC (ug/kg)	
1-Methyl naphthalene	<17.9
2-Methylnaphthalene	<17.9
Acenaphthene	<17.9
Acenaphthylene	<17.9
Anthracene	<17.9
Benzo(a)anthracene	<17.9
Benzo(a)pyrene	<17.9
Benzo(b)fluoranthene	<17.9
Benzo(ghi)perylene	<17.9
Benzo(k)fluoranthene	<17.9
bis(2-Ethylhexyl) phthalate	<17.9
Chrysene	<17.9
Dibenzo(a,h)anthracene	<17.9
Diethyl phthalate	<17.9
Dimethyl phthalate	<17.9
Di-n-butyl phthalate	<17.9
Di-n-octyl phthalate	<17.9
Fluoranthene	<17.9
Fluorene	<17.9
Indeno(1,2,3-cd)pyrene	<17.9
Naphthalene	<17.9
n-Nitrosodimethylamine	<17.9
Phenanthrene	<17.9
Pyrene	<17.9

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SVOCs, TPH, and PCBs Data Results DOE LF3 RFI Site

FIGURE Q.3-8B