Report

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

Volume V – RFI Site Reports
Appendix I

Coal Gasification Process Development Unit

Prepared for:

The Boeing Company

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DRAFT IN PROGRESS

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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
Dioxins/Furans	(a) - *see table below*
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
ELV	
EPC	exposure point concentration

ERA	ecological risk assessment
ESL	environmental screening level
ETEC	Energy Technology Engineering Center
gpd	gallons per day
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
SMOU	Surficial Media Operable Unit
SNAP	Systems for Nuclear Auxiliary Power
SE Drum Yard	Southeast Drum Storage Yard
SOP	standard operating procedure
SPA	
SQL	sample quantification limit
SRAM	Standardized Risk Assessment Methodology
SSFL	Santa Susana Field Laboratory
STL-IV	Systems Test Laboratory IV
STP-3 Site	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
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	microsiemens per centimeter
VOC	volatile organic compound
WPA	RFI Work Plan Addendum
WPAA	RFI Work Plan Addendum Amendments

(a) Definition of dioxin/furan congeners

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

Appendix I

I.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 Coal Gasification Process Development Unit (PDU) of the Santa Susana Field Laboratory (SSFL). The PDU RFI Site contains one solid waste management unit (SWMU)—Building 4005 (SWMU 7.10). The PDU Site, located within Area IV of the SSFL, was used in support of Rockwell International for the United States Department of Energy (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 PDU Site is 1 of 17 RFI sites included in the Group 5 RFI Report. The location of the PDU Site within the SSFL and Group 5 Reporting Area is shown in Figure I.1-1. An RFI Site is an area that includes at least one 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)
- 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 (PDU) (AOC)
- Department of Energy Leach Field 3 (DOE LF3) (AOC)
- Hazardous Material Storage Area (HMSA) (AOC)
- Rockwell International Hot Laboratory (RIHL) (SWMU 7.7)
- Systems for Nuclear Auxiliary Power Facility (SNAP) (AOC).

The PDU Site is located in the north-central portion of the Group 5 Reporting Area, north of the Boeing Area IV Leach Fields RFI Site, south of the DOE LF1 RFI Site and the Group 7 Reporting Area, west of the Compound A RFI Site, and east of HMSA (Figure I.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 (the ecosystem, that is), and (3) gather data for the next phase of RCRA Corrective Action to 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 PDU Site characterization presented in this appendix comprises data for the SMOU and summaries of the CFOU data. 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.

I.1.1 Report Organization

This PDU Site Report provides detailed sampling data and evaluation pertaining to the PDU 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 I.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 I.3 – Nature and Extent of Chemical Impacts.** Presents a summary of SMOU and CFOU characterization information for the PDU Site.
- **Section I.4 – Summary of Risk Assessment Findings**. Presents the results of the human health risk assessment (HRA) and ecological risk assessment (ERA) for the PDU Site; the complete risk assessment is included in Appendix A of the Group 5 RFI Report.
- **Section I.5 – Site Actions Recommendations**. Presents a summary of the PDU 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 I.6 – References.** Includes a list of cited references.

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

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

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

- Figure I.1-1: Presents the location of the PDU Site within the SSFL and the Group 5 Reporting Area.

- Figure I.2-1: Presents a plan view of the PDU Site, showing known and potential chemical use areas. Tables I.2-1 through I.2-5 present summaries of buildings, tanks, transformers, other site features, and spills at the PDU Site.
- Figure I.2-2: Presents a plan view of the PDU Site, showing locations of soil and soil vapor sampling, and of nearby monitoring wells.
- Figures I.2-3A through I.2-3D: Present geologic cross-sections across the PDU Site.
- Figures I.3-1 through I.3-9: Summarize results of the soil and soil vapor sampling at the PDU Site. Soil and soil vapor sampling results are shown on these maps and are also listed in Tables I.3-2A and I.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 PDU Site. Information includes groundwater occurrence and quality, chemical transport, data set representativeness, and supporting data (such as monitoring results, time-series plots, and hydrographs), as well as an evaluation of naturally occurring constituents.

I.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 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 PDU Site. It is worth noting that information presented in this PDU 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, 2000; MWH, 2002 and 2003a). These reports contain:
  - Geologic framework at the SSFL and hydrogeologic conditions of both NSGW and CFOU groundwater.
  - Transport and fate of TCE, and the occurrence and transport of other chemicals of concern in the CFOU.
- Annual and quarterly groundwater monitoring reports, including:
  - Annual Groundwater Monitoring Report 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 which includes:
  - Quality assurance/quality control (QA/QC) procedures to ensure that field and laboratory data quality and project work achieve the data quality objectives (DQO).
  - Ensure 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

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

The PDU Site is approximately 18.6 acres located in the north-central portion of Area IV at the SSFL. The site location within the SSFL is shown in Figure I.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 I.2-1. The sampling locations across the site are shown in Figure I.2-2.

During the RFA, various SWMUs and AOCs within the SSFL were identified. Building 4005 was identified as an SWMU in the RFA (SAIC, 1994). No other SWMUs or AOCs were identified in the RFA within the boundary of the PDU Site as it is defined in this report (Figure I.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 PDU RFI Site boundary was defined to include operations associated with Building 4005. In addition, facilities or features near this SWMU were included for assessment in the RFI. These include Buildings 4006, 4027, 4032, 4037, 4042, 4048, 4049, 4185, 4402, 4606, 4616, and 4714, 16 aboveground storage tanks (ASTs), 11 underground storage tanks (USTs), 8 unknown tanks, 3 transformers, 5 electrical substations, the process development unit, a bag house, a leach field, drainages and a catchment basin, a stripping tower, and a coal storage area. The identified Chemical Use Areas at the PDU Site are shown in Figure I.2-1 and described in Tables I.2-1 through I.2-4. A spill record is included in Table I.2-5.

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

I.2.1 SWMUs and/or AOCs at the PDU Site

The PDU Site contains one SWMU—the Building 4005 Area (SAIC, 1994). A brief description of this SWMU that is included in this RFI Site Report is presented below.

I.2.1.1 Building 4005 (SWMU 7.10)

Building 4005 was built in 1958 for non-nuclear testing to determine the thermodynamic characteristics of proposed coolants for organic moderated reactor experiment and Piqua reactors. During the mid-1960s, the facility was converted for fabrication of enriched uranium carbide fuel for a Heavy Water Organic Cooled Reactor. During a 9-month period in 1966 to 1967, the facility operated using depleted uranium and later enriched uranium. In 1967, the equipment was removed and surfaces were decontaminated to permit non-radiological use of the building. From 1972 to 1986, the building was used as a pilot plant for molten salt combustion (Molten Salt Test Facility). The pilot plant consists of water tanks, hoppers, a water treatment system, boilers, bag houses, and an oven. During the late 1970s, decontamination efforts involved removal of underground radioactive liquid holdup tanks outside the building. The drain lines from the buildings were capped and left in place, but were removed during another decontamination effort in 1987. Removal of contaminated systems was completed in 1993. Several concrete pads, which held various equipment from the Molten Salt Oxidation project and the radioactive filter plenums, were located to the east of the building. The building was connected to a holding tank by drain lines. Six spills have been reported at the facility. Spilled materials included molten salt in carbonate or slurry

form, water-tar solutions, and coal ash in solution with sodium bicarbonate. Reported released quantities ranged up to 250 gallons. All releases were to the R-2 Ponds. In 1991 contaminated oil dripped from a radioactive exhaust duct, and all contamination was successfully cleaned up. In 1991, the PDU Site was demolished, and remaining features include building foundations. Further information is described in Tables I.2-1 through I.2-4.

I.2.2 PDU Site History

A summary of the site chronology, including descriptions of site operations and investigation activities for the PDU Site, is presented below. Facility correspondence, investigation reports, waste disposal records, facility maps, drawings, photographs, and personnel interview records were reviewed and evaluated to compile the site history information presented below. Primary sources of information are summarized in Section I.1.1.2.

I.2.2.1 Site Chronology

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

I.2.2.1.1 Late 1950s through 1986

The majority of buildings in the PDU Site were constructed from the late 1950s to the early 1960s in support of reactor testing operations. Operations at the PDU Site over time included testing various coolant reactors, fabricating uranium fuels, vibration and shock testing of reactors, space environment testing of SNAP reactors, and reactor shield fabrication. Also included was the Molten Salt Test Facility.

I.2.2.1.2 1962 through 2002

A berm was constructed around the 17th Street drainage to create a 30-foot by 30-foot hold-up pond. The pond filled during the winters and dried during the summers, creating a marshy environment with scrubs and trees that accumulated significant amounts of silts. In 1998 the area was cleared of all vegetation.

I.2.2.1.3 1967

A fire at the PDU Site in 1967 allowed release of contaminated smoke to Building 4005, but no release outside the building was thought to have occurred.

I.2.2.1.4 1987

An investigation was conducted at UT-01 and the tank was subsequently removed.

I.2.2.1.5 1987 through 1994

Various radiological surveys were conducted at buildings with the PDU Site to characterize radioactive contamination concerns. Limited to no remaining concerns were found in all buildings surveyed.

I.2.2.1.6 1991 through 2002

Eight soil and soil vapor sampling investigations were conducted in the former PDU area, and one investigation was conducted at the 17th Street drainage.

I.2.2.1.7 1996 through 2003

Buildings 4005, 4027, 4032, 4036, 4037, 4042, and various other support buildings related to operations at PDU were demolished during this period. The majority of buildings were demolished in 2003.

I.2.2.1.8 2000 through 2001

The Building 4005/4006 leach field, drain lines, and underground tanks were removed. Sampling under the leach field and tanks did not indicate any impacts to site soil.

I.2.2.2 Site Inventories

Inventories of buildings, tanks, transformers, and chemicals used at the PDU 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 I.2-1. The inventories are included as the following tables:

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

I.2.3 PDU 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 historical document review, 25 Chemical Use Areas were identified within the PDU Site RFI Site boundary. Chemicals that were potentially used or stored in these chemical use areas include VOCs, SVOCs, total petroleum hydrocarbons (TPH), polychlorinated biphenyls (PCBs), metals, inorganics, dioxins, and energetics. Chemical Use Areas at the PDU Site are shown in Figure I.2-1 and described in detail in Table I.2-8.

I.2.4 Site Conditions

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

I.2.4.1 General Conditions and Topography

The PDU Site is located within the north-central portion of Area IV. The site is currently inactive, with two remaining structures. Topography in the central portion of the site slopes to the southeast. Current surface elevations at the northwestern and north-central PDU Site are relatively flat at approximately 1810 feet (mean sea level) msl. Surface elevations at the northeastern portion of the PDU Site are relative flat at approximately 1820 feet msl. The

southern portion of the PDU Site ranges from a high of approximately 1810 feet msl in the coal storage area just north of G Street to a low of approximately 1764 feet msl at the southern end of the 17th Street Drainage. A summary site conceptual model is presented in Table P.2-8. Figures I.2-3B, I.2-3C, and I.2-3D present cross-sections developed for the PDU Site (Surficial Cross Sections N-N', O-O', and P-P'), detailing topography, locations and depths of alluvium, and the most recent groundwater elevations. Locations of the cross-sections are shown in Figure I.2-3A.

I.2.4.2 Geology

The PDU Site is located north of the Coca Fault, encompasses the Upper Burro Flats Member, Expandable Launch Vehicle (ELV) Member, the Lower Burro Flats Member, Storable Propellant Area (SPA) Member, and Silvernale Member of the Upper Chatsworth Formation to the north of the fault (Dibblee, 1992; MWH, 2002 and 2007C).

Beds of the Upper Burro Flats, ELV, Lower Burro Flats, SPA, and Silvernale Members generally strike N70°E and dip 25°NW. The Upper Burro Flats Member is predominantly composed of fine- and medium-grained sandstone with minor interbeds of siltstone and shale. The ELV Member is predominantly composed of interbedded fine-grained sandstone, siltstone, and shale. The Lower Burro Flats Member is predominantly composed of medium- to fine-grained sandstone with significant interbeds of siltstone and shale. The SPA Member consists of thin-bedded shale, siltstone, and sandstone, with shale and siltstone comprising more than 50 percent of the member. The Silvernale Member is predominantly medium- and fine-grained sandstone with locally thin, lenticular conglomerates. Figure 2-5 of the Group 5 RFI Report (Volume I) shows the geologic units represented within the RFI Site. The location of the Coca Fault is shown on 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.

I.2.4.3 Soil

Throughout most of the PDU Site, soil is generally thin, typically ranging from less than 0.6 feet to greater than 13 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). Alluvium soil and weathered Chatsworth Formation materials are primarily composed of fine-grained silty sands, sandy silts, clayey sands, silt with sand, sandy lean clays, lean clays with sand, silts, poorly graded sands, and lean clay. Soil in the undisturbed areas of the site consists of weathered Chatsworth Formation materials. Soil boring logs are included as Attachment I-2 to this appendix.

I.2.4.4 Groundwater

The groundwater system and monitoring network in RFI Group 5 are 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 PDU Site. Figure I.2-2 shows locations of wells in and around the PDU Site.

At the PDU Site, eight piezometers (PZ-041, PZ-051, PZ-052, PZ-107, PZ-108, PZ-110, PZ-120, and PZ-122) and four shallow wells (ES-31, RS-11, RS-15, and RS-27) were installed to monitor groundwater conditions in alluvium and weathered bedrock (that is, in NSGW),

while one well (RD-29) was installed to monitor groundwater conditions in the unweathered bedrock (that is, in CFOU Groundwater). Construction details for these wells/piezometers are discussed in Tables B-2 and B-3 of Appendix B in the Group 5 RFI Report, and their locations are shown in Figure I.2-2 of this appendix.

The NSGW in the PDU Site area is laterally continuous with the CFOU Groundwater. A cross-sectional diagram of NSGW, and CFOU Groundwater occurrence is shown in Figure B-6 in Appendix B of the Group 5 RFI Report. NSGW is encountered at depths ranging from 4 feet below ground surface (bgs) (1761 feet msl) at well RS-15 to 18 feet bgs (1769 feet msl) at well ES-31. NSGW at the PDU Site flows to the south at a hydraulic gradient of approximately 0.06 foot/foot. The occurrence of NSGW in the PDU Site area is shown in plan view of Figure B-7 in Appendix B of the Group 5 RFI Report.

CFOU groundwater at the PDU Site is encountered at average depths ranging from 12 feet bgs (1794 feet msl) to 20 feet bgs (1787 feet msl) at RD-29. CFOU Groundwater at the PDU Site has a hydraulic gradient of approximately 0.02 ft/ft to the southwest and 0.04 ft/ft to the south. The occurrence of CFOU Groundwater in the PDU Site area is shown in plan view of Figure B-8 in Appendix B of the Group 5 RFI Report.

I.2.4.5 Surface Water

Surface water flow at the PDU Site is shown in Figure 2-7 of the Group 5 RFI Report (Volume I). Surface water exists intermittently at the PDU Site as the result of seasonal precipitation events. Storm flow within the PDU Site/Building 4005 site is generally to the west, toward 17th Street. When stormwater reaches 17th Street, flow is to the south and largely contained within an asphalt-lined drainage down to G Street. From G Street, stormwater flows into the 17th Street Drainage.

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, occurs downgradient at the discharge of the R-S 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.

I.2.4.6 Biology

In April 2008, a reconnaissance-level biological survey was conducted at the Group 5 RFI Sites. Biological conditions at the PDU 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 of the Group 5 RFI Report.

I.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 PDU 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

I.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 (GRC, 1991; ICF, 1993; Ogden, 1995 and 2000a). Based on the review of historical documents, summarized in Section I.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 set out 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 I.3-1A and I.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 I.3.2). Based on detected RFI site chemicals, chemical distribution, and site conditions, additional groundwater sampling and analysis was also conducted to complete characterization of individual RFI sites and provide data sufficient for risk assessment. Groundwater sampling was conducted as described in the Sampling Analysis Plans (GRC, 1995a and 1995b) and the Shallow Zone Groundwater Investigation Work Plan (Ogden, 2000b.

I.3.2 Sampling Scope

A total of 201 soil matrix samples and 68 soil vapor samples were collected between December 1990 and May 2008 to assess potential impacts associated with the Chemical Use Areas at the PDU 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 schedules are presented in Tables I.3-1A and I.3-1B. Sample locations are shown in Figure I.2-2.

Both CFOU Groundwater and NSGW have been sampled and analyzed according to agency-approved work plans (GRC, 1995a and 1995b; Ogden, 2000b). Four wells (ES-31, RS-11, RS-15, and RS-27) and six piezometers (PZ-041, PZ-051, PZ-052, PZ-107, PZ-108, and PZ-122) were used to characterize NSGW were used, while one Chatsworth Formation well (RD-29) was used to characterize CFOU Groundwater specifically at the PDU Site. Groundwater characterization data for the PDU 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 Quality Assurance Project Plans (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 I-3 of this report. Historical samples (collected prior to the beginning of the RFI in 1996) data quality evaluation is described in the RFI Program Report (MWH, 2004). Site-specific data quality summaries for the PDU Site are described by media in the subsections that follow.

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

- Soil vapor
- Soil matrix
- Groundwater
- Surface water

I.3.3 Key Decision Points

Site assessment was been 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 I.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).

I.3.4 Soil Matrix and Soil Vapor Findings

Soil and soil vapor sampling results and characterization findings are summarized in Table I.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 characterization and assess whether further sampling is warranted.
3. For areas recommended for CMS, indicate that soil volumes 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 analytical data. For example, if detected concentrations are sufficiently high to indicate that further evaluation in the CMS will be necessary, the data are considered to be adequate for the purpose of risk assessment. Similarly, the risk assessment results can be used along with the soil analytical results to delineate CMS areas and estimate soil volumes within an order of magnitude (Goal 3). Other criteria used to evaluate characterization completeness include the sampling results compared to screening levels, the presence and magnitude of concentration gradients, the types of historical site operations and chemical uses, and analytical detection limits.

The evaluation of site characterization data for the PDU Site is provided in Table I.3-3A and Table I.3-3B.

I.3.4.1 Soil and Soil Vapor Data Presentation

The results by chemical group are summarized in Figures I.3-1 through I.3-9. Relevant site information, sampling rationale, analytical results, and evaluation of results are presented in Table I.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 of soil and soil vapor for each chemical group in a particular Chemical Use Area. (A more detailed sitewide summary is presented in Section I.3.4.2 that follows.) 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 displayed in Tables I.3-3A and I.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 volumes (within a factor of 10) for areas that require further consideration in the CMS (if needed).

I.3.4.2 Soil and Soil Vapor Data Summary

As detailed in Table I.2-8, 16 individual confirmed and potential Chemical Use Areas were investigated at the PDU 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.

I.3.4.2.1 Volatile Organic Compounds

A total of 68 soil vapor samples was collected at 54 locations and analyzed for VOCs. Of the 68 samples, 22 samples had detectable levels of VOCs, and results are shown in Figures I.3-1A and I.3-8. Soil vapor sampling was also attempted at 14 additional locations. 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 vapor wells to allow sample collection

- Toluene was detected above the Ecological RBSL of 0.084 micrograms per liter (µg/L) in seven samples collected from:
  - PUSV1013 at a depth of 4 to 5 feet bgs (0.09 J µg/L),
  - PUSV1010 at a depth of 4 to 5 feet bgs (0.47 µg/L),
  - PUSV1008 at a depth of 4 to 5 feet bgs (0.15 J µg/L) and 7.3 to 8.3 feet bgs (0.28 µg/L),
  - U5SV1104 at a depth of 9 to 10 feet bgs (0.27 µg/L),
  - PUSV1004 at a depth of 4 to 5 feet bgs (0.22 µg/L),
  - PUSV1003 at a depth of 4 to 5 feet bgs (0.145 µg/L).
- Tetrachloroethene (PCE) was detected above the Residential RBSL of 0.452 µg/L in one sample collected from PUSV04 at a depth of 4 feet bgs (2.2 µg/L).

[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 of the Group 5 RFI Report.

- Benzene, ethylbenzene, xylenes, and trichlorofluoromethane were detected at concentrations that did not exceed their respective RBSLs.

A total of 90 soil samples were collected at 57 locations and analyzed for VOCs. Of the 90 samples, 22 samples had detectable levels of VOCs and results are shown in Figures I.3-1B and I.3-8.

- 1,2,4-Trimethylbenzene, acetone, dichlorodifluoromethane, methyl ethyl ketone, methylene chloride, styrene, and xylenes were detected at concentrations that did not exceed their respective RBSLs.

The lateral extent of Ecological RBSL exceedances for PCE in the northwest area of the PDU Site have not been adequately delineated. Based on risk assessment findings (Section I.4), PCE was determined to be a chemical risk driver. Further characterization of PCE at the former baghouse area is recommended as part of a corrective measure study..

I.3.4.2.2 Semivolatile Organic Compounds

A total of 111 soil samples was collected at 65 locations and analyzed for SVOCs. Of the 111 samples, 73 samples had detectable levels of SVOCs, and results are shown in Figures I.3-2, I.3-9A, and I.3-9B.

- Bis(2-ethylhexyl) phthalate, butyl benzyl 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, and further characterization of SVOCs in soil is not recommended at the PDU Site.
- Various polyaromatic hydrocarbons (PAHs) were detected in all of the 59 samples analyzed for PAHs. Detections at the following locations exceeded Residential RBSLs or Ecological RBSLs, or both.
  - Anthracene was detected above the Ecological RBSL of 2,400 micrograms per kilogram (µg/kg) in a sample from PUBS07 at a depth of 0 to 0.5 feet bgs (8,200 J µg/kg).
  - Benzo(a)anthracene was detected above the Residential RBSL of 600 µg/kg, Ecological RBSL of 5,600 µg/kg, or both, in two samples from PUBS07 at a depth of 0 to 0.5 feet bgs (16,000 J µg/kg) and PUBS08 at a depth of 0 to 0.5 feet bgs (5,200 J µg/kg).
  - Benzo(a)pyrene was detected above the Residential RBSLs or Residential and Ecological RBSLs in 11 samples. Detection results are shown in Figures I.3-9A and I.3-9B.
  - Benzo(b)fluoranthene was detected above the Residential RBSL of 600 µg/kg, Ecological RBSL of 5,600 µg/kg, or both, in four samples from PUBS08 at a depth of 0 to 0.5 feet bgs (26,000 J µg/kg), PUBS07 at a depth of 0 to 0.5 feet bgs (18,000 J µg/kg), PUBS1042 at a depth of 0 to 1 foot bgs (2,150 J µg/kg), and PUBS10 at a depth of 0 to 0.5 feet bgs (920 J µg/kg).

- Benzo(ghi)perylene was detected above the Ecological RBSL of 6,400 µg/kg in two samples from PUBS08 at a depth of 0 to 0.5 feet bgs (90,000 J µg/kg) and PUBS07 at a depth of 0 to 0.5 feet bgs (27,000 J µg/kg).
- Benzo(k)fluoranthene was detected above the Residential RBSL of 600 µg/kg, Ecological RBSL of 5,800 µg/kg, or both, in two samples from PUBS07 at a depth of 0 to 0.5 feet bgs (15,000 J µg/kg) and PUBS08 at a depth of 0 to 0.5 feet bgs (14,000 J µg/kg).
- Chrysene was detected above the Residential RBSL of 6,000 µg/kg and Ecological RBSL of 2,400 µg/kg in two samples from PUBS07 at a depth of 0 to 0.5 feet bgs (22,000 J µg/kg) and PUBS08 at a depth of 0 to 0.5 feet bgs (10,000 J µg/kg).
- Dibenzo(a,h)anthracene was detected above the Residential RBSL of 170 µg/kg in one sample from PUBS1042 at a depth of 0 to 1 foot bgs (275 µg/kg).
- Indeno(1,2,3-cd)pyrene was detected above the Residential RBSL of 600 µg/kg, the Ecological RBSL of 5,800 µg/kg, or both, in five samples from PUBS08 at a depth of 0 to 0.5 feet bgs (77,000 J µg/kg), PUBS07 at a depth of 0 to 0.5 feet bgs (25,000 J µg/kg), PUBS10 at a depth of 0 to 0.5 feet bgs (2,200 J µg/kg), PUBS1042 at a depth of 0 to 1 foot bgs (1,800 µg/kg), and PUBS1050 at a depth of 0 to 1 foot bgs (930 µg/kg).
- Phenanthrene was detected above the Ecological RBSL of 1,300 µg/kg in two samples from PUBS07 at a depth of 0 to 0.5 feet bgs (14,000 J µg/kg) and PUBS08 at a depth of 0 to 0.5 feet bgs (8,200 J µg/kg).
- Pyrene was detected above the Ecological RBSL of 18,000 µg/kg in two samples from PUBS07 at a depth of 0 to 0.5 feet bgs (27 J µg/kg) and PUBS08 at a depth of 0 to 0.5 feet bgs (27 J µg/kg).

The exceedances of the PAH RBSLs listed above occur in the 17th Street Drainage at the south end of the site. Additionally, these RBSL exceedances (with the exception of the sample collected at PUBS1044 at a depth of 4 to 5 feet bgs) occurred in the surface soil samples. PAHs are sufficiently delineated within the drainage. Based on risk assessment findings (Section I.4), benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene were determined to be chemical risk drivers. Areas along the 17th Street Drainage with these elevated PAHs will be addressed as part of a corrective measure study.

I.3.4.2.3 Total Petroleum Hydrocarbons

A total of 104 soil samples was collected at 68 locations and analyzed for total petroleum hydrocarbons (TPH). Of the 104 samples, 68 had detectable levels of TPH, and results are shown in Figures I.3-3, I.3-9A, and I.3-9B.

- Gasoline range hydrocarbons (C8-C11) were detected above the Residential RBSL of 1.1 milligrams per kilogram (mg/kg) in 10 samples from PUBS09, PUBS11, PUTS01, PUTS08, PUBS1007, PUBS1008, PUBS1050, PUBS1056, U5BS1105, and U5BS1118.

- Kerosene range hydrocarbons (C12-C-14), diesel range hydrocarbons (C14-C20 and C15-C20), lubricant oil range hydrocarbons (C20-C30 and C21-C30), TPH, and total recoverable petroleum hydrocarbons (TRPH) were detected at concentrations that did not exceed their respective RBSLs.

No further characterization of the RBSL exceedances for gasoline-range hydrocarbons is recommended.

I.3.4.2.4 Polychlorinated Biphenyls

A total of 82 soil samples was collected at 62 locations and analyzed for PCBs. Of the 82 samples, 36 had detectable levels of PCBs, and results are shown in Figures I.3-4, I.3-9A, and I.3-9B.

- Aroclor 1248 was detected above the Ecological RBSL of 11.4 µg/kg in six samples:
  - PUBS06 at a depth of 0 to 0.5 feet bgs (340 µg/kg)
  - PUBS09 at a depth of 0 to 0.5 feet bgs (200 µg/kg)
  - PUBX1000 at a depth of 0 to 1 foot bgs (135 µg/kg)
  - PUBS1044 at depths of 0 to 1 feet bgs (50 J µg/kg) and 4 to 5 feet bgs (20.9 µg/kg, respectively)
  - PUBS1045 at a depth of 4.5 to 5.5 feet bgs (13.1 µg/kg)

- Aroclor 1254 was detected above the Ecological RBSL of 77 µg/kg in four samples:
  - PUBS1042 at a depth of 0 to 1 foot bgs (170 µg /kg)
  - PUBX1000 at a depth of 0 to 1 foot bgs (88.1 J µg/kg)
  - PUBS09 at a depth of 0 to 0.5 feet bgs (88 µg /kg)
  - PUBS12 at a depth of 0 to 0.5 feet bgs (86 µg/kg)

- Aroclor 1260 was detected above the Ecological RBSL of 77 µg/kg in four samples:
  - PUBS08 at a depth of 0 to 0.5 feet bgs (180 µg/kg)
  - PUTS04 at a depth of 0.5 to 1 foot bgs (120 µg/kg)
  - PUBS07 at depths of 0 to 0.5 feet bgs (97 J µg/kg)
  - PUBS1042 at a depth of 0 to 1 foot bgs (95 µg/kg)

At PUBX1000, the composite sample was reported with Ecological RBSL exceedances of Aroclor 1248 and Aroclor 1254. The four individual samples were then analyzed to further delineate exceedances. All four of the individual samples were either nondetects or were below their respective PCB RBSLs. Sample locations with PCBs exceeding RBSLs are sufficiently delineated by step-out locations, with sample results below RBSLs. Based on risk assessment findings (Section I.4), aroclor 1248 and aroclor 1260 were found to be chemical risk drivers. Areas with elevated aroclor 1248 (17th Street Drainage) and Aroclor 1260 (17th Street Drainage and building 4006 area) will be address during the site corrective measure study.

I.3.4.2.5 Metals/Inorganic Compounds

A total of 178 soil samples was collected at 130 locations and analyzed for metals. At least one or more metals were detected in nearly all sampling locations, and results are shown in Figures I.3-5, I.3-10A, and I.3-10B.

- Aluminum, antimony, barium, boron, cadmium, copper, lead, mercury, nickel, selenium, silver, vanadium, and zinc concentrations were detected above their respective background concentrations, Ecological RBSLs, and/or Residential RBSLs.
  - Aluminum (background of 20,000 mg/kg, Ecological RBSL of 12 mg/kg) was detected at concentrations ranging from 5,500 mg/kg to 43,000 mg/kg. Aluminum was detected above background and Ecological RBSLs in six samples:
    - PUBS1019 at a depth of 0 to 1 foot bgs (43,000 mg/kg)
    - PUBS1413 at a depth of 0 to 1 feet bgs (38,850 mg/kg)
    - PUBS1052 at a depth of 5 to 6 feet bgs (25,000 mg/kg)
    - PUBS1011 at a depth of 5 to 6 feet bgs (22,400 J mg/kg)
    - PUBS1006 at a depth of 5 to 6 feet bgs (21,000 J mg/kg)
    - PUBS1401 at a depth of 5 to 6 feet bgs (21,000 mg/kg)
  - Antimony (background of 8.7 mg/kg, Ecological RBSL of 0.17 mg/kg) was detected at concentrations ranging from 0.49 J mg/kg to 11 mg/kg. Antimony was detected above background and Ecological RBSLs in three samples:
    - PUBS08 at a depth of 0 to 0.5 feet bgs (11 mg/kg)
    - PUBS09 at a depth of 0 to 0.5 feet bgs (11 mg/kg)
    - PUBS12 at a depth 0 to 0.5 feet bgs (9.3 mg/kg)
  - Barium (background of 140 mg/kg, Ecological RBSL of 15 mg/kg) was detected at concentrations ranging from 46 mg/kg to 710 mg/kg. Barium was detected above background and Ecological RBSLs in 12 samples. Detection results are shown in Figures I.3-9A and I.3-9B.
  - Boron (background of 9.7 mg/kg, Ecological RBSL 6.76 mg/kg) was detected at concentrations ranging from 0.855 J mg/kg to 14.3 mg/kg. Boron was detected above background and Ecological RBSLs in one sample from PUBS1044 at a depth of 0 to 1 foot bgs (14.3 mg/kg).
  - Cadmium (background of 1.0 mg/kg, Ecological RBSL of 0.0045 mg/kg) was detected at concentrations ranging from 0.035 J mg/kg to 14.7 mg/kg. Cadmium was detected above background and Ecological RBSLs in 19 samples. Detection results are shown in Figures I.3-9A and I.3-9B.
  - Copper (background of 29 mg/kg, Ecological RBSL of 1.1 mg/kg) was detected at concentrations ranging from 4.55 J mg/kg to 60 mg/kg. Copper was detected above background and Ecological RBSLs in five samples:
    - PUBS08 at a depth of 0 to 0.5 feet bgs (60 mg/kg)
    - PUBS10 at a depth of 0 to 0.5 feet bgs (58 mg/kg)
    - PUBS1044 at a depth of 0 to 1 foot bgs (56.1 mg/kg)
    - PUBS07 at a depth of 0 to 0.5 feet bgs (34 mg/kg)

- PUBS1042 at a depth of 0 to 1 foot bgs (33.5 mg/kg)

– Lead (background of 34 mg/kg, Residential RBSL of 150 mg/kg, Ecological RBSL of 0.013 mg/kg) was detected at concentrations ranging from 1.9 mg/kg to 394 mg/kg. Lead was detected above background, Residential, and/or Ecological RBSLs in eight samples:

  - PUBS1066 at a depth of 0 to 1 foot bgs (394 mg/kg)
  - PUBS1044 at a depth of 0 to 1 foot bgs (97.4 mg/kg)
  - PUBS08 at a depth of 0 to 0.5 feet bgs (79 mg/kg)
  - PUBS1045 at a depth of 0 to 1 foot bgs (53.1 mg/kg)
  - PUBS07 at a depth of 0 to 0.5 feet bgs (52 mg/kg)
  - PUBS10 at a depth of 0 to 0.5 feet bgs (47 mg/kg)
  - PUBS1042 at a depth of 0 to 1 foot bgs (38 mg/kg)
  - PUBS1009 at a depth of 0 to 1 foot bgs (35.7 J mg/kg)

– Mercury (background of 0.09 mg/kg, Ecological RBSL of 0.1 mg/kg) was detected at concentrations ranging from 0.002 J mg/kg to 1.6 J mg/kg. Mercury was detected above background and Ecological RBSLs in 13 samples. Detection results are shown in Figures I.3-9A and I.3-9B.

– Nickel (background of 29 mg/kg, Ecological RBSL of 0.1 mg/kg) was detected at concentrations ranging from 4.3 mg/kg to 120 mg/kg. Nickel was detected above background and Ecological RBSLs in four samples:

  - PUBS1044 at a depth of 0 to 1 foot bgs (140 mg/kg)
  - PUBS08 at a depth of 0 to 0.5 feet bgs (72 mg/kg)
  - PUBS07 at a depth of 0 to 0.5 feet bgs (54 mg/kg)
  - PUBS10 at a depth of 0 to 0.5 feet bgs (37 mg/kg)

– Selenium (background of 0.655 mg/kg, Ecological RBSL of 0.17 mg/kg) was detected at concentrations ranging from 0.225 J mg/kg to 1.4 mg/kg. Selenium was detected above background and Ecological RBSLs in 18 samples. Detection results are shown in Figures I.3-9A and I.3-9B.

– Silver (background SL of 0.79 mg/kg, Ecological RBSL of 0.54 mg/kg) was detected at concentrations ranging from 0.021 J mg/kg to 29 mg/kg. Silver was detected above background and Ecological RBSLs in 25 samples. Detection results are shown in Figures I.3-9A and I.3-9B.

– Vanadium (background of 62 mg/kg, Ecological RBSL of 1.5 mg/kg) was detected at concentrations ranging from 14 mg/kg to 79 mg/kg. Vanadium was detected above background and Residential and/or Ecological RBSLs in three samples:

  - PUBS1011 at a depth of 5 to 6 feet bgs (79 mg/kg)
  - PUBS1019 at a depth of 0 to 1 foot bgs (75 mg/kg)
  - PUBS1044 at a depth of 0 to 1 foot bgs (63.3 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 of 110 mg/kg, Ecological RBSL of 21 mg/kg) was detected at concentrations ranging from 33.4 mg/kg to 1,860 mg/kg. Zinc was detected above background and Ecological RBSLs in 21 samples. Detection results are shown in Figures I.3-9A and I.3-9B.

- Metals detected above background (but below their respective RBSLs) include beryllium, chromium, lithium, sodium, and thallium. Background concentrations for metals are included in Table G.3-3A. Sodium was detected at concentrations ranging from 28 J mg/kg to 1200 mg/kg. RBSLs for sodium have not been established.
- Perchlorate was not found to have been previously used at the PDU Site and was not included for analysis at any sampling locations.
- Fluoride was detected at concentrations ranging from 0.3 mg/kg to 12 mg/kg, but did not exceed its RBSLs. Fluoride was detected above background concentrations in two samples collected—one sample from PUBS1055 at a depth of 5 to 6 feet bgs (12 mg/kg) and one from PUBS1050 at a depth of 0 to 1 foot bgs (6.8 mg/kg).

Based on risk assessment findings (Section I.4), cadmium, silver and zinc were determined to be a chemical risk drivers. Additional characterization for cadmium, silver and zinc may be required at the former PDU area and the 17th Street Drainage as part of the site corrective measure study. Additional characterization of cadmium and zinc may be required near the building 4006 area..

I.3.4.2.6 Dioxins

A total of six soil samples was collected at three locations and analyzed for dioxins. Of the six samples, four had detectable levels of dioxins and/or furans at concentrations for which the Dioxin-Furan TEQ values did not exceed the SSFL background concentrations and the RBSLs. Results are presented in Figures N.3-6 and N.3-10. Background concentrations for dioxins are included in Table N.3-3A.

All six samples had detectable levels of dioxins. Results are presented in Figures I.3-7 and I.3-11.

The source of dioxins detected in the dioxin screening areas situated in the 17th Street Drainage area is not known. A possible source of the dioxins observed in these soil samples is ash deposited onsite during regional wildfires at and near SSFL (Boeing, 2005, 2006, 2007a). The ash deposited at SSFL may also have been transported to the 17th Street drainage area via storm water flow.

Additional characterization of dioxins in soil might be required in the vicinity of the 17th Street Drainage area as part of the site corrective measure study.

I.3.4.2.7 Energetics

A total of 40 soil samples was collected at 24 locations and analyzed for energetics. None of the samples had detectable levels of energetics.

No further characterization for energetics in soil is recommended for the PDU Site.

I.3.5 Groundwater Findings

Groundwater occurrence and impacts at the PDU Site are described below.

I.3.5.1 Groundwater Data Presentation

Groundwater sampling results and characterization findings are summarized in Tables I.3-2B and Appendix B. The purposes of Table I.3-2B are to:

- Summarize soil impacts as they potentially relate to groundwater impacts.
- Summarize groundwater sampling results.
- Demonstrate that groundwater characterization is sufficient for the purposes of risk assessment, including:
  - That groundwater characterization is adequate for detected site-related chemical constituents
  - That site soil characterization is adequate for detected groundwater chemical constituents.

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

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

A detailed compilation of groundwater data is provided in Appendix B of the Group 5 RFI Report. The groundwater appendix contains a description of hydrogeologic conditions (such as occurrence, water levels, recharge, and yield), groundwater quality, and transport and fate. These data include the following:

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

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

I.3.5.2 Groundwater Data Summary

At the PDU Site, six piezometers (PZ-041, PZ-051, PZ-052, PZ-107, PZ-108, and PZ-122) and four shallow wells (ES-31, RS-11, RS-15, and RS-27) were installed to characterize groundwater conditions in alluvium and weathered bedrock (that is, in NSGW), while one well (RD-29) was installed to characterize groundwater conditions in the unweathered bedrock (that is, in CFOU groundwater). Groundwater findings from these wells are presented in Tables I.3-2B of this appendix and in Appendix B of the Group 5 RFI Report. CFOU Groundwater will be evaluated further in Appendix B and the CFOU RFI Report.

I.3.5.2.1 NSGW Data Summary

As described in Appendix B of the Group 5 RFI Report, samples from shallow wells installed in the NSGW have been analyzed for VOCs, SVOCs, hydrocarbons, metals, inorganics, and energetics.

- The following VOCs were detected in groundwater samples collected from the NSGW. None of the concentrations for these compounds exceeded their respective screening levels.

1,1,1-trichloroethane	1,1,2-trichloro-1,2,2-trifluoroethane
1,2,4-trimethylbenzene	1,2-dichlorobenzene;
1,2-dichloroethene	1,3,5-trimethylbenzene
1,4-dichlorobenzene	2,2-dichloro-1,1,1-trifluoroethane
acetone	carbon disulfide
chloromethane	methyl ethyl ketone
methylene chloride	PCE
toluene	trans-1,2-dichloroethene

- The following VOCs were detected in groundwater samples collected from the NSGW at concentrations that exceeded their respective groundwater screening levels.
  - 1,1-dichloroethene (groundwater screening level of 6 µg/L) was detected in samples collected from ES-31 (6.3 µg/L) and RS-15 (7.25 µg/L – 23 µg/L) installed in the NSGW.
  - Benzene (groundwater screening level of 1 µg/L) was detected at a concentration of 6 µg/L in well RS-15.
  - Cis-1,2-DCE (groundwater screening level of 6 µg/L) was detected at a concentration of 10 µg/L in a sample from well PZ-108,
  - TCE (groundwater screening level of 5 µg/L) was detected at concentrations ranging from 0.2 µg/L to 1,400 µg/L in samples collected from PZ-051, PZ-052, PZ-108, and RS-15.
- Benzo(k)fluoranthene and 2-n-butoxyethanol concentrations were detected but did not exceed their respective groundwater screening levels.
- TPH was not detected in samples collected from wells installed.

- Dissolved metals (magnesium, sodium, and strontium) were all detected below screening levels, except the following metals.
  - Boron (groundwater screening levels of 340 µg/L) was detected in samples from RS-11 (500 µg/L) and from RS-15 (480 µg/L).
  - Potassium (groundwater screening levels of 9,600 µg/L) was detected in RS-11 (12,000 µg/L) and in RS-15 (15,000 µg/L).
- Inorganics – Chloride (groundwater screening levels of 250,000 µg/L) was detected at a concentration of 254, 000 µg/L in a sample from well RS-15.
- Energetics concentrations were not detected in samples collected from wells installed in the NSGW.

NSGW exceedances of 1,1-DCE, cis 1,2-DCE, TCE and several metals above their respective groundwater screening levels might require additional monitoring at the PDU Site. These exceedances within the PDU Site may be related to site activities. These VOCs in NSGW within the PDU Site should be considered during the site-wide groundwater Corrective Measure Study.

I.3.5.2.2 CFOU Data Summary

As described in Appendix B of the Group 5 RFI Report, samples from RD-29 have been analyzed for VOCs, SVOCs, hydrocarbons, metals, inorganics, and energetics.

- VOCs (acetone, carbon disulfide, toluene, trans-1,2-dichloroethene, and TCE) were detected but did not exceed their respective groundwater screening levels.
- SVOC concentrations were not detected in samples collected from wells installed in the CFOU.
- TPH was not detected in samples collected from wells installed in the CFOU.
- Dissolved metals (boron, magnesium, manganese, potassium, sodium, strontium, and zinc) were all detected below groundwater screening levels.
- Inorganics – Concentrations detected did not exceed respective RBSLs in samples collected from wells installed in the CFOU.
- Energetics were not detected in samples collected from wells installed in the CFOU.

I.3.6 The constituents described above, although detected in NSGW samples collected at the PDU site, the concentrations did not exceed their respective groundwater screening levels .Surface Water Findings

Surface water exists intermittently at the PDU Site primarily as the result of seasonal precipitation events. RFI and NPDES surface water sampling was conducted at the site as described in Table I.3-1C. For the RFI, two surface water samples were collected and the samples were analyzed for inorganics (perchlorate). Data quality and risk assessment evaluation summaries for surface water sampling are provided in Table I.3-3C.

Soil within the !7th Street Drainage portion of the PDU Site could have been impacted by upgradient sites via surface water transport. Portions of the HMSA site and DOE LF1 are upgradient from the PDU Site. However, there are no defined surface water pathways leading from these sites to the PDU Site, so it is not likely that the upgradient sites have impacted PDU Site soil. Near surface soil within the 17th Street Drainage has been impacted by metals, SVOCs, PCBs, and dioxins. The exact source of these exceedances is not known, but similar constituents have been detected at the suspect dredge area within the adjacent Compound A Facility RFI Site. It is possible that these contaminants are transported downgradient towards the drainage south of Compound A Facility Site, and ultimately to the R-2 Ponds.

I.4 Summary of Risk Assessment Findings

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

The following sections summarize the findings of the HRA and ERA performed for the PDU Site. Details regarding how the HRA and ERA were conducted are presented in the SRAM (MWH, 2005) and in Appendix A in the Group 5 RFI Report. Details regarding the site-specific HRA and ERA are presented in Appendix A, Attachment A6, in the Group 5 RFI Report.

I.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 A6, in 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:

1. Both direct (drinking water) and indirect (soil vapor) exposures to groundwater COPCs were evaluated in the risk assessment (Appendix A of the Group 5 RFI Report).
2. 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 PDU 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.
3. Large home-range receptors were assumed to live only in source areas within the PDU 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 sitewide summary large home-range receptor risk assessment report.

I.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 PDU Site. A conceptual site model diagram for human health risk assessment is presented in Figure I.4-1. A summary of COPCs and risk estimates for human health are presented in Table I.4-1 and Table I.4-2, respectively. Results of the risk characterization indicated the following:

- Soil – Benzo(a)pyrene, indeno(1,2,3-cd)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dioxin/furan TEQ, and benzo(a)anthracene were identified as COCs for direct contact with soil by future residents. No COCs were identified for plant consumption by future residents. Benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(b)fluoranthene were identified as COCs for direct contact with soil by future recreators.
- Soil Vapor – Tetrachlorothene was identified as a COC for inhalation of indoor air by future residents. No COCs were identified as COCs for inhalation of ambient air by future residents or future recreators.
- Near-surface Groundwater – Antimony was identified as a COCs for domestic use of shallow groundwater by future residents.
- Chatsworth Groundwater – COCs will be identified and addressed as part of the Chatsworth Formation OU.

The uncertainties associated with the Group 5 RFI Sites in general were discussed in Appendix A of the Group 5 RFI Report. Uncertainties specific to the PDU Site are summarized in Table I.4-3.

I.4.3 Summary of 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 I.4-2, and a summary of risk estimate and chemicals of ecological concern (COECs) are presented in Table I.4-4. Results of the risk characterization indicated the following:

- Soil – Retained as COECs were the following:

cadmium	silver
zinc	Aroclor 1248
Aroclor 1260	benzo(a)anthracene
benzo(a)pyrene	benzo(b)fluoranthene
benzo(ghi)perylene	benzo(k)fluoranthene
chrysene	dioxinFuranPCB_TEQs (birds and mammals)
indeno(1,2,3-cd)pyrene	phenanthrene
pyrene	

Not retained as COECs were 2,4-dinitrophenol and hexachlorobenzene. The aroclors, dioxin/furans, and PAHs were retained generally as chemical classes. Estimated risks were in the low range for aroclors and PAHs and in the medium range for dioxin/furans.

- Soil Vapor – No COECs. No chemicals exceeded soil vapor TRVs.
- Surface Water – No COECs. No chemicals exceeded surface water TRVs.

The ecological risk assessment uncertainties associated with the Group 5 RFI Sites in general are discussed in Appendix A of the Group 5 RFI Report. Additional uncertainties specific to the PDU Site are listed in Table I.4-6.

I.4.4 PDU Site Risk Assessment Conclusions

This section presents the overall conclusions for the PDU Site according to this RA. The risk assessment 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 PDU Site consists of Building 4006 area (sodium laboratory), PDU Area (several areas including PDU and photo lab), 17th Street Drainage area (impacts from upstream process areas), PDU Bag House.

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 VOCs, SVOCs, TPH, metals/inorganics, PCBs, dioxins, and energetics. Data were considered adequate to evaluate potential risks. Benzo(a)pyrene, indeno(1,2,3-cd)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dioxin/furan TEQ, and benzo(a)anthracene were identified as COCs for direct contact with soil by future residents. Benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(b)fluoranthene were identified as COCs for direct contact with soil by future recreators. Tetrachlorothene was identified as a COC in soil vapor for inhalation of indoor air by future residents. Cadmium, silver, zinc, Aroclor 1248, Aroclor 1260, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, DioxinFuranPCB_TEQs (birds and mammals), indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene were identified as COECs in soil. No COECs were identified in soil vapor during ERA.

Surface water samples were collected and analyzed for inorganics (perchlorate). No COECs were identified in surface water during ERA.

NSGW samples were collected and analyzed for VOCs, SVOCs, hydrocarbons, metals, inorganics, and energetics. Antimony was identified as a COCs for domestic use of shallow groundwater by future residents. Chatsworth groundwater will be addressed as part of the CFOU.

The locations within the PDU Site that will require further action to address human health or ecological risk or both include Building 4006 Area, the PDU (and other areas, including Buildings 4005, 4705, 4042, and 4742), the 17th Street Drainage Area, and the former Bag House.

I.5 PDU Site Action Recommendations

This section presents a summary of RFI reporting requirements as applicable to the PDU Site. Section I.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 I.5.2. Site action recommendations for the PDU Site are summarized in Sections I.5.3 and I.5.4.

I.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 PDU 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 I.3-2A and I.3-2B). Section I.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 PDU Site (Section I.4 and Appendix A).
4. Identifying PDU Site areas requiring further work (this section).

I.5.2 Basis for Site Action Recommendations

In summary, site action recommendations included in the PDU 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.

I.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 F.5-1. CMS Areas are also depicted graphically in Figure I.5-1 to illustrate locations and approximate areal extents, and summarized in Table I.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.

I.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).

I.5.3 CMS Site Action Recommendations

As presented in Section I.4, the maximum cumulative human health risk for the PDU Site is 8×10^{-5} under a hypothetical future residential exposure scenario and 3×10^{-5} under a hypothetical future recreational exposure scenario. The maximum hazard indices under the hypothetical residential and recreational exposure scenarios are 7 and <0.01, respectively. The potential human health risks at the PDU 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 (non-cancer risks). Consequently, a CMS is recommended. As shown in Table I.5-1, the primary contributors to the human health risk are:

- TCE in soil vapor.
- Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, Dioxin/Furan TEQ, indeno(1,2,3-cd)pyrene in soil.
- Arsenic in NSGW.

As presented in Section F.4 for the ecological risk assessment, cadmium, silver, zinc, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, DioxinFuranPCB_TEQ_Bird, DioxinFuranPCB_TEQ_Mammal, indeno(123-cd)pyrene, phenanthrene and pyrene were

retained as COEC Hazard quotients up to 58 were calculated in the ERA. Because these hazard quotient values exceed 1, a CMS is recommended to address ecological risks.

Based on these findings, portions of the PDU Site are recommended for CMS. The following four CMS areas were identified to address the human health and ecological risks for the PDU Site:

- **PDU-1**: Building 4006 area. The chemical risk drivers are metals (cadmium and silver) and PCBs (Aroclor 1260).
- **PDU-2**: Former PDU area and the area including Buildings 4005, 4705, 4042, and 4742. The chemical risk drivers are petroleum hydrocarbons and metals (cadmium, silver, and zinc) in soil.
- **PDU-3**: 17th Street Drainage Area. The chemical risk drivers are SVOCs, metals (cadmium, silver, and zinc), PCBs (Aroclor 1248 and Aroclor 1260), and dioxins in soil.
- **PDU-4**: Former Bag House. The chemical risk drivers are VOCs in soil vapor.

Site action recommendations are tabulated by Chemical Use Area, and chemical risk drivers/contributors are identified for each appropriate receptor in Table I.5-1. CMS Areas are also depicted graphically in Figure I.5-1 to illustrate locations and approximate areal extents, and summarized in Table I.5-2. As noted in Section 7.2 of the Group 5 RFI Report, recommendations reported in this document will be reviewed upon completion of the sitewide groundwater report and large home-range receptor evaluations, and updates to this report will be prepared as needed.

I.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 PDU Site except the four 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 PDU Site will be reevaluated, and if appropriate revised, in the future after the existing structures are demolished. The portion of the PDU Site that includes former Buildings 4027, 4032, 4402, and 4616, the Coal Storage Yard (4501 Parking), Buildings 4005 and 4006 Leach Fields, catchment basin, the former tank areas, and transformers 4702 and 4706 are recommended for No Further Action, as shown in Figure I.5-1. This recommendation is made based on several factors, including site processes identified during the historical document review, history of releases, and an evaluation of the data collected at the site, previously and during this RFI.

As part of the planned demolition of existing 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 PDU Site will be re-evaluated based on the data collected following building demolition.

I.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 PDU 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 PDU Site were investigated and the findings presented and considered herein.

Historical documents indicate that the area was used to support reactor testing operations, including testing of various coolant reactors, fabricating uranium fuels, vibration and shock testing of reactors, space environment testing of SNAP reactors, reactor shield fabrication, and the Molten Salt Test Facility. Buildings 4027, 4032, and various other support buildings related to operations at PDU Site were demolished between 1996 and 2003. The Buildings 4005 and 4006 Leach Field, drain lines, and underground tanks were removed between 2000 and 2001.

The area recommended for NFA at the PDU Site includes all portions of the site that are not recommended for CMS (Figure I.5-1), including the following Chemical Use Areas described below.

Building 4027 was used as a vibration and shock test facility in support of the SNAP program launch schedule and later as a non-radiological hazardous waste storage facility equipped with secondary containment. Waste was collected from different satellite accumulation areas, such as the machine shop maintenance areas, and included lab packs, waste oil, contaminated waste solids, debris, batteries, paint waste, wastewater, flammable waste, caustics, and corrosives. Building 4027 was also used as a former weld shop.

Building 4032 was used as a space environmental test facility for a thermal vacuum system and for mock-ups using a radiological source to determine the positioning of nonradioactive rods for use in developing the fuel rod control system. After support work for SNAP test ceased, Building 4032 was used as a sodium component and instrumentation test facility. Building 4032 was used as a Sodium Pump Test Facility from the 1970s to 1984, and was demolished in 2003.

Building 4402 was used for sodium testing and solvent storage, and was demolished. Building 4616 was a cooling tower for Building 4006. The Coal Storage Yard (4501 Parking) was used to store coal for the PDU Site. The Bag House and Catchment Basin were part of the Molten Salt Facility, and have been removed.

The Buildings 4005 and 4006 Leach Fields received sanitary wastes from various laboratories and work areas in Buildings 4005 and 4006. The drain lines and tanks were removed in 2001 at the same time the septic tanks were removed, and sampling of soil under the drain lines, leach fields, and septic tanks did not detect any contamination.

Sampling near transformers 4702 and 4706 indicates that there have been no releases of PCBs.

Historical documents indicate that a hydraulic oil spill was reported at Building 4027 in 1992. Two spills are documented at Building 4032. A malfunctioning cooling tower in Building 4032 was the source of the first spill, which consisted of a rusty-colored iron solution that poured out to the underpass at G Street and 17th Street. Chemical analysis showed that the solution contained 0.02 mg/L of iron and 181 mg/L of chloride. The second spill consisted of 2 gallons of oil released when a contractor struck a forklift with a roll-off bin. No other spills are documented.

Three debris locations (2003, 3007, and 3009) were identified during the Group 5 debris survey. These debris piles were screened for chemicals of potential concern (COPCs). None of the COPC concentrations exceeded RBSLs except two metals (zinc and selenium) at debris location 2003.

I.5.4.2 Sampling and Analysis Results

As presented in Section I.3, several soil and soil vapor samples were collected in the areas recommended for NFA designation. Soil and soil vapor samples were collected and analyzed for VOCs. Soil samples were collected and analyzed for SVOCs, petroleum hydrocarbons, metals, inorganics, PCBs, dioxins, and energetics. Although several compounds were detected above background concentrations (metals) and Ecological RBSLs, the exceedances appear to be isolated in nature, and not indicative of a release. These areas are not recommended for further consideration in a CMS based on the risk assessment results.

I.5.4.3 Risk Assessment

Finally, as presented in Section I.4, the potential human health risks at the PDU 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 (non-cancer risks). The entire RFI site exceeds acceptable risk based primarily on metals in soil, as well as on SVOCs, PCBs, and dioxins detected in soil samples from the 17th Street Drainage area, PCBs detected in soil near Building 4185, and VOCs in soil vapor near the Bag House. These areas are recommended for CMS, as discussed in Section I.53. However, based on the screening sample results collected throughout the rest of the PDU Site area (former Buildings 4027, 4032, 4402, and 4616, the Coal Storage Yard [4501 Parking], Buildings 4005 and 4006 Leach Fields, Catchment Basin, the former tanks areas, and transformers 4702 and 4706) is not contributing to the overall site risk. As such, the NFA site areas do not pose a threat to future receptors.

I.5.5 Source Area Stabilization Site Action Recommendations

Based on detection of PCBs, dioxins, and metals in near surface soil within the 17th Street Drainage (CMS Area PDU-3), source stabilization should be considered to prevent migration of these contaminants downgradient via surface water transport. There are currently a series of waddles and berms within the drainage, and therefore, the 17th Street Drainage CMS area does not require additional stabilization measures at this time. The CMS areas PDU-1, PDU-2, and PDU-4 include near-surface dectections of VOCs, metals, and PCBs. These CMS areas are located near the surface water divide and mobilization of these constituents via surface water flow is unlikely. None of these CMS areas require stabilization measures at this time.

I.6 References – In Progress

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Tables

Table I.2-1
Building Inventory
PDU RFI Site

Building Number	Start (Year)	End (Year)	Process/Chemical Use	Chemical Use Area Number	Comments	Reference
4005	1958	1986	Building 4005 is located in the north-central portion of Area IV. It was built for non-nuclear testing thermodynamic characteristics of proposed coolants for organic moderated reactor experiment and Piqua reactors. During the mid-1960s, the facility was converted for fabrication of enriched uranium carbide fuel for Heavy Water Organic Cooled Reactor. During a nine month period in 1966-1967, the facility operated using depleted uranium and later enriched uranium. In 1967, the equipment was removed and surfaces were decontaminated to permit non-radiological use of the building. From 1972 to 1986, the building was used as a pilot plant for molten salt combustion (Molten Salt Test Facility). The pilot plant consists of water tanks, hoppers, a water treatment system, boilers, bag houses, and an oven. During the late 1970s, decontamination efforts involved removal of underground radioactive liquid holdup tanks outside the building. The drain lines from the buildings were capped and left in place, but were removed during another decontamination effort in 1987. Completion of removal of contaminated systems was completed in 1993. Building 4005 was a tilt-up concrete structure with Butler aluminum siding and several windows. The structure was 80 feet long (running north to south), and 60 feet wide. Building 4005 was divided into several portions, including a small administration area, change rooms, chemistry laboratories, storage rooms and a large high-bay area. Several concrete pads, which held various equipment from the Molten Salt Oxidation project and the radioactive filter plenums, were located to the east of the building. The building was connected to a holding tank by drain lines. A fire in 1967 allowed release of contaminated smoke to the building, but no release outside the building was thought to have occurred. Six spills have been reported at the facility. Spilled materials included molten salt in carbonate or slurry form, water-tar solutions, and coal ash in solution with sodium bicarbonate. Reported released quantities ranged up to 250 gallons. All releases were to the R-2 Ponds. In 1991 contaminated oil dripped from a radioactive exhaust duct and all contamination was successfully cleaned up. In 1991, the PDU was demolished and the site was	1	Polyphenols and other polymer products were used in the testing of Organic Moderated Reactors. Personnel revealed several long existing hazards involving flammable, toxic and radioactive material which were improperly labeled, outdated, leaking, etc. 24 boxes of materials were removed and disposed of in 1966. NOx/SOx were generated at the Molten Salt Test Facility. Benzene was produced by the coal gasification process. Between 1977 and 1981 sodium carbonate was used to destroy chlorinated waste. May 7, 1981 unknown quantity of molten salt carbonate was spilled at the PDU due to gasket and equipment failure. The liquid went into storm channels which drain into R2A Pond. Chromium was detected in the clean salt bin in 1993. During a week-long demonstration (May 1981) of the molten carbonate coal gasification process, there was a large discharge of black effluent from the PDU onto G and 17th Streets. The discharge was clear at the R2A Pond on May 8-9. On May 10 a leak in the water main couldn't be stopped and a flow of ~75 gpm facilitated the flow of the effluent towards the R2A Pond. On May 11th the flow down G and 17th St. was dark and accompanied ay a sulfide odor. It was suspected that wastes from the PDU operations entered floor drains and discharged with other wastes to the culvert at 17th and G St. In the evening of May 11, the drain from R2B failed, allowing the PDU discharge to enter the R2A Pond.	ICF, 1993; Ogden, 1996; Sapere, 2005; Rockwell International, 1990; Unknown, 1992; Atomics International, 1975; Boeing, 2000; Unknown, 1989a, Unknown, 1981.
4006	Unknown	1999	Building 4006 was a non-nuclear sodium laboratory and was constructed with a steel frame and steel walls and measures 13,284 square feet, including 2,268 square feet of office space and 7,674 square feet of lab space. The building had an associated cooling tower that was removed in the early 1980s in order to make room for a Power Pak associated substation. In 1974 tritiated titanium foils as gas chromatograph detectors were permitted. The foils were declared excess in 1986 and removed from the building.	2	Sodium fire on 11/25/87 resulted in a sodium metal release. The fire smoldered for 25 hours and a caustic smoke cloud was released but didn't leave the SSFL boundary. Mercury spill on 1/21/92 in sink. Tetralin fire on 8/16/59.	Sapere, 2005; Rockwell International, 1987a.
4027	1961	2003 (demolished)	Used as a vibration and shock test facility in support of the SNAP program launch schedule. Following the end of the support work for the SNAP test, 4027 was used as a non-radiological hazardous waste storage facility. The storage facility had a secondary containment and the waste was collected from different satellite accumulation areas. Also known as "The Yard." Waste from machine shop maintenance which included, lab packs, waste oil, contaminated waste solids, debris, batteries, paint waste, wastewater, flammable waste, caustics and corrosives. Also a former weld shop.	4	On May 6, 1992 a 30 gallon hydraulic fluid spill occurred in Building 4027.	Sapere, 2005; California EPA, 2002; Atomics International, 1963; Rockwell International, 1992; Lee, 1998.
4032	1962 (Constructed)	1984	Used as a space environmental test facility for a thermal vacuum system and for mock-ups using a radiological source to determine the positioning of non-radioactive rods for use in developing the fuel rod control system. After support work for SNAP test ceased, Building 4032 was used as a sodium component and instrumentation test facility. Building 4032 was used as a Sodium Pump Test Facility from the 1970s to 1984. The building was demolished in 2003.	5	About 50 gallons of rusty colored iron solution was observed to be pouring out of the G and 17th Street underpass on October 21, 1988. The apparent source was some malfunctioning cooling towers at 4032. A contractor struck a company forklift with roll off and spilled 0.2 gallons of kerosene.	Sapere, 2005; Rockwell International, 1985; Rockwell International, 1988; Unknown, 2007.
4036	1962	1999	Engineering Office for SNAP Operations; joined to Building 4037. Abatement for asbestos, Freon (in air conditioners), and PCB ballasts was performed during building demolition in 1999.	N/A	No chemical uses based on available information on operations at this building.	Boeing, 1999a; Boeing, 1999b.
4037	1962	1999	Engineering Office for SNAP operations. Housed a clarifier and used for chemical storage and processing. Contained 5 concrete sumps (20 to 50 gallons in capacity) that contained waste oils. Processing tanks contained chromated solutions prior to June 1992. Storage of drums containing TCA and 1,4-dioxane. Also contained a Freon storage tank. Spills occurred on May 18, 1981 (Freon), August 3, 1987 (20-30 gallons of hydraulic oil), February 17, 1988 (diesel), March 15, 1988 (diesel), May 12, 1988 (battery acid at transfer station), August 29, 1988 (diesel), July 2, 1989 (2-3 gallons of machine coolant on the roadway east of Building 4037), January 12, 1990 (TCE), and July 1, 1992 (CFC-113). A plastic tank failed in the Chemical Processing Area on March 5, 1990. Tank contents consisted of a mild alkaline solution.	25		Rockwell International, 1992a; Rockwell International, 1993a; Rockwell International, 1990a; Rockwell International 1992b; Rockwell International 1989b; Unknown, 2007; Rockwell International 1981; Unknown, 1980.
4042	1963	2003 (demolished)	Lithium hybrid shield fabrication (LMFBR) Development Building. Used as a general test and lithium hybrid shield fabrication building in support of the SNAP program. The facility was also used for sodium-aerosol and related technology tests. After support work for SNAP tests ceased, Building 4042 was used for liquid metal technology work. The water-vapor nitrogen process converted metallic sodium to sodium hydroxide from pipes that came from Building 4026.	6		Sapere, 2005; Boeing, 1998.
4048	1978	1981	Served as the instrumentation building for the PDU facility. Building 4048 was a small structure located southeast of Building 005. Building 4048 was demolished in the mid-1990s.	7		Sapere, 2005; Rockwell International, 1976.

Table I.2-1
Building Inventory
PDU RFI Site

Building Number	Start (Year)	End (Year)	Process/Chemical Use	Chemical Use Area Number	Comments	Reference
4049	1959	1999 (demolished)	PDU Control Center/Hydraulic Testing. Building 4049 was an 800-square-foot structure with concrete walls, a concrete slab floor , and a concrete foundation. The roof was tar and gravel and supported steel trusses. Building 49 was used a control center in the 1950s and 1960s to support the SNAP program. Beginning in 1960, it was used as a hydraulic test facility control center. The outside test stand was used for tests with terphenyl organics and finned sintered-aluminum-product cladding materials, sodium-water reaction tests and a variety of sodium and NaK hydraulic tests. From 1968 to 1977, Building 4049 was used as a control center for Piqua Test Loops. In 1977, it was designated as a control and test center for the PDU coal gasification process. By 1988, Building 4049 was inactive. It was demolished in 1999. In 1960, a pipe containing High Boiler Residue (HBR) was opened. Activated corrosion product (AP) contamination levels were recorded at 500 dpm/100cm2	7	Also referred to as the Na Tank Building. Large sodium drain tanks was removed from Building 4049 for processing and cleaning. Water Vapor Nitrogen processing of metallic sodium. Baker tank had approximately 4100 gallons of caustic requiring disposition. Another use of the building was maintenance associated with the TO55 programs.	Sapere, 2005; Boeing, 1997a; Boeing, 1997b; Boeing, 1997c; Rockwell International, 1987b; Rockwell International, 1976.
4185	1950	1970 (demolished)	This facility served as the Steam Generator control building for SRE area. Building 4185 was a small (less than 1,000 square feet) structure located northeast of Building 1443. On the 1983 Industrial Planning Map, a structure south of Building 4005, is referred to as Building 4185, but all other records indicate Building 4185 was located in the SRE complex. DOE released the facility and surrounding soil for unrestricted use as a part of the SRE release in September 1985.	7		Sapere, 2005; Rockwell International, 1976.
4293	Approximately 1971	Approximately 1977	Although designated a s a construction facility, Building 4293 served as a time clock station.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4310	early 1960s	approximately 1973	Building 4310 was a small, portable structure. Near the Large Component Test Loop facility from 1971 through 1973.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4354	1957	middle 1980s (demolished)	Building 4354 was a non-radiological facility used to test the mechanical systems by which control rods were moved in support of the Fast Breeder Reactor. The building was demolished in the middle 1980s. The building was an 800-square-foot structure constructed with a steel roof, frame and siding.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4402	prior to 1967	Unknown	Building 4402 was a non-radiological facility. Used for sodium testing and solvent storage. The building has been demolished. Included a solvent fume hood and solvent rack.	11		Sapere, 2005.
4477	Unknown	Unknown	Unknown	N/A	Not listed in H.S.A and not in building list obtained from SSFL	Sapere, 2005.
4606	1960s	Unknown	Building 4606 was used to test the capacity of they Hydrogen Recombiner, a device to mix hydrogen and air to create water. The building was serviced by Building 4816. The building has been demolished.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4607	prior to 1962	early 1970s (demolished)	Building 4607 was used for non-radiological storage. This area was covered as part of the 1994 - 1995 Area IV Radiological Characterization Survey. Storage of sodium lab instruments.	12	Sodium	Sapere, 2005.
4616	Unknown	Unknown	Cooling Tower for Building 4006.	13	Due to the power outage on April 30, 1986 caused by explosion at 4705B the cooling tower water system went into a manual mode and opened a system drain valve resulting in 2000 gallons of water treated with a sodium nitrate base chemical to drain into a pit located in the coal yard south of Building 4005 at G and 17th Streets.	Sapere, 2005.
4714	1988	Unknown	4714 was the Power Pak electrical cogeneration unit. It used steam generated by SCTI to produce electrical power by a Rankine cycle, and typically operated at 26-27 megawatts electrical at 13.8 kV. Steam produced in SCTI steam generator tests was admitted to the Power Pak turbine, where it was condensed in a close-coupled condenser and pumped back to the SCTI full-flow demineralizer system. The demineralized condensate was returned to the Power Pak, where it was heated by turbine-extracted steam in two condensate heaters, a deaerator, and two feed water heaters. The heated feed water was then returned to the SCTI as feed to the steam generator system. Electrical power produced by the recovery of heat from the SCTI was delivered to Southern CA Edison power grid through an interconnection facility.	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005; Boeing, 2003.
4793	Unknown	Unknown	Building 4793 was a portable trailer unit that was placed at multiple location at SSFL. Building 4793 was located at the PDU area, but did not have any chemical uses associated with it at this location.	N/A	Listed in the H.S.A but not the correct location. 4793 listed in the H.S.A refers to the 4793 that was in the DOE Leach field 1	
4806	Unknown	Unknown	Time clock	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4816	Unknown	Unknown	Building 4816 was a Hydrogen Recombiner Test Canopy	N/A	No chemical uses based on available information on operations at this building.	Sapere, 2005.
4823	1962 (?)	1964 (?)	Guard shack	N/A	No chemical uses based on available information on operations at this building.	Trippeda, 2007.

Table I.2-2
Tank Inventory
PDU 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										
Unknown #1	Building 4042	1200	Alcohol. Stainless steel tank.	Unknown	Removed	Regulated under Corrective Action		6		Rocketdyne, 1992.
Unknown #2	Building 4042	1200	Alcohol. Stainless steel tank.	Unknown	Removed	Regulated under Corrective Action		6		Rocketdyne, 1992.
Unknown #3	Building 4042	1000	Alcohol. Contained within a concrete berm and dirt bottom.	Unknown	Unknown	Regulated under Corrective Action		6		Rockwell International, 1989.
Unknown #4	Coal Gasification PDU Area	Unknown	Coal Gasification	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1976.
Unknown #5	Coal Gasification PDU Area	Unknown	Coal Gasification	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1976.
Unknown #6	Coal Gasification PDU Area	Unknown	Coal Gasification	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1976.
Unknown #7	Coal Gasification PDU Area	Unknown	Coal Gasification	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1976.
Unknown #8	Coal Gasification PDU Area	Unknown	Coal Gasification	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1976.
Unknown #9	Coal Gasification PDU Area	Unknown	Coal Gasification	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1976.
Unknown #10	Coal Gasification PDU Area	Unknown	Coal Gasification	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1976.
Unknown #11	Coal Gasification PDU Area	Unknown	Coal Gasification	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1976.
Unknown #12	Coal Gasification PDU Area	Unknown	Coal Gasification	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1976.
Unknown #13	Coal Gasification PDU Area	Unknown	Coal Gasification	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1976.
Unknown #14	Coal Gasification PDU Area	Unknown	Coal Gasification	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1976.
T-801 A and B	Unknown	Unknown	Carbonate solution mix	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1981.
AT-14	Unknown	Unknown	Green Liquor from the coal gasification process	1979 to Unknown	Removed	Regulated under Corrective Action	The coal gasification process generated a "green liquor" wastewater that contained organic compounds, sulfur compounds, and ash. The green liquor wastewater was filtered. Two ASTs were used to contain wastewater and then was disposed of as hazardous waste.	7	Contaminated, Non-RA, DOE	ICF, 1993; Ogden, 1996; Sapere, 2005; Unknown, 1989b; Rockwell International, 1976.

Table I.2-2
Tank Inventory
PDU RFI Site

Tank ID	Location	Size (gallons)	Contents	Use Period	Use Status	Regulatory Closure Status	Additional Information	Chemical Use Area Number	Comments	Reference
Underground Tanks										
UT-1	Western side of Building 4005	1,500	Fuel oil/diesel	Unknown	Removed (1987)	Closed (1991)	No Contamination; No Remediation. Tank removed under permit #698. File #C90095	1	A leakage from the tank was reported, but there is no information available regarding the date or amount of fuel leakage. Reportedly soils containing diesel fuel were removed at the time of the tank removal. Soil analysis showed contamination was present when UT-01 was removed. Confirmation samples submitted to VCEHD were approved and the site was closed in 1991.	ICF, 1993; Ogden, 1995; Sapere, 2005; Unknown, 1994a, Unknown, 1989b, GRC, 1990; Unknown, 1994b.
UT-2	East of Building 4006	1,000	Fuel oil/diesel	Unknown	Removed (8/1988)	Regulated under Corrective Action	No Contamination; No Remediation. Tank removed under permit #1034.	2		Unknown, 1994a; Unknown, 1989b.
UT-20	Building 4826	12,000	Sodium	1958 to Unknown	Removed (1998)	Regulated under Corrective Action		3		Unknown, 1994a; Unknown, 1989b.
UT-21	Building 4826	10,000	Sodium	Unknown	Removed (1998)	Regulated under Corrective Action		3		Unknown, 1994a; Unknown, 1989b.
UT-22	East of Building 4032	1,500	Fuel Oil	Unknown	Removed	Regulated under Corrective Action		5		
UT-23 (Tank ID T-1)	East of Building 4032	5,500	Sodium	Unknown	Removed	Regulated under Corrective Action		5		Rocketdyne, 1992.
UT-68	Building 4006	1,400	Residues of metallic Na	Unknown	Removed (1994)	Regulated under Corrective Action		2		Unknown, 1995.
UT-69	Building 4006	90	Sodium hydroxide	Unknown	Removed (1994)	Regulated under Corrective Action		2		Unknown, 1995.
Unknown	Building 4006 Area	Unknown	Gasoline	Unknown to 1995	Removed (1995)	Regulated under Corrective Action		2		Rockwell International, 1995.
Unknown	Building 4006 Area	Unknown	Gasoline	Unknown to 1995	Removed (1995)	Regulated under Corrective Action		2		Rockwell International, 1995.
RC4481	North of Building 4006	4000	LN2	Unknown	Removed	Regulated under Corrective Action	Trailer-mounted	2		Rocketdyne, 1992.
Unknown Tanks										
Unknown	Coal Gasification PDU Area	Unknown	Coal Gasification	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1976.
Unknown	West of 4049	Unknown	Unknown	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1976.
Unknown	East of Building 4005	Unknown	Unknown	Unknown	Removed	Regulated under Corrective Action		1		
Unknown	North of Building 4005	Unknown	Unknown	Unknown	Removed	Regulated under Corrective Action		1		
V-420	Coal Gasification PDU Area	Unknown	Spray Cooler Vessel in Coal Gasification System	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1980.
V-431-1	Coal Gasification PDU Area	Unknown	Effluent Tank	Unknown	Removed	Regulated under Corrective Action		7		Rockwell International, 1980.
V-510-2	Coal Gasification PDU Area	Unknown	Quench tank for green liquor	Unknown	Unknown	Regulated under Corrective Action		7		Rockwell International, 1980; Rockwell International, 1976.
Unknown	Southeast corner of Building 4042	Unknown	Unknown	Unknown	Removed	Regulated under Corrective Action		6		

Table I.2-3
Transformer Inventory
PDU RFI Site

Transformer/ Substation Number	Location	Use Period	Use Status	Description	Chemical Use Area Number	Comments	Reference
4705	South of Building 4005	Unknown	Removed	Substation for Building 5. Power to substations 4705A and 4705B are supplied from substation 4704.	15	Explosion occurred at 4705B on April 30, 1986 which was thought to be due to underground insulation failure.	ICF, 1993; Ogden, 1995; Sapere, 2005; Rockwell International, 1984.
4704	Near 17th Street and F Street	Prior to 1962 - current	Existing	Building 4704 is an inbound transformer adjacent to a station owned by Edison Power. Scheduled for demolition in 2004. Building 4704 was a small structure located at the corner of 17th and F Streets.	16		Sapere, 2005.
4706	Southwest of 4006	Unknown	Existing	Substation for Building 4006	17		Sapere, 2005.
4727	North of Building 4032	Unknown	Removed	Substation for Building 4032 and 4027	18		Sapere, 2005.
4742	South of Building 4042	Unknown	Removed	Substation for Building 4042. 2 transformers, 1000 KVA each with PCB concentrations of 168 and 96 ppm.	20		Sapere, 2005; Rockwell International, 1985.
4726	West of 4826	Unknown	Removed	Substation for Building 4826	19		Sapere, 2005.
Unknown	Building 4049	Unknown	Unknown	One transformers, 1000 KVA General Electric with a PCB concentration of 55 ppm.	7		Rockwell International, 1985.

Table I.2-4
Inventory of Other Site Features
PDU RFI Site

Feature ID	Location	Use Period	Use Status	Process/Chemical Use	Chemical Use Area Number	Comments	Reference
PDU	Southeast of Building 4005	1978 to 1981	Removed	Coal gasification system was designed to demonstrate the technical feasibility of producing sulfur-free, low BTU product gas by partial combustion of coal. The coal gasification system was termed the PDU and was located in the equipment yard east and southeast of Building 005. The coal gasification process generated a "green liquor" wastewater that contained organic compounds, sulfur compounds, and ash. The green liquor wastewater was filtered and the ash was disposed of offsite.	7	Runoff from PDU test 4 through 9 contained chromium, fluoride, surfactants, phenols, oil and grease, ammonia, sulfate, boron, manganese, lithium, iron, and occasionally contained mercaptans and cyanide.	ICF, 1993; Ogden, 1996; Rockwell International, 1982a; Rockwell International, 1976.
Building 4005/4006 Leach Field	West of 4006 and 4005	1958 to 1961	Removed	Received sanitary wastes from Buildings 5 and 6. From Bldg 5, various laboratories and work areas drained to system. Leach field was disconnected and abandoned in 1960-61. The drain lines and tanks were removed in 2001 at the same time the septic tanks were removed. Sampling of soil under drain lines, leach fields, and septic tanks did not detect any contamination. Two 2,340 gallon septic tanks and a 480 linear feet leach field.	21		ICF, 1993; Ogden, 1996; Sapere, 2005; Liddy, 1999.
Bag House	North of 4005	Unknown	Removed	Part of the Molten Salt Facility	22		ICF, 1993; Ogden, 1996; Sapere, 2005.
Catchment Basin	North of 4005	Unknown	Removed	Part of the Molten Salt Facility	23		
17th Street Drainage Area	South of the intersection of 17 St. and G St.	1962 to Unknown	Removed	A natural rainwater channel. In 1962 a berm was constructed around the area to provide a 30 ft x 30 ft holdup pond. The berm restricted drainage from Area IV into Area III. The pond was functional for many years. It cycled through periods of evaporative drying in summer seasons and refilled during rainy season causing the low-lying area to be marshy. Eventually the pond became full of silt and overgrown. In 1997 soil samples were collected which contained radiation but further sampling showed the concentrations were below action levels. Part of the pond was excavated (120 ft x 200 ft) in 1998. The pond was approximately 85 square meters. The entire impacted area measures 2,230 meters. In 1998, the original bermed pond area and all intakes and outlets were mapped and surveyed. The Pond is now dry and overgrown with grass and shrubs. DHS released the pond for unrestricted use in 2004	24	During a week-long demonstration (May 1981) of the molten carbonate coal gasification process, there was a large discharge of black effluent from the PDU onto G and 17th Streets. The discharge was clear at the R2A Pond on May 8-9. On May 10 a leak in the water main couldn't be stopped and a flow of ~75 gpm facilitated the flow of the effluent towards the R2A Pond. On May 11th the flow down G and 17th St. was dark and accompanied ay a sulfide odor. It was suspected that wastes from the PDU operations entered floor drains and discharged with other wastes to the culvert at 17th and G St. In the evening of May 11, the drain from R2B failed, allowing the PDU discharge to enter the R2A Pond. Due to the power outage on April 30, 1986 caused by explosion at 4705B the cooling tower water system went into a manual mode and opened a system drain valve resulting in 2000 gallons of water treated with a sodium nitrate base chemical to drain into a pit located in the coal yard south of Building 4005 at G and 17th Streets.	Boeing, 1999; Sapere, 2005.

Table I.2-4
Inventory of Other Site Features
PDU RFI Site

Feature ID	Location	Use Period	Use Status	Process/Chemical Use	Chemical Use Area Number	Comments	Reference
Building 4005 Concrete Pad	Unknown	Unknown	Unknown	In July 2000, approximately 1 gallon of hydraulic oil was spilled onto a concrete pad, while unloading roll-ff boxes of concrete at the Building 4005 concrete pile.	1		Unknown, 2007.
Concrete Pad Number 1	Unknown	Unknown	Unknown	Old Coal Flow Test/Demonstration Pad, 1980. Also used for demonstration of chemical pump technologies which used liquid lithium. In the 1990s sodium tanks from SNAP were cleaned on a concrete pad near Building 4005	1		ETEC, 1996.
H2S Stripper Tower	Unknown	Unknown	Removed	The H2S gas is burned in an incinerator which produces a dilute SO2 gas stream. The SO2 is reacted with a sodium carbonate solution in a spray dryer to produce a dry powder consisting primarily of sodium sulfite an sodium sulfate. The dry powder is removed from the gas stream in a bag filter and collected for disposal. The liquid from the H2S stripper is pumped through a carbonator where CO2 is absorbed to convert the sodium carbonate to sodium bicarbonate crystals. These crystals are separated from the solution, dried, and decomposed to produce regenerated sodium carbonate. The remaining liquid is recycled to the quench tank to dissolve additional melt.	7		Rockwell International, 1976; Rockwell International, 1982b.
Air Condensate Separator (S-201)	Unknown	Unknown	Removed	Equipped with a condensate trap with a flow rate capacity of 2000 CFM. Part of the Coal Gasification Process near Building 4005	N/A		Atomics International, 1975b.
Coal Storage Area	4501 Parking area	Unknown	Removed	Coal Storage for the PDU	14		Ogden, 2000.
Miscellaneous Pipelines	Across the Site	Unknown	Unknown	The purpose and uses of the pipelines shown on site figures are unknown.	N/A	No chemical uses based on available information on operations at this feature.	
Debris Pile 2003	North of Building 4714	Unknown	Unknown	A debris pile was located north of the location of the former building. It appears the pile is construction debris (soil, asphalt, and concrete) from demolition activities.	N/A		CH2M HILL and MWH, 2008.

Table I.2-5
Spill Inventory
PDU RFI Site

Date	Building/ Feature	Chemical Spilled	Amount (gallons)	Comments	References
3/16/1979 5/7 to 5/12/1981	4005	Molten Salt	500 to 1000 Unknown	An unknown Quantity of Molten Salt mixed with 500-1000 gallons of water spilled due to a tank overflow. Liquid went into storm channels and into R2A discharge pond. On May 7th, during a demonstration of the molten carbonate coal gasification process, a discharge from the PDU facility exceeded NPDES limits. During May 8-9th, a gasket failed at the gasifier causing a black effluent to flow onto the G and 17th St. drainage. May 10th, a water line leaked and could not be stopped. The flow from the water line transported deposited waste from PDU into G and 17th drainage, then out to R2A pond. On May 11th, the water in the drainage was dark and had a hydrogen sulfide odor. On May 12th, approximately 60 catfish were found dead in R2A pond.	Unknown, Date Unknown (HDMSe00411937); Schmued, 1981.
2/11/1980	4005	Sodium Bicarbonate with Coal Ash	Several 100	Several 100 gallons of sodium bicarbonate solution contaminated with coal ash was spilled due to overfilling a storage tank.	Unknown, Date Unknown (HDMSe00411937).
7/22/1986	4005	Mercury	< 1 lb	Less than 1 pound of mercury in the storeroom of building 005.	Unknown, 1986.
Nov. 1997	4006	Sodium	Unknown	A sodium leak occurred in November 1997 causing a fire that smoldered for 2.25 hours.	Unknown, Date Unknown (HDMSp01630074).
8/25/1992	4006	Coolant	Unknown	Coolant spill at B-006 Hi-Bay.	Unknown, 1992.
5/6/1992	4027	Hydraulic Fluid	30	Hydraulic oil line broke from a hydraulic cutting shears causing fluid to spill in Building 027.	Rockwell International, 1992.
10/21/1988	4032	Iron	50	A malfunctioning cooling tower in Building 032 was the source of a rusty colored iron solution that poured out to the G and 17th St. underpass. Chemical analysis showed that the solution contained 0.02mg/L of iron and 181mg/L of chloride. The chloride content can be attributed to the water distribution system.	Rockwell International, 1988.
Apr. 1997	4032	Oil	2	A contractor struck a forklift with roll off.	Unknown, 2007.
1/21/1992	4006	Mercury	< 1	Mercury spill in the sink at Building 4006	Lafflam, Date Unknown.
4/30/1986	4005	Green Liquor	Unknown	On April 30, 1986 at 4pm, Green Liquor from Building 5 was seen running down the storm drain. A bi-product of the coal gasification process is a "Green Liquor" that contained organic compounds, sulfur compounds, and ash.	Lafflam, Date Unknown; Rockwell International, 1990.
Unknown	4005	Hydraulic Fluid	Unknown	Several occurrence of hydraulic fluid leaking to the ground near building 005.	Unknown, 2007.
6/12/2003	4006	Transformer Fluid	< 1	A wrecking contractor was taking down a former transformer when they noticed that oil started to leak onto the ground.	Unknown, 2007.
7/31/1987	4037	Nitric Acid	1	A 55 gallon tank was found leaking 70% nitric acid. Cause of the spill was due to overheating of the drum.	Rockwell International, 1987c.
11/19/1985	4037	Trichloroethane (TCA)	20 to 25	A forklift punctured a 55 gallon drum causing approximately 20-25 gallons of TCA to spill in the yard area of Building 4037,	Wiltsey, 1985.

Table I.2-5
Spill Inventory
PDU RFI Site

Date	Building/ Feature	Chemical Spilled	Amount (gallons)	Comments	References
7/7/1988	4037	Diesel Fuel	2 to 3	A diesel fuel was reported on 7/7/1988. A driver had used water to wash away the spill causing more fluid to be cleaned up.	Rockwell International, 1988a.
7/2/1989	4037	Coolant	2 to 3	On July 2,1989 a machine coolant spill was reported to the control center. The spill was contained and kept of the road storm drains.	Rockwell International, 1989a.
5/18/1981	4037	Freon	300 to 450	On Monday May 18, 1981 approximately 300-450 gallons of freon 113 spilled onto the floor of the white room and adjacent areas in building 4037.	Rockwell International, 1981a.
2/17/88	4037	Diesel	Unknown	Diesel Oil Spill at Building 4037. Emergency Response called to the scene.	Lafflam, Date Unknown.
3/15/88	4037	Diesel	1 to 2	Diesel oil spill on the ground near Building 4037 from a temporary storage tank. Emergency Response called to the scene.	Lafflam, Date Unknown.

Table I.2-6
Site History - Investigations
PDU RFI Site

Chemical Use Area Number	Chemical Use Area Name	Date	Purpose	COPCs Analyzed*	COPCs Reported*	Comments	Reference
1	Underground Tank (UT)-1	1987	Two samples collected during tank removal. Based on initial results, additional soil samples were collected from three locations. Two borings were drilled within former excavation @ 8.5 and 10.5 feet bgs and one northwest of excavation to 8.5 feet bgs. Soil samples collected at 4-foot intervals.	TPH (initial) TPH and BTEX (second)	Initial >TPH - Diesel range, max. concentration 130 mg/kg. Second > BTEX and TPH - ND		Ogden, 1996.
7	Former PDU Area	1991	Three soil samples collected within PDU area, at depths ranging from surface to 2 feet bgs. One additional sample collected outside PDU.	Metals, pH, cyanide, and PAHs	Beryllium -1.2 mg/kg , exceeded PBL pH was between 7.5 and 8.7.		Ogden, 1996.
7	Former PDU Area	1993	Four soil vapor samples collected between 1.5 and 3.5 feet bgs. Seven soil samples were collected from 5 locations.	VOCs VOCs, TRPHs, chloride, fluoride, nitrate, metals, pH	VOCs -ND Acetone from 22 to 59 ug/kg, Toluene 7.6 ug/kg, total xylenes 9.1 ug/kg, TRPH from 25 to 120 mg/kg, silver 5.7 mg/kg, chloride 14 mg/kg, fluoride 0.3 mg/kg, nitrate 0.9 mg/kg, pH 7 and 7.9		Ogden, 1996.
7	Former PDU Area	1996	Two soil samples collected as part of the metals sampling program. Collected at 0.5 ft bgs	Total metal and metal leachate concentrations, pH	Barium (103 mg/kg, < 1 mg/L [soluble]), cobalt (18.4 mg/kg, 20.8 ug/L [soluble]), and silver (>1.1 mg/kg, <50 ug/L [soluble]) exceeded PBL		Ogden, 1996.
7	Former PDU Area	1997	Two soil vapor samples collected. Sample depths ranged from 2 to 3 ft bgs. Two soil samples collected. Samples collected at 2 ft bgs.	VOCs Inorganics, metals			From soil vapor summary table. Ogden sampled, from soil summary table
7	Former PDU Area	1998	2 soil samples collected. Samples depths ranged from 1 to 5 ft bgs.	Inorganics, metals			Ogden sampled, from soil summary table.
7	Former PDU Area	1999	Multiple soil vapor samples collected. Sample depth was 4 ft bgs. 2 soil samples collected. Sample depths ranged from 1 to 1.5 ft bgs.	VOCs Inorganics, metals			Ogden sampled, from soil vapor summary table. Ogden sampled, from soil summary table.
7	Former PDU Area	2001	5 soil vapor samples collected Sample depths ranged from 3 to 7 ft bgs. 8 soil samples collected. Sample depths ranged from 0.5 top 4.5 ft bgs. 4 soil samples collected. Sample depths ranged from 7 to 9 ft bgs.	VOCs hydrocarbons, inorganics, metals, PCBs, propellants, SVOCs hydrocarbons, inorganics, metals, propellants, SVOCs			AMEC sampled, from soil vapor summary table. AMEC sampled, from soil summary table. MWH sampled, from soil summary table.
7	Former PDU Area	2002	30 soil vapor samples collected. Sample depths ranged from 3 to 6 ft bgs. 9 soil samples collected. Sample taken from 0.5 ft bgs.	VOCs Energetics, hydrocarbons, inorganics, metals, PCBs, propellants, SVOCs, VOCs			MWH sampled, from soil vapor summary table. MWH sampled, from soil summary table.
24	17th Street Drainage Area	1997	Soil samples	Radiation, energetics, hydrocarbons, inorganics, metals, PCBs, SVOCs, VOCs, propellants		DHS released the pond for unrestricted use in 2004	Boeing, 1999.

* COPCs - Chemicals of potential concern by chemical group - VOCs, SVOCs, etc.

Table I.2-7
Site History - Soil Disturbance
PDU RFI Site

Chemical Use Area Number	Chemical Use Area Name	Date	COPCs Targeted*	Media	Key Activities	Status	Reference
21	B4005/4006 Leach field	2001	Propellants, SVOCs, TPH, Metals	Soil	Removed in 2001	Completed	ICF, 1993; Ogden 1996; Sapere, 2005.
1	Underground Tank (UT)-1	1991	TPH	Soil	UST removed in 1987 under the oversight of VCEHD	Completed	Ogden, 1995.

Table I.2-8
Chemical Use Summary
PDU 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		Fluoride, Chloride, Nitrate, Sulfate, Bromide	Perchlorate	Dioxins, Furans	pH	Asbestos
1	Building 4005	PCB, benzene, calcium carbonate, coal, coal dust, coke, cyanide, green liquor (organics, sulfur compounds, and ash, pH =12), silica, chloramines, hexachlorobenzene, sodium carbonate, molten salt carbonate, chromium, toluene, xylene, aromatic hydrocarbons, heavy metals	X	X	X		X	X					X				
2	Building 4006	Tritium titanium foils, mercury, tetralin			X			X									
3	Buildings 4026, 4426, 4826, and 4226	**Moved to HMSA**															
4	Building 4027	Beryllium, lab packs, waste oil, contaminated waste solids, debris, batteries, paint waste, wastewater, flammable waste, caustics, corrosives	X	X	X	X	X	X	X	X			X				
5	Building 4032	Kerosene, PCBs, lead paint, asbestos		X			X	X			X						
6	Building 4042	Lithium, alcohol						X									
7	Former PDU Area	Terphenyl organics, aluminum, caustics, solvents, metals, SVOC, asbestos, Freon, lead paint, sodium hydroxide	X				X	X					X				
8	Building 4359	**Moved to HMSA**															
9	Building 4334	**Moved to HMSA**															
10	Building 4358	**Moved to HMSA**															
11	Building 4402	Solvents	X														
12	Building 4607	None															
13	Building 4616	Sodium nitrate base chemical						X					X				
14	Coal Storage Yard	Solvents, PCBs, Oil, Metals, and waste construction debris (including asbestos).	X	X			X	X					X				
15	Building 4705	None															
16	Substation 4704	PCBS															
17	Transformer 4706	PCBs									X						
18	Transformer 4727	PCBs															
19	Substation 4726	**Moved to HMSA**															
20	Transformer 4742	PCBs									X						
21	Building 4005/4006 Leach Field	Solvents										X[3]					

Table I.2-8
Chemical Use Summary
PDU 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		Fluoride, Chloride, Nitrate, Sulfate, Bromide	Perchlorate	Dioxins, Furans	pH	Asbestos
22	Bag House	PCB, benzene, calcium carbonate, coal, coal dust, coke, cyanide, green liquor (organics, sulfur compounds, and ash, pH =12), silica, chloramines, hexachlorobenzene, sodium carbonate, molten salt carbonate, chromium, toluene, xylene, aromatic hydrocarbons, heavy metals	X	X			X	X					X				
23	Catchment Basin	PCB, benzene, calcium carbonate, coal, coal dust, coke, cyanide, green liquor (organics, sulfur compounds, and ash, pH =12), silica, chloramines, hexachlorobenzene, sodium carbonate, molten salt carbonate, chromium, toluene, xylene, aromatic hydrocarbons, heavy metals	X	X	X		X	X					X				
24	17 Street Drainage Area	Iron, PCB, benzene, calcium carbonate, coal, coal dust, coke, cyanide, green liquor (organics, sulfur compounds, and ash, pH =12), silica, chloramines, hexachlorobenzene, sodium carbonate, molten salt carbonate, chromium, toluene, xylene, aromatic hydrocarbons, heavy metals	X	X	X		X	X					X				
25	Building 4037	Solvents, 1,4-dioxane, Diesel, hydraulic oil, waste oils, metals	X	X	X		X	X									

Notes:
1. VOCs are a COPC for TPH-gasoline.
2. SVOCs and dioxins were evaluated as COPCs if burned materials were observed. PCBs were evaluated as COPCs if elevated concentrations of lubricant oil-range TPH were detected.
3. Chemical uses for Buildings 4005 and 4006 Leach Field were assumed to be the same as those for Buildings 4005 and 4006 (VOCs, petroleum fuels, SVOCs, oil-related materials, metal wastes, non-metal inorganic compounds).

Table I.2-9
Conceptual Site Model
PDU 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 Direction (ft/ft)	Depth to Chatsworth Formation Groundwater (Feet)	Chatsworth Formation Groundwater Horizontal Gradient/Flow Direction (ft/ft)	Surface Water Present? (Yes/No)	Surface Water Flow Information	Other Information?	Reference
PDU	1764 to 1820	0.6 to 13	1739 to 1783	4 to 18	0.06/south	6.64 to 19.78	0.02/southwest and 0.04/south	No	Storm flow within the PDU/Building 4005 site is generally to the east, towards 17th Street. When stormwater reaches 17th Street, flow is to the south and largely contained within an asphalt lined drainage.		

MSL = above mean sea level

Table I.3-1A
Sampling Summary for Soil
PDU RFI Site

Sample Location	Location Type	Sample Name	Collection Date	Top Depth (feet bgs)	Base Depth (feet bgs)	Sample Type	Remediation Status	Consultant	Matrix	Dioxins/ Furans	Energetics	Geotechnical	Hydrocarbons	Inorganics	Metals	PCBs	SVOC	VOC
SB_B005-1	Soil Boring	SB_B005-1_10-10.5	12/1/1990	10	10.5	Primary Sample	In Place	Groundwater Resources Consultants, Inc.	Soil				X					X
SB_B005-1	Soil Boring	SB_B005-1_4-4.5	12/1/1990	4	4.5	Primary Sample	In Place	Groundwater Resources Consultants, Inc.	Soil				X					X
SB_B005-1	Soil Boring	SB_B005-1_8-8.5	12/1/1990	8	8.5	Primary Sample	In Place	Groundwater Resources Consultants, Inc.	Soil				X					X
SB_B005-2	Soil Boring	SB_B005-2_4-4.5	12/1/1990	4	4.5	Primary Sample	In Place	Groundwater Resources Consultants, Inc.	Soil				X					X
SB_B005-2	Soil Boring	SB_B005-2_8-8.5	12/1/1990	8	8.5	Primary Sample	In Place	Groundwater Resources Consultants, Inc.	Soil				X					X
SB_B005-3	Soil Boring	SB_B005-3_4-4.5	12/1/1990	4	4.5	Primary Sample	In Place	Groundwater Resources Consultants, Inc.	Soil				X					X
SB_B005-3	Soil Boring	SB_B005-3_8-8.5	12/1/1990	8	8.5	Primary Sample	In Place	Groundwater Resources Consultants, Inc.	Soil				X					X
BG-1	Soil Boring	BG-1	8/28/1991	1	1	Primary Sample	In Place	Groundwater Resources Consultants, Inc.	Soil					X	X			
PDU-1-1	Soil Boring	PDU-1-1	8/28/1991	1	1	Primary Sample	In Place	Groundwater Resources Consultants, Inc.	Soil					X	X		X	
PDU-2-1	Soil Boring	PDU-2-1	8/28/1991	1	1	Primary Sample	In Place	Groundwater Resources Consultants, Inc.	Soil					X	X		X	
PDU-3-1	Soil Boring	PDU-3-1	8/28/1991	1	1	Primary Sample	In Place	Groundwater Resources Consultants, Inc.	Soil					X	X		X	
SB_FPDU-1	Soil Boring	SB_FPDU-1_1.0-1.8	8/28/1991	1	1.8	Primary Sample	In Place	Groundwater Resources Consultants, Inc.	Soil					X	X		X	
SB_FPDU-2	Soil Boring	SB_FPDU-2_1.0-2.0	8/28/1991	1	2	Primary Sample	In Place	Groundwater Resources Consultants, Inc.	Soil					X	X		X	
SB_FPDU-3	Soil Boring	SB_FPDU-3_0.8-1.5	8/28/1991	0	1.5	Primary Sample	In Place	Groundwater Resources Consultants, Inc.	Soil					X	X		X	
SB_FPDU-BG	Soil Boring	SB_FPDU_BG-1_0.5-1.0	8/28/1991	0	1	Primary Sample	In Place	Groundwater Resources Consultants, Inc.	Soil					X	X			
E-5-01	Soil Boring	E-5-01	3/9/1993	1	1	Primary Sample	In Place	Rocketdyne	Soil									X
E-5-02	Soil Boring	E-5-02	3/9/1993	1	1.5	Primary Sample	In Place	Rocketdyne	Soil									X
E-5-03	Soil Boring	E-5-03	3/9/1993	1	1	Primary Sample	In Place	Rocketdyne	Soil				X	X	X			X
E-5-04	Soil Boring	E-5-04	3/9/1993	1	1	Primary Sample	In Place	Rocketdyne	Soil									X
E-5-05	Soil Boring	E-5-05	3/19/1993	4	4	Primary Sample	In Place	Rocketdyne	Soil				X	X	X			X
E-5-03	Soil Boring	E-5-03A	3/24/1993	1	1	Primary Sample	In Place	Rocketdyne	Soil									X
E-5-04	Soil Boring	E-5-04A	3/24/1993	4	4	Primary Sample	In Place	Rocketdyne	Soil									X
SB-7.10-3	Soil Boring	SB-7.10-3-3.5	8/22/1993	3.5	3.5	Primary Sample	In Place		Soil			X		X				X
CGSS01	Surface Soil Sample	CG1S1	5/22/1996	0	0.5	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil					X	X			
CGSS02	Surface Soil Sample	CG2S1	5/22/1996	0	0.5	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil					X	X			
PUBS02	Soil Boring	RF280	11/14/1997	2	2	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil					X	X			
PUBS03	Soil Boring	RF281	11/14/1997	2	2	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil					X	X			
PUBS02	Soil Boring	RS194	1/30/1998	5	5	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil					X	X			
PUBS04	Soil Boring	RS195	1/30/1998	1	1	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil					X	X			
PUBS14	Soil Boring	RS885	9/22/1999	1	1	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil					X	X			
PUBS15	Soil Boring	RS886	9/22/1999	1.5	1.5	Primary Sample	In Place	OGDEN Environmental and Energy Services	Soil					X	X			
PUBS16	Soil Boring	RJ399	5/16/2001	0.5	1	Primary Sample	In Place	AMEC	Soil						X			
PUBS16	Soil Boring	RJ400	5/16/2001	3.5	4	Primary Sample	In Place	AMEC	Soil						X			
PUBS17	Soil Boring	RJ401	5/16/2001	0	0.5	Primary Sample	In Place	AMEC	Soil						X			
PUTS08	Grab Sample	RJ403	5/16/2001	0.5	1	Primary Sample	In Place	AMEC	Soil				X	X	X	X	X	
PUTS08	Grab Sample	RJ404	5/16/2001	4	4.5	Primary Sample	In Place	AMEC	Soil				X					
PUTS01	Grab Sample	RJ413	5/18/2001	0.5	1	Primary Sample	In Place	AMEC	Soil				X	X	X	X	X	
PUTS04	Grab Sample	RJ411	5/18/2001	0.5	1	Primary Sample	In Place	AMEC	Soil				X	X	X	X	X	
PUTS07	Grab Sample	RJ412	5/18/2001	0.5	1	Primary Sample	In Place	AMEC	Soil				X	X	X	X	X	
PUTS09S01	Trench	MJ035	11/20/2001	9	9	Primary Sample	In Place	MWH	Soil				X	X	X		X	
PUTS09S02	Trench	MJ036	11/20/2001	7	7	Primary Sample	In Place	MWH	Soil				X	X	X		X	
PUTS09S03	Trench	MJ043	12/5/2001	9	9	Primary Sample	In Place	MWH	Soil				X	X	X		X	
PUTS09S04	Trench	MJ044	12/5/2001	7	7.5	Primary Sample	In Place	MWH	Soil				X	X	X		X	
PUBS05	Soil Boring	MJ068	9/16/2002	0	0.5	Primary Sample	In Place	MWH	Soil				X	X	X	X	X	
PUBS06	Soil Boring	MJ070	9/16/2002	0	0.5	Primary Sample	In Place	MWH	Soil				X	X	X	X	X	
PUBS07	Soil Boring	MJ072	9/16/2002	0	0.5	Primary Sample	In Place	MWH	Soil		X		X	X	X	X	X	X
PUBS08	Soil Boring	MJ074	9/16/2002	0	0.5	Primary Sample	In Place	MWH	Soil		X		X	X	X	X	X	X
PUBS09	Soil Boring	MJ078	9/17/2002	0	0.5	Primary Sample	In Place	MWH	Soil				X	X	X	X	X	
PUBS10	Soil Boring	MJ079	9/17/2002	0	0.5	Primary Sample	In Place	MWH	Soil		X		X	X	X	X	X	X
PUBS11	Soil Boring	MJ076	9/17/2002	0	0.5	Primary Sample	In Place	MWH	Soil				X	X	X	X	X	
PUBS12	Soil Boring	MJ077	9/17/2002	0	0.5	Primary Sample	In Place	MWH	Soil				X	X	X	X	X	
XFBS01	Soil Boring	MJ246	5/22/2003	0	0	Primary Sample	In Place	MWH	Soil							X		
XFBS02	Soil Boring	MJ247	5/22/2003	0	0	Primary Sample	In Place	MWH	Soil							X		
PUBS13	Soil Boring	MT800	9/10/2003	0	0.5	Primary Sample	In Place	MWH	Soil					X		X		
XFBS20	Soil Boring	WD079	8/25/2004	0.5	1	Composite Sample	In Place	MWH	Soil					X		X		
XFBS21	Soil Boring	WD085	8/25/2004	0.5	1	Composite Sample	In Place	MWH	Soil					X		X		
PUBS1035	Soil Boring		3/17/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1035	Soil Boring	PUBS1035S100	3/17/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil					X		X		
PUBS1032	Soil Boring		3/17/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1032	Soil Boring	PUBS1032S100	3/17/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil					X		X		
PUBS1029	Soil Boring	PUBS1029D010	3/17/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X			
PUBS1002	Soil Boring	PUBS1002S010	3/18/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
PUBS1002	Soil Boring	PUBS1002S060	3/18/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
PUBX1000	Soil Boring	PUBX1000C010	3/18/2008	0	1	Composite Sample	In Place	CH2M HILL	Soil					X		X		
PUBX1000A	Soil Boring	PUBX1000AS010	3/18/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X		X		
PUBX1000B	Soil Boring	PUBX1000BS010	3/18/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X		X		
PUBX1000C	Soil Boring	PUBX1000CS010	3/18/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X		X		
PUBX1000D	Soil Boring	PUBX1000DS010	3/18/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X		X		
PUBS1007	Soil Boring	PUBS1007D010	3/18/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X	X	X		X	

Table I.3-1A
Sampling Summary for Soil
PDU RFI Site

Sample Location	Location Type	Sample Name	Collection Date	Top Depth (feet bgs)	Base Depth (feet bgs)	Sample Type	Remediation Status	Consultant	Matrix	Dioxins/ Furans	Energetics	Geotechnical	Hydrocarbons	Inorganics	Metals	PCBs	SVOC	VOC
PUBS1007	Soil Boring	PUBS1007S060	3/18/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
PUBS1028	Soil Boring		3/19/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil									X
PUBS1028	Soil Boring	PUBS1028D010	3/19/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X				
PUBS1058	Soil Boring		3/19/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1058	Soil Boring	PUBS1058S010	3/19/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X	X	X	
PUBS1031	Soil Boring		3/19/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1031	Soil Boring		3/19/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1031	Soil Boring	PUBS1031S010	3/19/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X	X	X	
PUBS1031	Soil Boring	PUBS1031S060	3/19/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X	X	X	X	
PUBS1030	Soil Boring		3/19/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1030	Soil Boring		3/19/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1030	Soil Boring	PUBS1030S010	3/19/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X	X	X	
PUBS1030	Soil Boring	PUBS1030S060	3/19/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X	X	X	X	
PUBS1030	Soil Boring	PUBS1030S100	3/19/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil					X				
PUBS1018	Soil Boring	PUBS1018S010	3/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X	X		
PUBS1017	Soil Boring	PUBS1017S010	3/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X	X		
PUBS1015	Soil Boring	PUBS1015S010	3/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X	X		
PUBS1016	Soil Boring	PUBS1016S010	3/21/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X	X		
PUBS1024	Soil Boring	PUBS1024S010	3/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1024	Soil Boring	PUBS1024S060	3/21/2008	5	6	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X			
PUBS1023	Soil Boring	PUBS1023S010	3/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1003	Soil Boring	PUBS1003D010	3/21/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X			
PUBS1003	Soil Boring	PUBS1003S060	3/21/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1022	Soil Boring	PUBS1022S010	3/24/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1019	Soil Boring	PUBS1019S010	3/24/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X	X		
PUBS1005	Soil Boring	PUBS1005S010	3/24/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1005	Soil Boring	PUBS1005S020	3/24/2008	1	2	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1005	Soil Boring	PUBS1005S050	3/24/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil					X	X			
U5BS1105	Soil Boring		3/24/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
U5BS1105	Soil Boring	U5BS1105S010	3/24/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X		X	
PUBS1004	Soil Boring	PUBS1004S020	3/24/2008	1	2	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1004	Soil Boring	PUBS1004D035	3/24/2008	2.5	3.5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X			
U5BS1118	Soil Boring		3/24/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
U5BS1118	Soil Boring		3/24/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil									X
U5BS1118	Soil Boring	U5BS1118S010	3/24/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X		X	
U5BS1118	Soil Boring	U5BS1118S060	3/24/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X		X	
U5BS1118	Soil Boring	U5BS1118S100	3/24/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil					X			X	X
PUBS1037	Soil Boring		3/24/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil									X
PUBS1037	Soil Boring		3/24/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1037	Soil Boring	PUBS1037D010	3/24/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X	X	X	X	X	
PUBS1037	Soil Boring	PUBS1037S060	3/24/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X	X	X	X	
U5BX1101	Soil Boring	U5BX1101C010	3/24/2008	0	0.5	Composite Sample	In Place	CH2M HILL	Soil					X		X		
PUBS1026	Soil Boring		3/25/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil									X
PUBS1026	Soil Boring	PUBS1026S010	3/25/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X		X	
PUBS1036	Soil Boring		3/25/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil									X
PUBS1036	Soil Boring	PUBS1036D010	3/25/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X	X	X	X	X	
PUBS1026	Soil Boring		3/25/2008	3.5	4.5	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1026	Soil Boring	PUBS1026S045	3/25/2008	3.5	4.5	Primary Sample	In Place	CH2M HILL	Soil					X	X		X	
PUBS1056	Soil Boring		3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1056	Soil Boring		3/25/2008	2.5	3.5	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1056	Soil Boring	PUBS1056S010	3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
PUBS1056	Soil Boring	PUBS1056S060	3/25/2008	2.5	3.5	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
PUBS1025	Soil Boring	PUBS1025S010	3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
U5BS1106	Soil Boring		3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
U5BS1106	Soil Boring	U5BS1106S010	3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
PUBS1012	Soil Boring		3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1012	Soil Boring	PUBS1012S010	3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X	X	X	
U5BS1106	Soil Boring		3/25/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil									X
U5BS1106	Soil Boring	U5BS1106S060	3/25/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X	X	X	X	
PUBS1008	Soil Boring		3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1008	Soil Boring	PUBS1008S010	3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X	X	X	
PUBS1009	Soil Boring		3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1009	Soil Boring	PUBS1009S010	3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X	X	X	
U5BS1107	Soil Boring	U5BS1107D010	3/25/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X			
PUBS1011	Soil Boring		3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1011	Soil Boring	PUBS1011S010	3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X	X	X	
U5BS1107	Soil Boring	U5BS1107S060	3/25/2008	5	6	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X			
PUBS1011	Soil Boring		3/25/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1011	Soil Boring	PUBS1011S060	3/25/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X	X	X	X	

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PDU RFI Site

Sample Location	Location Type	Sample Name	Collection Date	Top Depth (feet bgs)	Base Depth (feet bgs)	Sample Type	Remediation Status	Consultant	Matrix	Dioxins/ Furans	Energetics	Geotechnical	Hydrocarbons	Inorganics	Metals	PCBs	SVOC	VOC
PUBS1020	Soil Boring	PUBS1020D010	3/25/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X			
U5BS1117	Soil Boring	U5BS1117D010	3/25/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X			
U5BS1117	Soil Boring	U5BS1117S060	3/25/2008	5	6	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X			
U5BS1117	Soil Boring	U5BS1117S100	3/25/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1021	Soil Boring	PUBS1021S010	3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
U5BS1119	Soil Boring	U5BS1119D010	3/25/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X			
U5BS1119	Soil Boring	U5BS1119S060	3/25/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1010	Soil Boring		3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1010	Soil Boring	PUBS1010S010	3/25/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X	X	X	
PUBS1010	Soil Boring		3/25/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1010	Soil Boring	PUBS1010S050	3/25/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil				X	X	X	X	X	
U5BS1120	Soil Boring	U5BS1120D010	3/26/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X			
PUBS1000	Soil Boring		3/26/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1000	Soil Boring	PUBS1000S010	3/26/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
U5BX1102	Soil Boring	U5BX1102C010	3/27/2008	0	1	Composite Sample	In Place	CH2M HILL	Soil					X		X		
U5BS1041	Soil Boring	U5BS1041S01	4/1/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
U5BS1041	Soil Boring	U5BS1041S02	4/1/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
U5BS1016	Soil Boring	U5BS1016D01	4/1/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X	X	X		X	
U5BS1016	Soil Boring	U5BS1016S02	4/1/2008	4.5	5.5	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
PUBS1027	Soil Boring		4/4/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1027	Soil Boring	PUBS1027S010	4/4/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X		X	
PUBS1027	Soil Boring		4/4/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1027	Soil Boring	PUBS1027S060	4/4/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil					X	X		X	
PUBS1057	Soil Boring		4/4/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1057	Soil Boring	PUBS1057S010	4/4/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
PUBS1006	Soil Boring	PUBS1006S010	4/4/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X	X	X	X	X	
PUBS1006	Soil Boring	PUBS1006S060	4/4/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X	X	X	X	
PUBS1006	Soil Boring	PUBS1006S100	4/4/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1053	Soil Boring	PUBS1053S010	4/9/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil		X			X	X	X	X	X
PUBS1040	Soil Boring	PUBS1040D010	4/9/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUTS1000	Soil Boring	PUTS1000S010	4/11/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUTS1000	Soil Boring	PUTS1000S060	4/11/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1054	Soil Boring		4/17/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil	X								
PUBS1054	Soil Boring	PUBS1054S010	4/17/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1054	Soil Boring		4/17/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil	X								
PUBS1054	Soil Boring	PUBS1054S060	4/17/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1048	Soil Boring	PUBS1048D010	4/18/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1048	Soil Boring	PUBS1048S060	4/18/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1051	Soil Boring		4/18/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil	X								
PUBS1051	Soil Boring	PUBS1051D010	4/18/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1051	Soil Boring		4/18/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil	X								
PUBS1051	Soil Boring	PUBS1051S060	4/18/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1049	Soil Boring	PUBS1049S010	4/18/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1038	Soil Boring	PUBS1038S010	4/18/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1038	Soil Boring	PUBS1038S060	4/18/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1052	Soil Boring	PUBS1052S010	4/18/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1052	Soil Boring	PUBS1052D060	4/18/2008	5	6	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1052	Soil Boring	PUBS1052S100	4/18/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1044	Soil Boring	PUBS1044D050	4/21/2008	4	5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1044	Soil Boring	PUBS1044S010	4/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1045	Soil Boring	PUBS1045S010	4/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1045	Soil Boring	PUBS1045S055	4/21/2008	4.5	5.5	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1046	Soil Boring	PUBS1046S010	4/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1046	Soil Boring	PUBS1046S055	4/21/2008	4.5	5.5	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1041	Soil Boring	PUBS1041S010	4/21/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1041	Soil Boring	PUBS1041S060	4/21/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
U5BS1009	Soil Boring	U5BS1009S01	4/24/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
U5BS1009	Soil Boring	U5BS1009S02	4/24/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
PUBS1500	Soil Boring		4/30/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil									X
PUBS1500	Soil Boring	PUBS1500D01	4/30/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X		X		X	
PUBS1500	Soil Boring	PUBS1500S01	4/30/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X				
PUBS1039	Soil Boring	PUBS1039S010	4/30/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1039	Soil Boring	PUBS1039S060	4/30/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1042	Soil Boring		4/30/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil	X								
PUBS1042	Soil Boring	PUBS1042D010	4/30/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1042	Soil Boring		4/30/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil	X								
PUBS1042	Soil Boring	PUBS1042S060	4/30/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1050	Soil Boring	PUBS1050S010	4/30/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1050	Soil Boring	PUBS1050S060	4/30/2008	3.5	4.5	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X

Table I.3-1A
Sampling Summary for Soil
PDU RFI Site

Sample Location	Location Type	Sample Name	Collection Date	Top Depth (feet bgs)	Base Depth (feet bgs)	Sample Type	Remediation Status	Consultant	Matrix	Dioxins/ Furans	Energetics	Geotechnical	Hydrocarbons	Inorganics	Metals	PCBs	SVOC	VOC
PUBS1043	Soil Boring	PUBS1043S010	5/6/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1043	Soil Boring	PUBS1043S060	5/6/2008	4.5	5.5	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1047	Soil Boring	PUBS1047S010	5/6/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1040	Soil Boring	PUBS1040S060	5/6/2008	3	4	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1055	Soil Boring	PUBS1055D010	5/6/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
PUBS1055	Soil Boring	PUBS1055S060	5/6/2008	4.5	5.5	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
CFBS1031	Soil Boring		5/6/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil	X								
CFBS1031	Soil Boring	CFBS1031S010	5/6/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
CFBS1031	Soil Boring		5/6/2008	3.5	4.5	Primary Sample	In Place	CH2M HILL	Soil	X								
CFBS1031	Soil Boring	CFBS1031S060	5/6/2008	3.5	4.5	Primary Sample	In Place	CH2M HILL	Soil		X		X	X	X	X	X	X
U5BS1500	Soil Boring		5/13/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil									X
U5BS1500	Soil Boring	U5BS1500D01	5/13/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X		X	X	X	
U5BS1500	Soil Boring	U5BS1500S01	5/13/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X				
U5BS1501	Soil Boring		5/13/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil									X
U5BS1501	Soil Boring	U5BS1501S01	5/13/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X	X	X		X	
U5TS1503	Trench		5/14/2008	1	2	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil									X
U5TS1503	Trench	U5TS1503D01	5/14/2008	1	2	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil		X		X	X	X		X	
PUBS1415	Soil Boring	PUBS1415S01	5/15/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X		X	
PUBS1416	Soil Boring	PUBS1416S01	5/15/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X		X	
PUBS1420	Soil Boring	PUBS1420D01	5/15/2008	0.5	1.5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X		X	
PUBS1401	Soil Boring	PUBS1401S01	5/15/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1400	Soil Boring	PUBS1400S01	5/15/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1402	Soil Boring	PUBS1402S01	5/15/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1059	Soil Boring	PUBS1059S01	5/15/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
PUBS1059	Soil Boring	PUBS1059S02	5/15/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
PUBS1066	Soil Boring	PUBS1066D01	5/15/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil				X		X		X	
PUBS1066	Soil Boring	PUBS1066S01	5/15/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X				
PUBS1066	Soil Boring	PUBS1066S02	5/15/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
PUBS1403	Soil Boring	PUBS1403S01	5/15/2008	5	6	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X			
PUBS1404	Soil Boring		5/15/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil									X
PUBS1404	Soil Boring	PUBS1404S01	5/15/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
PUBS1061	Soil Boring	PUBS1061S01	5/16/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
PUBS1061	Soil Boring	PUBS1061S02	5/16/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil				X	X	X		X	
PUBS1405	Soil Boring	PUBS1405S01	5/16/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1406	Soil Boring	PUBS1406S01	5/16/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1406	Soil Boring	PUBS1406S02	5/16/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1407	Soil Boring	PUBS1407S01	5/16/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1407	Soil Boring	PUBS1407S02	5/16/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1408	Soil Boring	PUBS1408D01	5/16/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X				
PUBS1408	Soil Boring	PUBS1408S01	5/16/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil						X			
PUBS1409	Soil Boring	PUBS1409S01	5/16/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1411	Soil Boring	PUBS1411D01	5/16/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil						X			
PUBS1411	Soil Boring	PUBS1411S01	5/16/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X				
PUBS1412	Soil Boring	PUBS1412S01	5/16/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1410	Soil Boring	PUBS1410S01	5/19/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1413	Soil Boring	PUBS1413S01	5/19/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X			
PUBS1424	Soil Boring	PUBS1424S01	5/19/2008	0.5	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1423	Soil Boring	PUBS1423S01	5/19/2008	0.5	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1422	Soil Boring	PUBS1422S01	5/19/2008	0.5	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X				
PUBS1422	Soil Boring	PUBS1422X01	5/19/2008	0.5	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil						X			
PUBS1419	Soil Boring	PUBS1419S01	5/22/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1418	Soil Boring	PUBS1418S01	5/22/2008	0	0.5	Primary Sample	In Place	CH2M HILL	Soil					X	X			
PUBS1417	Soil Boring	PUBS1417S01	5/22/2008	0.3	0.8	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil						X			
PUBS1417	Soil Boring	PUBS1417X01	5/22/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X	X			
PUBS1414	Soil Boring	PUBS1414S01	5/22/2008	0	0.8	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil						X			
PUBS1414	Soil Boring	PUBS1414X01	5/22/2008	0	0.8	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X				
U5BS1432	Soil Boring	U5BS1432D01	5/22/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil					X				
U5BS1432	Soil Boring	U5BS1432S01	5/22/2008	0	1	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil						X			
U5BS1433	Soil Boring	U5BS1433S01	5/22/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X	X			
U5BS1041A	Soil Boring		5/27/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil									X
U5BS1041A	Soil Boring	U5BS1041AS01	5/27/2008	0	1	Primary Sample	In Place	CH2M HILL	Soil					X				
U5BS1041A	Soil Boring		5/27/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil									X
U5BS1041A	Soil Boring	U5BS1041AS02	5/27/2008	5	6	Primary Sample	In Place	CH2M HILL	Soil					X				

Table I.3-1B
Sampling Summary for Soil Vapor
PDU 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-7.10-1	Soil Vapor Sample	SV-7.10-1	8/20/1993	1.5	1.5	Primary Sample	In Place	ICF Kaiser Engineers	Soil Vapor	X
SV-7.10-2	Soil Vapor Sample	SV-7.10-2	8/20/1993	3	3	Primary Sample	In Place	ICF Kaiser Engineers	Soil Vapor	X
SV-7.10-3	Soil Vapor Sample	SV-7.10-3	8/20/1993	3.5	3.5	Primary Sample	In Place	ICF Kaiser Engineers	Soil Vapor	X
SV-7.10-4	Soil Vapor Sample	SV-7.10-4	8/20/1993	1.5	1.5	Primary Sample	In Place	ICF Kaiser Engineers	Soil Vapor	X
SV-LF005-2	Soil Vapor Sample	SVLF0052	8/23/1993	2	2	Primary Sample	In Place	ICF Kaiser Engineers	Soil Vapor	X
SV-LF005-1	Soil Vapor Sample	SVLF0051	8/25/1993	5	5	Primary Sample	In Place	ICF Kaiser Engineers	Soil Vapor	X
PUSV01	Soil Vapor Sample		7/25/1997	2	2	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV02	Soil Vapor Sample		7/25/1997	3	3	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV33	Soil Gas Probe		9/29/1999	4	4	MULTIPLE SAMPLE TYPES	In Place	OGDEN Environmental and Energy Services	Soil Vapor	X
PUSV03	Soil Vapor Sample		1/18/2001	3	3	Primary Sample	In Place	AMEC	Soil Vapor	X
PUSV03	Soil Vapor Sample		1/18/2001	7	7	Primary Sample	In Place	AMEC	Soil Vapor	X
PUSV04	Soil Vapor Sample		1/18/2001	4	4	Primary Sample	In Place	AMEC	Soil Vapor	X
PUSV04	Soil Vapor Sample		4/5/2001	4	4	Primary Sample	In Place	AMEC	Soil Vapor	X
P2SV12	Soil Vapor Sample		5/11/2001	4	4	Primary Sample	In Place	AMEC	Soil Vapor	X
HSSV04	Soil Vapor Sample		7/17/2002	5	5	Primary Sample	In Place	MWH	Soil Vapor	X
HSSV05	Soil Vapor Sample		7/17/2002	5	5	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV01	Soil Vapor Sample		7/17/2002	4	4	Primary Sample	In Place	Unknown	Soil Vapor	X
PUSV02	Soil Vapor Sample		7/17/2002	4	4	Primary Sample	In Place	Unknown	Soil Vapor	X
PUSV06	Soil Vapor Sample		7/17/2002	3.5	3.5	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV07	Soil Vapor Sample		7/17/2002	5	5	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV08	Soil Vapor Sample		7/17/2002	5	5	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV09	Soil Vapor Sample		7/17/2002	4	4	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV10	Soil Vapor Sample		7/17/2002	5	5	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV11	Soil Vapor Sample		7/17/2002	4	4	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV12	Soil Vapor Sample		7/17/2002	5.5	5.5	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV13	Soil Vapor Sample		7/17/2002	5	5	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV14	Soil Vapor Sample		7/17/2002	4	4	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV15	Soil Vapor Sample		7/17/2002	3.5	3.5	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV16	Soil Vapor Sample		7/17/2002	4.5	4.5	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV17	Soil Vapor Sample		7/18/2002	5	5	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV18	Soil Vapor Sample		7/18/2002	4	4	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV19	Soil Vapor Sample		7/18/2002	4.5	4.5	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV20	Soil Vapor Sample		7/18/2002	3	3	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV21	Soil Vapor Sample		7/18/2002	6	6	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV22	Soil Vapor Sample		7/18/2002	4	4	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV23	Soil Vapor Sample		7/18/2002	4	4	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV24	Soil Vapor Sample		7/18/2002	4	4	Primary Sample	In Place	MWH	Soil Vapor	X
HSSV08	Soil Vapor Sample		7/22/2002	4	4	Primary Sample	In Place	MWH	Soil Vapor	X
HSSV08	Soil Vapor Sample		7/22/2002	8	8	Primary Sample	In Place	MWH	Soil Vapor	X
HSSV09	Soil Vapor Sample		7/22/2002	3.5	3.5	Primary Sample	In Place	MWH	Soil Vapor	X
HSSV09	Soil Vapor Sample		7/22/2002	8	8	Primary Sample	In Place	MWH	Soil Vapor	X
HSSV10	Soil Vapor Sample		7/23/2002	4.5	4.5	Primary Sample	In Place	MWH	Soil Vapor	X
HSSV10	Soil Vapor Sample		7/23/2002	9	9	Primary Sample	In Place	MWH	Soil Vapor	X
HSSV11	Soil Vapor Sample		7/23/2002	6	6	Primary Sample	In Place	MWH	Soil Vapor	X
HSSV12	Soil Vapor Sample		7/23/2002	4	4	Primary Sample	In Place	MWH	Soil Vapor	X
PUSV1015	Soil Vapor Sample		3/25/2008	3.3	4.3	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X
PUSV1015	Soil Vapor Sample	PUSV1015D043	3/25/2008	3.3	4.3	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X
PUSV1008	Soil Vapor Sample		3/25/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
PUSV1008	Soil Vapor Sample		3/25/2008	7.3	8.3	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
PUSV1009	Soil Vapor Sample		3/26/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
PUSV1010	Soil Vapor Sample		3/26/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
PUSV1014	Soil Vapor Sample		3/26/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
PUSV1012	Soil Vapor Sample		3/28/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
PUSV1013	Soil Vapor Sample		3/28/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X

Table I.3-1B
Sampling Summary for Soil Vapor
PDU 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
PUSV1004	Soil Vapor Sample		3/28/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
PUSV1003	Soil Vapor Sample		3/28/2008	4	5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X
PUSV1003	Soil Vapor Sample	PUSV1003D050	3/28/2008	4	5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X
U5SV1104	Soil Vapor Sample		3/28/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
U5SV1104	Soil Vapor Sample		3/28/2008	9	10	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
U5SV1018	Soil Vapor Sample		4/10/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
U5SV1002	Soil Vapor Sample		4/18/2008	4	5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X
U5SV1002	Soil Vapor Sample	U5SV1002D01	4/18/2008	4	5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X
PUSV1003	Soil Vapor Sample		4/18/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
PUSV1008	Soil Vapor Sample		4/29/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
PUSV1008	Soil Vapor Sample		4/29/2008	7.3	8.3	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
PUSV1013	Soil Vapor Sample		4/29/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
PUSV1017	Soil Vapor Sample		6/3/2008	4	5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X
PUSV1017	Soil Vapor Sample	PUSV1017D01	6/3/2008	4	5	MULTIPLE SAMPLE TYPES	In Place	CH2M HILL	Soil Vapor	X
PUSV1403	Soil Vapor Sample		6/3/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
PUSV1404	Soil Vapor Sample		6/3/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X
PUSV1405	Soil Vapor Sample		6/3/2008	4	5	Primary Sample	In Place	CH2M HILL	Soil Vapor	X

Table I.3-1C
Sampling Summary for Surface Water
PDU RFI Site

Sample Location	Location Type	Sample Name	Collection Date	Top Depth (feet bgs)	Base Depth (feet bgs)	Sample Type	Remediation Status	Consultant	Matrix	Propellants
PUSW01	Surface Water Sample	MJ222	3/15/2003	0	0.5	MULTIPLE SAMPLE TYPES	In Place	MWH	Surface Water	X
PUSW01	Surface Water Sample	SSFL-W-134K	2/25/2003	0	0.5	MULTIPLE SAMPLE TYPES	In Place	DTSC	Surface Water	X

Table I.3-2A
Evaluation of Soil Sampling Results
PDU 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 I.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 I.5-1 for CMS area)
1	Building 4005	VOCs	Chemical uses at Building 4005 included VOCs. VOCs were screened to evaluate potential presence. Soil Vapor: Samples were collected at three(3) locations. Soil vapor sampling was also attempted at 2 additional locations. 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 vapor wells to allow sample collection. Soil Matrix: Samples were collected at seven (7) locations.	Soil Vapor: Toluene was detected above the Eco RBSL in one sample. PUSV1013 at 4-5 ft. bgs Soil Matrix: VOCs were detected but did not exceed any RBSLs. Discussion of results is presented in Section I.3.4.2.1 and Figures I.3-1A, I.3-1B, and I.3-8.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Chemical uses at Building 4005 included coal dust, coke, and green liquor (organics, sulfur compounds, and ash, pH =12). SVOCs at Building 4005 have not been investigated and were screened to evaluate potential presence. Soil Matrix Soil samples were collected at two (2) locations.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.2 and Figures I.3-2 and I.3-9.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPH	Chemical uses at Building 4005 included TPH, coal dust, and coke. TPH was screened to evaluate potential presence. Soil samples were collected at seven (7) locations.	Gasoline range hydrocarbons (C8-C11) were detected above Residential RBSLs in one sample. PUBS1056 at 5-6 ft. bgs Discussion of results is presented in I.3.4.2.3 and Figures I.3-3 and I.3-9.	**Yes.** Characterization is sufficient for risk assessment.	**N/A**
		PCBs	Chemical uses at Building 4005 included PCB. PCBs at Building 4005 have not been investigated and were screened to evaluate potential presence. Soil samples were collected at one (1) location.	No PCBs were detected in any of the soil samples.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table I.3-2A
Evaluation of Soil Sampling Results
PDU 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 I.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 I.5-1 for CMS area)
1	Building 4005 (continued)	Metals	Chemical uses at Building 4005 included metals. Metals in soil have been detected at concentrations exceeding RBSLs and have not been adequately characterized (the lateral and vertical extents of metals in soil are undefined). Metals were further characterized to attempt to define extents. Soil samples were collected at 16 locations.	Metals were detected above background concentrations and Eco RBSLs in eight samples. PUBS1056 at 0-1 and 5-6 ft. bgs (Barium) PUBS1406 at 0-1 ft. bgs (Barium) PUTS1000 at 0-1 ft. bgs (Barium) PUBS02 at 2 ft. bgs (Silver) E-5-03 at 1 ft. bgs (Silver) CGSS01 at 0-0.5 ft. bgs (Silver) E-5-05 at 4 ft. bgs (Cadmium) Discussion of results is presented in I.3.4.2.5 and Figures I.3-5 and I.3-10.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**Yes.** The extent of silver and cadmium impacts is defined and the area is not recommended for further characterization based on sampling and risk assessment results.
2	Building 4006	VOCs	VOCs were screened to evaluate potential presence. Soil Vapor: Samples were collected at seven (7) locations. Soil Matrix: Soil samples were collected at one (1) location.	Soil Vapor: No VOCs were detected in any of the soil vapor samples. Soil Matrix: VOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.1 and Figures I.3-1A, I.3-1B, and I.3-8.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	SVOCs have not been investigated at Building 4006 and was screened to evaluate potential presence. Soil samples were collected at seven (7) locations.	SVOCs were detected but did not exceed any RBSLs. Discussion of results is presented in I.3.4.2.2 and Figures I.3-2 and I.3-9.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPH	Chemical uses included gasoline storage in unidentified underground tanks. TPH has not been investigated at Building 4006 and was screened to evaluate potential presence. Soil samples were collected at seven (7) locations.	Gasoline range hydrocarbons (C8-C11) were detected above the Residential RBSL in one sample. PUBS1007 at 0-1 ft. bgs Discussion of results is presented in I.3.4.2.3 and Figures I.3-3 and I.3-9.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		PCBs	PCBs were screened to evaluate potential presence. Soil samples were collected at one (1) location.	No PCBs were detected in any of the soil samples.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table I.3-2A
Evaluation of Soil Sampling Results
PDU 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 I.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 I.5-1 for CMS area)
2	Building 4006 (continued)	Metals	Chemical uses include tritium titanium foils and mercury. Metals have not been investigated at Building 4006 and were screened to evaluate potential presence. Soil samples were collected at 11 locations.	Metals were detected above background concentrations and their respective Residential and/or Eco RBSLs in four samples. PUBS1002 at 0-1 (Silver) PUBS1404 at 5-6 ft. bgs (Aluminum, Barium, and Selenium) PUBS1006 at 5-6 ft. bgs (Aluminum and Barium) PUBS1066 at 0-1 ft. bgs (Cadmium and Lead) Discussion of results is presented in I.3.4.2.5 and Figures I.3-5 and I.3-10.	**Yes.** Characterization is sufficient for risk assessment.	**No.** **CMS Area - PDU-1:** Cadmium and zinc impacts are not bounded to the south and west of Building 4006 and may require further characterization. Area is recommended for further characterization in CMS based on sampling and risk assessment results.
3	Buildings 4026, 4426, 4826, and 4226	**Moved to HMSA RFI Site**				
4	Building 4027	VOCs	Chemical uses included contaminated waste solids, paint waste, wastewater, and flammable waste. VOCs have not been investigated at Building 4027 and was screened for VOCs to evaluate potential presence. Soil Vapor: Samples were collected at one (1) location. Soil vapor sampling was also attempted at 1 additional location. 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 vapor wells to allow sample collection. Soil Matrix: Samples were collected at two (2) locations.	Soil Vapor: Toluene was detected above the Eco RBSL in one sample. U5SV1104 at 9-10 ft. bgs Soil Matrix: No VOCs were detected in any of the soil samples. Discussion of results is presented in Section I.3.4.2.1 and Figures I.3-1A, I.3-1B, and I.3-8.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Chemical uses included contaminated waste solids, paint waste, and wastewater. SVOCs have not been investigated at Building 4027 and was screened for SVOCs to evaluate potential presence. Soil samples were collected at two (2) locations.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.2 and Figures I.3-2 and I.3-9.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPH	Chemical uses included waste oil, contaminated waste solids, paint waste, wastewater, and flammable waste. TPH has not been investigated at Building 4027 and was screened for TPH to evaluate potential presence. Soil samples were collected at two (2) locations.	Gasoline range hydrocarbons (C8-C11) were detected above the Residential RBSL in two samples. U5BS1105 at 0-1 ft. bgs U5BS1118 at 5-6 ft. bgs Discussion of results is presented in I.3.4.2.3 and Figures I.3-3 and I.3-9.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table I.3-2A
Evaluation of Soil Sampling Results
PDU 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 I.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 I.5-1 for CMS area)
4	Building 4027 (continued)	Metals	Chemical uses include beryllium, contaminated waste solids, debris, batteries, paint waste, and wastewater. Metals have not been investigated at Building 4027 and was screened for metals to evaluate potential presence. Soil samples were collected at two (2) locations.	Metals were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.5 and Figures I.3-5 and I.3-10.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Energetics	Chemical uses include contaminated waste solids and wastewater. Energetics have not been investigated at Building 4027 and was screened for energetics to evaluate potential presence. Soil samples were collected at two (2) locations.	No energetics were detected in any of the soil samples.	**Yes.** The extent of energetics impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
5	Building 4032	VOCs	No prior sampling had occurred and was screened for VOCs to evaluate potential presence. <u>Soil Vapor</u>: No soil vapor samples were collected. <u>Soil Matrix</u>: Samples were collected at one (1) locations.	VOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.1 and Figures I.3-1A, I.3-1B, and I.3-8.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	No prior sampling had occurred and was screened for SVOCs to evaluate potential presence. <u>Soil Matrix</u> Soil samples were collected at one (1) location.	No SVOCs were detected in any of the soil samples.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPH	Chemical uses included kerosene. Tank UT-22 has been removed and documentation was submitted to VCEHD to authorize site closure. Final documentation showing closure has not been identified. No prior sampling has occurred and was screened for TPH to evaluate potential presence. Soil samples were collected at one (1) location.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.3 and Figures I.3-3 and I.3-9.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		PCBs	Chemical uses included PCBs. No prior sampling has occurred and was screened for PCBs to evaluate potential presence. Soil samples were collected at three (3) locations.	No PCBs were detected in any of the soil samples.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table I.3-2A
Evaluation of Soil Sampling Results
PDU 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 I.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 I.5-1 for CMS area)
5	Building 4032 (continued)	Metals	Chemical uses included lead paint. No prior sampling has occurred and was screened for metals to evaluate potential presence. Soil samples were collected at one (1) location.	Metals were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.5 and Figures I.3-5 and I.3-10.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
6	Building 4042	Metals	Chemical uses included lithium at Building 4042. Metals have not been investigated at Building 4042 and was screened to evaluate potential presence. Soil samples were collected at 11 locations.	Metals were detected above background concentrations and Eco RBSLs in five samples. BG-1 at 1 ft. bgs (Cadmium) SB-FPDU-BG at 0-1 ft. bgs (Cadmium) U5BS1117 at 5-6 ft. bgs (Barium) U5BS1119 at 0-1 ft. bgs (Zinc) U5BS1433 at 0-1 ft. bgs (Zinc) Discussion of results is presented in I.3.4.2.5 and Figures I.3-5 and I.3-10.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**Yes.** The extent of cadmium and zinc impacts is defined and the area is not recommended for further characterization based on sampling and risk assessment results.
7	Former PDU Area	VOCs	Chemical uses included solvents, green liquor, freon, and lead paint. These chemicals have not been investigated at Building 4049 and the surrounding PDU process area and was screened for VOCs to evaluate potential presence. Soil Vapor: Samples were collected at six (6) locations. Soil vapor sampling was also attempted at 4 additional locations. 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 vapor wells to allow sample collection. Soil Matrix: Samples were collected at 12 locations.	Soil Vapor: Toluene was detected above Eco RBSLs in two samples. PUSV1003 at 4-5 ft bgs PUSV1004 at 4-5 ft bgs Soil Matrix: VOCs were detected but did not exceed any RBSLs. Discussion of results is presented in I.3.4.2.1 and Figures I.3-1A, I.3-1B, and I.3-8.	**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 terphenyl organics, green liquor, SVOC, freon, and lead paint. These chemicals have not been investigated at Building 4049 and the surrounding PDU process area and was screened for SVOCs to evaluate potential presence. Soil samples were collected at 18 locations.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.2 and Figures I.3-2 and I.3-9.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table I.3-2A
Evaluation of Soil Sampling Results
PDU 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 I.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 I.5-1 for CMS area)
7	Former PDU Area (continued)	TPH	No prior sampling had occurred in the northern section of the former PDU and was screened for screened for TPH to evaluate potential presence. Soil samples were collected at ten (10) locations.	Gasoline range hydrocarbons (C8-C11) were detected above Residential RBSLs in three samples. PUBS1008 at 0-1 ft. bgs PUTS08 at 0.5-1 ft. bgs PUTS01 at 0.5-1 ft. bgs Discussion of results is presented in I.3.4.2.3 and Figures I.3-3 and I.3-9.	**Yes.** Characterization is sufficient for risk assessment.	**N/A**
		PCBs	PCBs have been detected in concentrations exceeding ecological RBSLs. PCBs were analyzed to further define extents. Soil samples were collected at 14 locations.	Aroclor 1260 was detected above Eco RBSLs in one sample. PUTS04 at 0.5-1 ft. bgs Discussion of results is presented in I.3.4.2.4 and Figures I.3-4 and I.3-9.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**Yes.** The extent of Aroclor 1260 is defined and the area is not recommended for further characterization based on sampling and risk assessment results.
		Metals	Chemical uses included aluminum, metals, and lead paint. Within the southern portion of the chemical use area, metals in solids have been detected at concentrations exceeding residential and ecological RBSLs. Metals were analyzed to further define extents. Soil samples were collected at 38 locations.	Metals were detected above background concentrations and their respective Residential and/or Eco RBSLs in 12 samples. PDU-1-1 at 1 ft. bgs (Cadmium) PDU-2-1 at 1 ft. bgs (Cadmium) PDU-3-1 at 1 ft. bgs (Cadmium) PUTS04 at 0.5-1 ft. bgs (Zinc) PUBS1018 at 0-1 (Silver) PUBS1019 at 0-1 (Aluminum, Barium, Vanadium, and Zinc) PUBS1022 at 0-1 ft. bgs (Silver) PUBS1027 at 0-1 ft. bgs (Barium and Silver) PUBS1413 at 0-1 ft. bgs (Aluminum and Barium) SB-FPDU-1 at 1-1.8 ft. bgs (Cadmium) SB-FPDU-2 at 1-2 ft. bgs (Cadmium) SB-FPDU-3 at 0-1.5 ft. bgs (Cadmium) Discussion of results is presented in I.3.4.2.5 and Figures I.3-5 and I.3-10.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**Yes.** **CMS Area - PDU-2:** Metals impacts are bounded tby exposed bedrock o the south and adequately defined. All other metals appear to have extents well defined.
8	Building 4359	**Moved to HMSA RFI Site**				
9	Building 4334	**Moved to HMSA RFI Site**				
10	Building 4358	**Moved to HMSA RFI Site**				

Table I.3-2A
Evaluation of Soil Sampling Results
PDU 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 I.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 I.5-1 for CMS area)
11	Building 4402	VOCs	Chemical uses include solvents. These chemicals have not been investigated at Building 4402 and was screened for VOCs to evaluate potential presence. Soil Vapor: Samples were collected at one (1) location. Soil vapor sampling was also attempted at 1 additional location. 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 vapor wells to allow sample collection. Soil Matrix: Samples were collected at one (1) location.	Soil Vapor: No VOCs were detected in any soil vapor samples. Soil Matrix: VOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.1 and Figures I.3-1A, I.3-1B, and I.3-8.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
12	Building 4607	**No chemical uses at building.**				
13	Building 4616	Metals	Chemical uses include sodium nitrate used as a coolant. Non-metal inorganic compounds have not been characterized at Building 4616 and was screened for inorganics to evaluate potential presence. Soil samples were collected at one (1) location.	Mercury was detected above background concentrations and Eco RBSLs in one sample. PUBS1029 at 0-1 ft. bgs Discussion of results is presented in I.3.4.2.5 and Figures I.3-5 and I.3-10.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
14	Coal Storage Yard	VOCs	Chemical uses included solvents. No sampling has occurred at the Coal Storage Yard and was screened for VOCs to evaluate potential presence. Soil Vapor: Samples were collected at five (5) locations. Soil vapor sampling was also attempted at 1 additional location. 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 vapor wells to allow sample collection. Soil Matrix: Samples were collected at three (3) locations.	Soil Vapor: Toluene was detected above Eco RBSLs in two samples. PUSV1008 at 4-5 ft bgs (on 3/25/08 and 4/29/08) and 7.3-8.3 ft bgs (on 3/25/08) Soil Matrix: VOCs were detected but did not exceed any RBSLs. Discussion of results is presented in I.3.4.2.1 and Figures I.3-1a, I.3-1b, and I.3-8.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	No sampling has occurred at the Coal Storage Yard and was screened for SVOCs to evaluate potential presence. Soil samples were collected at three (3) locations.	No SVOCs were detected in any of the soil samples.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table I.3-2A
Evaluation of Soil Sampling Results
PDU 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 I.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 I.5-1 for CMS area)
14	Coal Storage Yard (continued)	TPH	Chemical uses included oil and waste construction debris. These chemicals have not been investigated at the Coal Storage Yard and was screened for TPH to evaluate potential presence. Soil samples were collected at three (3) locations.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.3 and Figures I.3-3 and I.3-9.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		PCBs	Chemical uses included PCBs and waste construction debris. These chemicals have not been investigated at the Coal Storage Yard and was screened for PCBs to evaluate potential presence. Soil samples were collected at three (3) locations.	No PCBs were detected in any of the soil samples.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Chemical uses included metals and waste construction debris. These chemicals have not been investigated at the Coal Storage Yard and was screened for PCBs to evaluate potential presence. Soil samples were collected at three (3) locations.	Metals were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.5 and Figures I.3-5 and I.3-10.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
15	Transformer 4705	**Adequate sampling has been completed at Building 4705.**				
16	Substation 4704	**California Edison Burro Flats Substation. No sampling required.**				
17	Transformer 4706	PCBs	The substation has not been investigated and was screened for PCBs to evaluate potential presence. A four point composite soil sample was collected from the area of the former substation. The composite sample exceeded RBSLs and the four samples points that generated the composite were then analyzed individually.	Aroclor 1248 was detected in the composite sample collected from PUBX1000 above Eco RBSLs at a depth of 0-0.5 ft bgs. However, PCB concentrations in the individual samples that made up the composite were below all RBSLs. Discussion of results is presented in I.3.4.2.4 and Figures I.3-4 and I.3-9.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
18	Transformer 4727	**RFI Evaluation complete**				
19	Substation 4726	**Moved to HMSA RFI Site**				
20	Transformer 4742	PCBs	The substations have not been investigated and was screened for PCBs to evaluate potential presence. Soil samples were collected at two (2) locations.	PCBs were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.4 and Figures I.3-4 and I.3-9.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table I.3-2A
Evaluation of Soil Sampling Results
PDU 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 I.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 I.5-1 for CMS area)
21	Building 4005/4006 Leach Field	VOCs	Chemical uses include sanitary wastes from Buildings 4005 and 4006. VOCs were screened to evaluate potential presence. Soil Vapor: Samples were collected at two (2) locations. Soil Matrix: Samples were collected at two (2) locations.	Soil Vapor: No VOCs were detected in any of the soil vapor samples. Soil Matrix: VOCs were detected but did not exceed any RBSLs. Discussion of results is presented in I.3.4.2.1 and Figures I.3-1A, I.3-1B, and I.3-8.	**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 sanitary wastes from Buildings 4005 and 4006. SVOCs were screened to evaluate potential presence. Soil samples were collected at four (4) locations.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.2 and Figures I.3-2 and I.3-9.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPH	Chemical uses include sanitary wastes from Buildings 4005 and 4006. TPH was screened to evaluate potential presence. Soil samples were collected at four (4) locations.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.3 and Figures I.3-3 and I.3-9.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		PCBs	Chemical uses include sanitary wastes from Buildings 4005 and 4006. PCBs were screened to evaluate potential presence. Soil samples were collected at four (4) locations.	No PCBs were detected in any of the soil samples.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Chemical uses include sanitary wastes from Buildings 4005 and 4006. Metals were screened to evaluate potential presence. Soil samples were collected at four (4) locations.	Metals were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.5 and Figures I.3-5 and I.3-10.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table I.3-2A
Evaluation of Soil Sampling Results
PDU 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 I.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 I.5-1 for CMS area)
22	Bag House	VOCs	Chemical uses at the Bag House included benzene, green liquor (organics, sulfur compounds, and ash, pH =12), chloramines, hexachlorobenzene, sodium carbonate, toluene, xylene, and aromatic hydrocarbons. No sampling has occurred and was screened for VOCs to evaluate potential presence. Soil Vapor: Samples were collected at four (4) locations. Soil vapor sampling was also attempted at 2 additional locations. 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 vapor wells to allow sample collection. Soil Matrix: Samples were collected at one (1) locations.	Soil Vapor: VOCs were detected above Residential and/or Eco RBSLs in two samples. PUSV04 at 4 ft. bgs (PCE) PUSV1010 at 4-5 ft. bgs (Toluene) Soil Matrix: VOCs were detected but did not exceed any RBSLs. Discussion of results is presented in Section I.3.4.2.1 and Figures I.3-1A, I.3-1B, and I.3-8.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**No.** **CMS Area - PDU-4:** PCE impacts are not bounded around the former Bag House area and may require further characterization. Area is recommended for further characterization in CMS based on sampling and risk assessment results.
		SVOCs	Chemical uses at the Bag House included coal, coal dust, coke, and green liquor (organics, sulfur compounds, and ash, pH =12). No sampling has occurred and was screened for SVOCs to evaluate potential presence. Soil samples were collected at one (1) location.	SVOCs were detected but did not exceed any RBSLs. Discussion of results is presented in I.3.4.2.2 and Figures I.3-2 and I.3-9.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPH	Chemical uses at the Bag House included fuel and oil related compounds. No sampling has occurred and was screened for TPH to evaluate potential presence. Soil samples were collected at one (1) location.	TPH was detected but did not exceed any RBSLs. Discussion of results is presented in I.3.4.2.3 and Figures I.3-3 and I.3-9.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		PCBs	Chemical uses at the Bag House included PCBs. No sampling has occurred and was screened for PCBs to evaluate potential presence. Soil samples were collected at one (1) location.	No PCBs were detected in any of the soil samples.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Chemical uses at the Bag House included chromium and heavy metals. No sampling has occurred and was screened for metals to evaluate potential presence. Soil samples were collected at one (1) location.	Metals were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.5 and Figures I.3-5 and I.3-10.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table I.3-2A
Evaluation of Soil Sampling Results
PDU 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 I.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 I.5-1 for CMS area)
23	Catchment Basin	VOCs	No sampling has occurred in the vicinity of the Catchment Basin. Chemical usage included VOCs and was screened for VOCs to evaluate potential presence. Soil Vapor: Samples were collected at one (1) location. 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 I.3.4.2.1 and Figures I.3-1A, I.3-1B, and I.3-8.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**No.**
		SVOCs	No sampling has occurred in the vicinity of the Catchment Basin. Chemical usage included SVOCs and was screened for SVOCs to evaluate potential presence. Samples were collected at one (1) location.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.2 and Figures I.3-2 and I.3-9.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPH	No sampling has occurred in the vicinity of the Catchment Basin. Chemical usage included fuels and was screened for TPH to evaluate potential presence. Samples were collected at one (1) location.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.3 and Figures I.3-3 and I.3-9.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		PCBs	No sampling has occurred and was screened for PCBs to evaluate potential presence. Soil samples were collected at one (1) location.	No PCBs were detected in any of the soil samples.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	No sampling has occurred and was screened for metals to evaluate potential presence. Soil samples were collected at one (1) location.	Mercury was detected above background concentrations and Eco RBSLs in one sample. PUBS1037 at 0-1 ft. bgs Discussion of results is presented in I.3.4.2.5 and Figures I.3-5 and I.3-10.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
24	17 Street Drainage Area	VOCs	This area received waste runoff from the entire PDU area. Screening was conducted to determine impacts to the drainage area. Soil Vapor: Samples were collected at 23 locations. Soil Matrix: Samples were collected at 21 locations.	No VOCs were detected in any of the soil or soil vapor samples.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table I.3-2A
Evaluation of Soil Sampling Results
PDU 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 I.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 I.5-1 for CMS area)
24	17 Street Drainage Area (continued)	SVOCs	This area received waste runoff from the entire PDU area. Screening was conducted to determine impacts to the drainage area. Soil samples were collected at 29 locations.	SVOCs were detected above Residential and/or Eco RBSLs in samples from ten boring locations: PUBS05, PUBS07, PUBS08, PUBS10. PUBS1042, PUBS1044, PUBS1046, PUBS1047, PUBS1050, and PUBS1054. Discussion of results is presented in I.3.4.2.2 and Figures I.3-2 and I.3-9.	**Yes.** Characterization is sufficient for risk assessment.	**Yes.** **CMS Area - PDU-3:** The extent of SVOCs is defined and the area is not recommended for further characterization based on sampling and risk assessment results.
		TPH	This area received waste runoff from the entire PDU area. Screening was conducted to determine impacts to the drainage area. Soil samples were collected at 25 locations.	Gasoline range hydrocarbons (C8-C11) were detected above Residential RBSLs in three samples. PUBS09 at 0-0.5 ft. bgs PUBS1050 at 3.5-4.5 ft. bgs PUBS11 at 0-0.5 ft. bgs Discussion of results is presented in I.3.4.2.3 and Figures I.3-3 and I.3-9.	**Yes.** Characterization is sufficient for risk assessment.	**N/A**
		PCBs	This area received waste runoff from the entire PDU area. Screening was conducted to determine impacts to the drainage area. Soil samples were collected at 26 locations.	PCBs were detected above Eco RBSLs in three samples. PUBS06 at 0-0.5 ft. bgs (Aroclor 1248) PUBS07 at 0-0.5 ft. bgs (Aroclor 1260) PUBS08 at 0-0.5 ft. bgs (Aroclor 1260) PUBS09 at 0-0.5 ft. bgs (Aroclor 1248 and Aroclor 1254) PUBS12 at 0-0.5 ft. bgs (Aroclor 1254) PUBS1042 at 0-1 ft. bgs (Aroclor 1254 and Aroclor 1260) PUBS1044 at 0-1 and 4-5 ft. bgs (Aroclor 1248) PUBS1045 at 4.5-5.5 ft. bgs (Aroclor 1248) Discussion of results is presented in I.3.4.2.3 and Figures I.3-3 and I.3-9.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**Yes.** The extent of PCBs is defined and the area is not recommended for further characterization based on sampling and risk assessment results.
		Metals	This area received waste runoff from the entire PDU area. Screening was conducted to determine impacts to the drainage area.	Metals were detected above background concentrations and Eco RBSLs in samples from 28 boring locations. Discussion of results is presented in I.3.4.2.2 and Figures I.3-2 and I.3-10.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Dioxins	This area received waste runoff from the entire PDU area. Screening was conducted to determine impacts to the drainage area.	Dioxins were detected above background concentrations and their respective Residential and/or Eco RBSLs in one sample. PUBS1042 at 0-1 ft. bgs Discussion of results is presented in I.3.4.2.6 and Figures I.3-6 and I.3-11.	**Yes.** The presence of dioxin impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**No.** Additional sampling is needed to characterize the extent of elevated dioxins.

Table I.3-2A
Evaluation of Soil Sampling Results
PDU 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 I.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 I.5-1 for CMS area)
24	17 Street Drainage Area (continued)	Energetics	This area received waste runoff from the entire PDU area. Screening was conducted to determine impacts to the drainage area.	No energetics were detected in any of the soil samples.	**Yes.** The extent of energetics impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
25	Building 4037	VOCs	Screening was conducted to determine impacts from Building 4037. Soil Vapor: Samples were collected at one (1) location. Soil Matrix: No samples were collected	No VOCs were detected in any of the soil vapor samples.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screening was conducted to determine impacts from Building 4037. Soil samples were collected at one (1) location.	No SVOCs were detected in any of the soil vapor samples.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPH	Screening was conducted to determine impacts from Building 4037. Soil samples were collected at one (1) location.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.3 and Figures I.3-3 and I.3-9.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screening was conducted to determine impacts from Building 4037. Soil samples were collected at one (1) location.	Selenium was detected above background concentrations and Eco RBSLs in one sample. U5BS1009 at 0-1 and 5-6 ft. bgs Discussion of results is presented in I.3.4.2.5 and Figures I.3-5 and I.3-10.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
N/A	Debris Location 2003	VOCs	Screening for COPC in debris pile. Soil Vapor: No samples were collected. 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 I.3.4.2.1 and Figures I.3-1A, I.3-1B, and I.3-8.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screening for COPC in debris pile. Soil samples were collected at one (1) location.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.2 and Figures I.3-2 and I.3-9.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table I.3-2A
Evaluation of Soil Sampling Results
PDU 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 I.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 I.5-1 for CMS area)
N/A	Debris Location 2003 (continued)	TPH	Screening for COPC in debris pile. Soil samples were collected at one (1) location.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.3 and Figures I.3-3 and I.3-9.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screening for COPC in debris pile. Soil samples were collected at one (1) location.	Zinc and selenium were detected above background concentrations and Eco RBSLs in one sample. PUBS1500 at 0-1 ft. bgs Discussion of results is presented in I.3.4.2.5 and Figures I.3-5 and I.3-10.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**Yes.** Zinc impacts are in soils at debris pile and therefore is not recommended for further characterization.
N/A	Debris Locations 3007 and 3009	VOCs	Screening for COPC in debris piles. <u>Soil Vapor</u>: No samples were collected. <u>Soil Matrix</u>: Samples were collected at two (2) locations.	No VOCs were detected in any of the soil vapor samples.	**Yes.** The extent of VOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		SVOCs	Screening for COPC in debris piles. Soil samples were collected at two (2) locations.	SVOCs were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.2 and Figures I.3-2 and I.3-9.	**Yes.** The extent of SVOC impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		TPH	Screening for COPC in debris piles. Soil samples were collected at two (2) locations.	TPH was detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.3 and Figures I.3-3 and I.3-9.	**Yes.** The extent of TPH impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		PCBs	Screening for COPC in debris piles. Soil samples were collected at one (1) location.	No PCBs were detected in any of the soil samples.	**Yes.** The extent of PCB impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**
		Metals	Screening for COPC in debris piles. Soil samples were collected at two (2) locations.	Metals were detected but did not exceed their respective RBSLs. Discussion of results is presented in I.3.4.2.5 and Figures I.3-5 and I.3-10.	**Yes.** The extent of metals impacts is adequately defined by representative sampling locations. Characterization is sufficient for risk assessment.	**N/A**

Table I.3-2B
Evaluation of Groundwater Sampling Results
PDU 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	Toluene and PCE were detected above RBSLs in soil vapor. All detected soil sample results were below RBSLs.	**Yes.** NSGW: Monitored at six piezometers (PZ-041, PZ-051, PZ-052, PZ-107, PZ-108, and PZ-122) and four shallow wells (ES-31, RS-11, RS-15, and RS-27). CFOU Groundwater : Monitored at RD-29.	**Yes.** NSGW: 1,1-DCE, benzene, cis-1,2-DCE, and TCE were all detected above groundwater screening levels. Additionally, toluene among other compounds were detected below screening levels.	**Likely.** While VOC concentrations in soil were below groundwater screening levels, exceedances of soil vapor RBSLs for toluene and PCE present possible historic sources for pathways to groundwater.	**NSGW - Yes** **CFOU Groundwater [1]**
SVOCs	SVOCs exceeded RBSLs in 17th Street Drainage Area. All other SVOC results for samples on site were below RBSLs.	**Yes.** NSGW: Monitored at two piezometers (PZ-108 and PZ-122) and four shallow wells (ES-31, RS-11, RS-15, and RS-27). CFOU Groundwater : Monitored at RD-29.	**Yes.** NSGW: No exceedances of groundwater screening levels. CFOU Groundwater: No exceedances of groundwater screening levels	**Possibly.** Benzo(k) flouranthene exceeded RBSLs in surface soils and was detected in groundwater.	**NSGW - Yes** **CFOU Groundwater [1]**
TPH	Gasoline range hydrocarbons (C8-C11) were detected above RBSLs in surface soils. All other detectable hydrocarbons were below RBSLs.	**Yes.** NSGW: Monitored at one piezometer (PZ-122) and one shallow well (RS-15). CFOU Groundwater : Not monitored.	**No.**	**No.**	**NSGW - Yes** **CFOU Groundwater [1]**
PCBs	PCBs were detected above RBSLs in surface soils.	**No.**	**N/A**	**No.**	**NSGW - Yes [2]** **CFOU Groundwater [1]**
Metals	A variety of metals were detected above background in soil samples. See Section I.3.2.5 for further information.	**Yes.** NSGW: Monitored at two piezometers (PZ-041 and PZ-122) and three shallow wells (ES-31, RS-11, and RS-15). CFOU Groundwater : Monitored at RD-29.	**Yes.** NSGW: Boron and potassium exceeded their respective groundwater screening levels for dissolved metals. CFOU Groundwater : No exceedance of screening levels.	**Possibly.** A large variety of metals were detected above background and RBSLs in surface soils including zinc. However, in general metals tend to bind to soils and have limited mobility. Additionally most metal analyses reported were for total metals and exceedances of screening levels for dissolved metals is limited.	**NSGW - Yes** **CFOU Groundwater [1]**
Dioxins	Screen for energetics to evaluate potential presence.	**Yes.** NSGW: Six piezometers (PZ-041, PZ-051, PZ-052, PZ-107, PZ-108, and PZ-122) and four shallow wells (ES-31, RS-11, RS-15, and RS-27) are located in PDU. CFOU Groundwater : Monitored at RD-29.	**No.**	**No.**	**NSGW - Yes** **CFOU Groundwater [1]**

Table I.3-2B
Evaluation of Groundwater Sampling Results
PDU 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?**
Energetics	Energetics were screened in surface soils but no detections were found.	**Yes.** NSGW: Monitored at three shallow wells (RS-11, RS-15, and RS-27). CFOU Groundwater : Monitored at RD-29.	**No.**	**N/A**	**NSGW - Yes** **CFOU Groundwater** [1]

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 PDU Site, NSGW is not expected to have been impacted by PCBs due to the high affinity of PCBs for soil and due to the very low PCB concentrations detected at the site.
3. NSGW - Near Surface Groundwater

Table I.3-3A
Data Screening and Statistical Summary for Soil
PDU 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**
Dioxin_Furans											
1,2,3,4,6,7,8-Heptachlorodibenzofuran	mg/kg	0.00069	0.00049	0.0000025	8	5	0.000012	0.00017			5
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	mg/kg	0.00069	0.00096	0.000013	8	7	0.000000306	0.0013	2	1	5
1,2,3,4,7,8,9-Heptachlorodibenzofuran	mg/kg	0.00069	0.00043	0.00000019	7	4	0.0000013	0.0000088			4
1,2,3,4,7,8-Hexachlorodibenzofuran	mg/kg	0.000069	0.000047	0.00000073	7	3	0.00000058	0.0000014			2
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	mg/kg	0.000069	0.000045	0.00000034	8	4	0.0000011	0.000012			4
1,2,3,6,7,8-Hexachlorodibenzofuran	mg/kg	0.000069	0.000054	0.0000003	6	2	0.000000553	0.000011			2
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	mg/kg	0.000069	0.000046	0.00000095	8	6	0.00000044	0.000059		1	5
1,2,3,7,8,9-Hexachlorodibenzofuran	mg/kg	0.000069	0.000043	0.00000043	8	2	0.0000002	0.00000044			1
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	mg/kg	0.000069	0.0000435	0.0000011	7	5	0.00000061	0.000028			4
1,2,3,7,8-Pentachlorodibenzofuran	mg/kg	0.00023	0.0001	0.00000059	7	1	0.000000149	0.000000149			
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	mg/kg	0.0000069	0.0000044	0.00000018	6	1	0.000000701	0.000000701			1
2,3,4,6,7,8-Hexachlorodibenzofuran	mg/kg	0.000069	0.000049	0.00000045	7	3	0.0000006	0.0000028			3
2,3,4,7,8-Pentachlorodibenzofuran	mg/kg	0.000023	0.0000098	0.00000064	7	2	0.00000038	0.0000019			1
2,3,7,8-TCDD	mg/kg	0.0000069	0.0000043	0.0000005	7						
2,3,7,8-Tetrachlorodibenzofuran	mg/kg	0.000069	0.0000044	0.0000018	6	1	9.39E-08	9.39E-08			
2,3,7,8-TCDD_TEQ	mg/kg	0.0000069	0.0000043	0.00000087	8	8	1.305E-08	0.000030305	2	2	5
Heptachlorodibenzofurans	mg/kg				5	2	0.0000757	0.00033			
Heptachlorodibenzo-p-dioxins	mg/kg				7	7	0.000000664	0.0026			
Hexachlorodibenzofurans	mg/kg				5	1	0.0000235	0.0000235			
Hexachlorodibenzo-p-dioxins	mg/kg				6	2	0.00000061	0.000036			
Octachlorodibenzofuran	mg/kg	0.023	0.097	0.0000081	7	5	0.000026	0.00035			5
Octachlorodibenzo-p-dioxin	mg/kg	0.023	0.12	0.00014	7	7	0.000002	0.015			5
Pentachlorodibenzofurans	mg/kg				5	1	0.00000588	0.00000588			
Pentachlorodibenzo-p-dioxins	mg/kg				5	2	0.00000089	0.00000403			
Tetrachlorodibenzofurans	mg/kg				6	2	0.000000167	0.00000145			
Tetrachlorodibenzo-p-dioxins	mg/kg				6	1	0.000000616	0.000000616			
Energetics											
1,3-Dinitrobenzene	mg/kg		0.75		3						
2,4,6-Trinitrotoluene	mg/kg		0.21		3						
2,4-diamino-6-nitrotoluene	mg/kg				3						
2,4-Dinitrotoluene	mg/kg		0.43		42						
2,6-diamino-4-nitrotoluene	mg/kg				3						
2,6-Dinitrotoluene	mg/kg		1.71		42						
2-Amino-4,6-Dinitrotoluene	mg/kg		0.43		3						
2-Nitrotoluene	mg/kg		0.43		3						
3-Nitrotoluene	mg/kg		0.43		3						
4-Am-2,6-DNT	mg/kg		0.43		3						
4-Nitrotoluene	mg/kg		0.43		3						
HMX	mg/kg	3100	64		3						
Nitrobenzene	mg/kg	29	2		42						
Nitroglycerin	mg/kg				3						
PETN	mg/kg				3						
RDX	mg/kg	6.9	43		3						
sym-Trinitrobenzene	mg/kg		11		3						
Tetryl	mg/kg		28		3						
Geotech											
Dry Density	pcf				1	1	108	108			
Porosity, Total	%				1	1	35.7	35.7			
Specific gravity	No Units				1	1	2.69	2.69			
Total Sand	%				1	1	33.33333333	33.33333333			

Table I.3-3A
Data Screening and Statistical Summary for Soil
PDU 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**
Hydrocarbons											
Diesel Range Organics	mg/kg				7						
Kerosene Range Hydrocarbons (C12-C14)	mg/kg	1400			80	4	1.7	2.7			
Diesel Range Hydrocarbons (C14-C20)	mg/kg	1400			17	2	3.5	9.1			
Diesel Range Hydrocarbons (C15-C20)	mg/kg	1400			80	26	1.1	138			
Lubricating Oil Range Hydrocarbons (C20-C30)	mg/kg	1400			17	13	4.2	260			
Lubricating Oil Range Hydrocarbons (C21-C30)	mg/kg	1400			81	51	1.3	1250			
Gasoline Range Hydrocarbons (C8-C11)	mg/kg	1.1			62	6	1.2	2.9	6		
Gasoline Range Hydrocarbons (C8-C11)	mg/kg	1.1			17	4	1.9	6.6	4		
Kerosene Range Hydrocarbons (C11-C14)	mg/kg	1400			17						
Total Petroleum Hydrocarbons	mg/kg				1	1	4.2	4.2			
TRPH	mg/kg				2	2	25	120			
Inorganics											
% Solids	%				12	12	86.5	99			
Bromide	mg/kg				53	4	0.3225	1.9			
Chloride	mg/kg				53	46	2.2	83			
Cyanides	mg/kg	1500			10	2	0.15	0.21			
Fluoride	mg/kg	4600		6.7	54	17	0.3	12			2
Moisture	%				107	107	0.69	18.4			
Nitrate-N	mg/kg	120000			49	32	0.3775	11.7			
Nitrate-NO3	mg/kg				2						
Nitrite-N	mg/kg				48	11	0.2775	0.76			
Orthophosphate as P	mg/kg				24	14	0.57	11.5			
pH	pH Units				98	98	3.6	9.8			
Phosphate	mg/kg				20	4	1.26	3.52			
Sulfate	mg/kg				53	47	2.3	2200			
Total Organic Carbon	%				1	1	0.205	0.205			
Total Solids	%				75	75	79.5	99			
Metals											
Aluminum	mg/kg	75000	12	20000	140	140	5500	43000		140	7
Antimony	mg/kg	30	0.095	8.7	129	15	0.44	11		15	3
Arsenic	mg/kg	0.095	1.9	15	148	135	0.98	13	135	131	
Barium	mg/kg	15000	15	140	160	160	46	710		160	13
Beryllium	mg/kg	150	5	1.1	148	142	0.25	2.7			16
Boron	mg/kg	15000	6.76	9.7	132	75	0.855	14.3		1	1
Cadmium	mg/kg	39	0.0045	1	153	142	0.035	14.7		142	19
Calcium	mg/kg				16	16	570	8900			
Chromium	mg/kg	3400	930	36.8	150	150	4.3	85.4			4
Cobalt	mg/kg	1500	8.9	21	147	147	2.8	15		15	
Copper	mg/kg	3000	1.1	29	148	148	4.55	60		148	5
Hexavalent Chromium	mg/kg	110	0.2		13	7	0.0378	1.1348		1	
Iron	mg/kg			28000	16	16	10000	22800			
Lead	mg/kg	150	0.013	34	151	149	1.9	393.95	1	149	8
Lithium	mg/kg	1521.66006		37	113	113	9.6	60			13
Magnesium	mg/kg				16	16	2000	5950			
Manganese	mg/kg	1800	59	495	16	16	68	373		16	
Mercury	mg/kg	23	0.1	0.09	137	104	0.002	1.6		14	15
Molybdenum	mg/kg	380	0.11	5.3	145	110	0.092	1.5		109	
Nickel	mg/kg	1500	0.1	29	148	148	4.3	120		148	4
Potassium	mg/kg			6400	132	132	1000	6090			
Selenium	mg/kg	380	0.17	0.655	148	58	0.225	1.4		58	19

Table I.3-3A
Data Screening and Statistical Summary for Soil
PDU 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**
Silver	mg/kg	380	0.54	0.79	159	96	0.021	29		32	28
Sodium	mg/kg			110	133	91	28	1200			74
Thallium	mg/kg	6.1	2.9	0.46	144	106	0.16	0.92			2
Vanadium	mg/kg	76	1.5	62	149	149	14	79	1	149	3
Zinc	mg/kg	23000	21	110	153	153	33.4	1860		153	21
Zirconium	mg/kg			8.6	116	106	1.095	6.8			
PCBs											
Aroclor 1016	mg/kg	3.9	1.6		85						
Aroclor 1221	mg/kg	0.35	1.6		85						
Aroclor 1232	mg/kg	0.35	0.077		85						
Aroclor 1242	mg/kg	0.35	0.079		85	4	0.0072	0.0203			
Aroclor 1248	mg/kg	0.35	0.0114		85	6	0.0131	0.34		6	
Aroclor 1254	mg/kg	0.35	0.077		85	20	0.0031	0.17		4	
Aroclor 1260	mg/kg	0.35	0.077		85	28	0.0018	0.18		5	
SVOC											
1,1-Dimethylhydrazine	mg/kg		0.05		3						
1,2-Diphenylhydrazine	mg/kg		8.5		36						
1-Methyl naphthalene	mg/kg	230			89	10	0.00033	0.0545			
2,4,5-Trichlorophenol	mg/kg	5700	9		39						
2,4,6-Trichlorophenol	mg/kg	10	10		39						
2,4-Dichlorophenol	mg/kg	170	1.3		39						
2,4-Dimethylphenol	mg/kg	1100	110		39						
2,4-Dinitrophenol	mg/kg	110	0.59		39						
2-Chloronaphthalene	mg/kg		530		39						
2-Chlorophenol	mg/kg	290	21		39						
2-Methylnaphthalene	mg/kg	230	210		105	17	0.00039	0.076			
2-Nitroaniline	mg/kg		11		39						
2-Nitrophenol	mg/kg		11		39						
3,3'-Dichlorobenzidine	mg/kg		1.3		39						
3-Nitroaniline	mg/kg		5.9		39						
4,6-Dinitro-o-cresol	mg/kg	5.7	11		39						
4-Bromophenyl phenyl ether	mg/kg		4.3		39						
4-Chlorophenylphenyl ether	mg/kg		1.3		39						
4-Nitrophenol	mg/kg		7		39						
Acenaphthene	mg/kg	3400	2.46		109	8	0.00023	0.00665			
Acenaphthylene	mg/kg	1700	370		111	10	0.0002	0.01295			
Aniline	mg/kg	130	11		36						
Anthracene	mg/kg	17000	2.4		109	33	0.00017	8.2		1	
Azobenzene	mg/kg		110		3						
Benzidine	mg/kg		2.3		30						
Benzo(a)anthracene	mg/kg	0.6	5.6		109	39	0.0002	16	2	1	
Benzo(a)pyrene	mg/kg	0.06	5.6		109	44	0.000325	31	11	2	
Benzo(b)fluoranthene	mg/kg	0.6	5.6		106	48	0.00019	26	4	2	
Benzo(ghi)perylene	mg/kg		6.4		109	47	0.00025	90		2	
Benzo(k)fluoranthene	mg/kg	0.6	5.8		86	17	0.0013	15	2	2	
Benzoic acid	mg/kg	230000	4.4		39						
Benzyl alcohol	mg/kg	17000	4.4		39						
bis(2-Chloroethoxy)methane	mg/kg		150		39						
bis(2-Chloroethyl) ether	mg/kg	0.29	150		39						
bis(2-Chloroisopropyl) ether	mg/kg	2300	150		38						
bis(2-Ethylhexyl) phthalate	mg/kg	250	4.9		72	15	0.0099	0.38			

Table I.3-3A
Data Screening and Statistical Summary for Soil
PDU 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**
Butyl benzyl phthalate	mg/kg	11000	340		54	3	0.0057	0.127			
Carbazole	mg/kg	36	34		3						
Chrysene	mg/kg	6	2.4		109	47	0.0003	22	2	2	
Dibenzo(a,h)anthracene	mg/kg	0.17	5.6		111	28	0.00034	0.275	1		
Dibenzofuran	mg/kg	110	62		39						
Diethyl phthalate	mg/kg	46000	6940		66	3	0.00052	0.003			
Dimethyl phthalate	mg/kg	570000	4.4		79	5	0.00051	0.0052			
Di-n-butyl phthalate	mg/kg	5700	0.49		66	18	0.0011	0.098			
Di-n-octyl phthalate	mg/kg	2300	39		90	15	0.0043	0.185			
Diphenylamine	mg/kg				11						
Fluoranthene	mg/kg	2300	38		108	48	0.00025	32			
Fluorene	mg/kg	2300	1.6		111	10	0.00026	0.079625			
Hexachlorobenzene	mg/kg	0.4	0.34		39						
Hexachlorocyclopentadiene	mg/kg	340	13		39						
Hexachloroethane	mg/kg	18	2.1		39						
Hydrazine	mg/kg		0.05		3						
Indeno(1,2,3-cd)pyrene	mg/kg	0.6	5.8		109	42	0.00029	77	5	2	
Isophorone	mg/kg	750	320		39						
Monomethylhydrazine	mg/kg		0.05		3						
Naphthalene	mg/kg	6	210		109	20	0.00037	0.038			
n-Nitrosodimethylamine	mg/kg	0.045	20		105						
n-Nitrosodi-n-propylamine	mg/kg	0.1	28		39						
n-Nitrosodiphenylamine	mg/kg	80	20		28						
o-Cresol	mg/kg	2867.0661	110		39						
p-Chloroaniline	mg/kg		4.4		39						
p-Chloro-m-cresol	mg/kg		21		39						
p-Cresol	mg/kg	290	4.3		39						
Pentachlorophenol	mg/kg	8.8	6		39						
Phenanthrene	mg/kg	1700	1.3		110	39	0.00048	14		2	
Phenol	mg/kg	18000	5		37						
p-Nitroaniline	mg/kg		3.3		39						
Pyrene	mg/kg	1700	18		108	48	0.00026	27		2	
Pyridine	mg/kg		2.1		3						
VOC											
1,1,1,2-Tetrachloroethane	mg/kg	0.00025	76		37						
1,1,1-Trichloroethane	mg/kg	0.49	4300		45						
1,1,2,2-Tetrachloroethane	mg/kg	0.0014	6		45						
1,1,2-Trichloro-1,2,2-trifluoroethane	mg/kg	16	583		45						
1,1,2-Trichloroethane	mg/kg	0.0012	8.3		45						
1,1-Dichloroethane	mg/kg	0.0016	210		45						
1,1-Dichloroethene	mg/kg	0.023	10.7		45						
1,1-Dichloropropene	mg/kg		22		38						
1,2,3-Trichlorobenzene	mg/kg	0.124604521	20		38						
1,2,3-Trichloropropane	mg/kg	0.000051	12		38						
1,2,4-Trichlorobenzene	mg/kg	0.124604521	20		76						
1,2,4-Trimethylbenzene	mg/kg	0.035	64		38	1	0.000231	0.000231			
1,2-Dibromo-3-chloropropane	mg/kg	0.029	22		38						
1,2-Dibromoethane	mg/kg		25		38						
1,2-Dichlorobenzene	mg/kg	1.8	370		83						
1,2-Dichloroethane	mg/kg	0.0005	76		45						
1,2-Dichloropropane	mg/kg		250		45						

Table I.3-3A
Data Screening and Statistical Summary for Soil
PDU 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
1,3,5-Trimethylbenzene	mg/kg	0.036	64		38						
1,3-Dichlorobenzene	mg/kg	1.7	160		83						
1,3-Dichloropropane	mg/kg		22		38						
1,4-Dichlorobenzene	mg/kg	0.01	20		83						
2-Chloro-1,1,1-trifluoroethane	mg/kg				14						
2-Chloroethylvinyl ether	mg/kg	9.56905E-06	0.73		38						
2-Hexanone	mg/kg		1220		41						
Acetone	mg/kg	51	43		42	7	0.0071	0.059			
Benzene	mg/kg	0.00013	110		52						
Bromobenzene	mg/kg		110		38						
Bromochloromethane	mg/kg		25		38						
Bromodichloromethane	mg/kg	0.00031	15		45						
Bromoform	mg/kg		38		45						
Bromomethane	mg/kg		25		45						
Carbon Disulfide	mg/kg	0.067695411	47		3						
Carbon Tetrachloride	mg/kg	0.000042	1.5		45						
Chlorobenzene	mg/kg	0.097	40		45						
Chloroethane	mg/kg		190		45						
Chloroform	mg/kg	0.00077	11		45						
Chloromethane	mg/kg		25		45						
Chlorotrifluoroethylene	mg/kg		10.7		14						
cis-1,2-Dichloroethene	mg/kg	0.014	68		45						
cis-1,3-Dichloropropene	mg/kg		22		45						
Cumene	mg/kg	0.382558451	210		38						
Dibromochloromethane	mg/kg		46		45						
Dibromomethane	mg/kg		25		38						
Dichlorodifluoromethane	mg/kg	0.015	64		41	1	0.00145	0.00145			
Ethylbenzene	mg/kg	1.2	210		52						
Formaldehyde	mg/kg	12000	40.1		4						
Hexachlorobutadiene	mg/kg	9.2	0.85		76						
Methyl ethyl ketone	mg/kg	62	2540		41	1	0.0048	0.0048			
Methyl isobutyl ketone (MIBK)	mg/kg	19.63756975	2540		41						
Methyl tert-butyl ether	mg/kg		120		38						
Methylene chloride	mg/kg	0.004	25		43	1	0.0012	0.0012			
m-Xylene & p-Xylene	mg/kg	0.15	64		38	1	0.000276	0.000276			
n-Butylbenzene	mg/kg		210		38						
n-Propylbenzene	mg/kg	0.203267508	210		38						
o-Chlorotoluene	mg/kg	1222.098214	160		38						
o-Xylene	mg/kg	0.19	64		38						
p-Chlorotoluene	mg/kg	1222.098214	160		38						
p-Cymene	mg/kg		64		38						
sec-Butylbenzene	mg/kg	76.76404578	210		38						
sec-Dichloropropane	mg/kg		22		38						
Styrene	mg/kg	7.2	427		41	14	0.000231	0.000613			
tert-Butylbenzene	mg/kg		210		38						
Tetrachloroethene	mg/kg	0.00043	6		45						
Toluene	mg/kg	0.3	3.4		52						
trans-1,2-Dichloroethene	mg/kg	0.016	970		45						
trans-1,3-Dichloropropene	mg/kg		4.4		45						
Trichloroethene	mg/kg	0.0022	3		45						
Trichlorofluoromethane	mg/kg	0.11	300		45						

Table I.3-3A
Data Screening and Statistical Summary for Soil
PDU 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**
Vinyl chloride	mg/kg	0.0000096	0.73		45						
VOC in soil (All ND)	mg/kg				1						
Xylenes, Total	mg/kg	0.15	64		38	1	0.000276	0.000276			
Xylenes, Total	mg/kg	0.15	64		14						

Table I.3-3B
Data Screening and Statistical Summary for Soil Vapor
PDU 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		61					
1,1,1-Trichloroethane	ug/L	640	38	61					
1,1,2,2-Tetrachloroethane	ug/L	0.048		61					
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/L	8800	91	61					
1,1,2-Trichloroethane	ug/L	0.17	0.057	61					
1,1-Dichloroethane	ug/L	1.7	36	61					
1,1-Dichloroethene	ug/L	58	0.6	61					
1,2-Dichloroethane	ug/L	0.13	42	61					
Benzene	ug/L	0.095	0.57	61	6	0.041	0.062		
Carbon Tetrachloride	ug/L	0.063	0.63	61					
Chloroethane	ug/L		992	61					
Chloroform	ug/L	0.5	0.24	61					
cis-1,2-Dichloroethene	ug/L	10	1.9	61					
Dichlorodifluoromethane	ug/L	58	91	61					
Ethylbenzene	ug/L	290	23	61	5	0.05	0.12		
Methylene chloride	ug/L	2.7	0.87	61					
m-Xylene & p-Xylene	ug/L		16	61	9	0.1	0.47		
o-Xylene	ug/L	29	16	61	5	0.05	0.12		
Tetrachloroethene	ug/L	0.45232	24	61	1	2.2	2.2	1	
Toluene	ug/L	110	0.084	61	11	0.065	0.62		9
trans-1,2-Dichloroethene	ug/L	20	1.9	61					
Trichloroethene	ug/L	1.4	6.4	61					
Trichlorofluoromethane	ug/L	200	90.9	61	2	0.19	0.28		
Vinyl chloride	ug/L	0.035	0.56	61					
VOC in vapor screen (All ND)	ug/L			6					
Xylenes, Total	ug/L		16	61	9	0.1	0.59		

Table I.3-3C
Data Screening and Statistical Summary for Surface Water
PDU RFI Site

		Screening Levels		Detect Data Summary					
Constituent	**Units**	**Groundwater**	**Ecological RBSL**	**Number of Samples**	**Number of Detects**	**Minimum Detected Value**	**Maximum Detected Value**	**Number of Detects > Groundwater SL**	**Number of Detects > Ecological RBSL**
Inorganics									
Perchlorate	ug/L			2	1	3.95	3.95		

Table I.4-1
Chemicals of Potential Concern for Human Health
PDU RFI Site

Medium	Depth (ft.)	Chemical	Exceeds Background? (Y/N)	Selected as COPC?	Reason for Exclusion
Soil	0-2	1,2,3,4,6,7,8-Heptachlorodibenzofuran		Y	
Soil	0-2	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin		Y	
Soil	0-2	1,2,3,4,7,8,9-Heptachlorodibenzofuran		Y	
Soil	0-2	1,2,3,4,7,8-Hexachlorodibenzofuran		Y	
Soil	0-2	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin		Y	
Soil	0-2	1,2,3,6,7,8-Hexachlorodibenzofuran		Y	
Soil	0-2	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin		Y	
Soil	0-2	1,2,3,7,8,9-Hexachlorodibenzofuran		Y	
Soil	0-2	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin		Y	
Soil	0-2	1,2,3,7,8-Pentachlorodibenzofuran		Y	
Soil	0-2	1,2,3,7,8-Pentachlorodibenzo-p-dioxin		Y	
Soil	0-2	1,2,4-Trimethylbenzene		N	< 5% Detection
Soil	0-2	1-Methyl naphthalene		Y	
Soil	0-2	2,3,4,6,7,8-Hexachlorodibenzofuran		Y	
Soil	0-2	2,3,4,7,8-Pentachlorodibenzofuran		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	N	N	Below Background
Soil	0-2	Anthracene		Y	
Soil	0-2	Antimony	N	N	Below Background
Soil	0-2	Aroclor 1242		Y	
Soil	0-2	Aroclor 1248		Y	
Soil	0-2	Aroclor 1254		Y	
Soil	0-2	Aroclor 1260		Y	
Soil	0-2	Arsenic	N	N	Below Background
Soil	0-2	Barium	N	N	Below Background
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	Bromide		N	No Toxicity Factors
Soil	0-2	Butyl benzyl phthalate		Y	
Soil	0-2	Cadmium	Y	Y	
Soil	0-2	Chromium	N	N	Below Background
Soil	0-2	Chrysene		Y	
Soil	0-2	Cobalt	Y	Y	
Soil	0-2	Copper	N	N	Below Background
Soil	0-2	Cyanides		N	No Toxicity Factors
Soil	0-2	Dibenzo(a,h)anthracene		Y	
Soil	0-2	Dichlorodifluoromethane		N	< 5% Detection
Soil	0-2	Gasoline Range Hydrocarbons (C8-C11)		N	See BTEX, PAHs
Soil	0-2	Kerosene Range Hydrocarbons (C12-C14)		N	See BTEX, PAHs
Soil	0-2	Diesel Range Hydrocarbons (C14-C20)		N	See BTEX, PAHs
Soil	0-2	Diesel Range Hydrocarbons (C15-C20)		N	See BTEX, PAHs
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	Diethyl phthalate		N	< 5% Detection
Soil	0-2	Dimethyl phthalate		Y	
Soil	0-2	Di-n-butyl phthalate		Y	
Soil	0-2	Di-n-octyl phthalate		Y	

Table I.4-1
Chemicals of Potential Concern for Human Health
PDU RFI Site

Medium	Depth (ft.)	Chemical	Exceeds Background? (Y/N)	Selected as COPC?	Reason for Exclusion
Soil	0-2	DioxinFuran_TEQ_Mammal		Y	
Soil	0-2	Fluoranthene		Y	
Soil	0-2	Fluorene		Y	
Soil	0-2	Fluoride		Y	
Soil	0-2	Heptachlorodibenzofurans	N	N	Below Background
Soil	0-2	Heptachlorodibenzo-p-dioxins	Y	Y	
Soil	0-2	Hexachlorodibenzofurans	N	N	Below Background
Soil	0-2	Hexachlorodibenzo-p-dioxins	N	N	Below Background
Soil	0-2	Hexavalent Chromium	N	N	Below Background
Soil	0-2	Indeno(1,2,3-cd)pyrene		Y	
Soil	0-2	Iron	N	N	Below Background
Soil	0-2	Lead	N	N	Below Background
Soil	0-2	Lithium	N	N	Below Background
Soil	0-2	Manganese	N	N	Below Background
Soil	0-2	Mercury	Y	Y	
Soil	0-2	Methylene chloride		N	< 5% Detection
Soil	0-2	Molybdenum	N	N	Below Background
Soil	0-2	m-Xylene & p-Xylene		N	< 5% Detection
Soil	0-2	Naphthalene		Y	
Soil	0-2	Nickel	N	N	Below Background
Soil	0-2	Nitrate-N		Y	
Soil	0-2	Nitrite-N		Y	
Soil	0-2	Octachlorodibenzofuran	Y	Y	
Soil	0-2	Octachlorodibenzo-p-dioxin	Y	Y	
Soil	0-2	Pentachlorodibenzofurans	N	N	Below Background
Soil	0-2	Pentachlorodibenzo-p-dioxins	N	N	Below Background
Soil	0-2	Phenanthrene		Y	
Soil	0-2	Pyrene		Y	
Soil	0-2	Selenium	N	N	Below Background
Soil	0-2	Silver	Y	Y	
Soil	0-2	Styrene		Y	
Soil	0-2	Tetrachlorodibenzofurans	N	N	Below Background
Soil	0-2	Tetrachlorodibenzo-p-dioxins	N	N	Below Background
Soil	0-2	Thallium	N	N	Below Background
Soil	0-2	Total Petroleum Hydrocarbons		N	See BTEX, PAHs
Soil	0-2	TRPH		N	See BTEX, PAHs
Soil	0-2	Vanadium	N	N	Below Background
Soil	0-2	Xylenes, Total		N	< 5% Detection
Soil	0-2	Zinc	Y	Y	
Soil	0-2	Zirconium	N	N	Below Background
Soil	0-10	1,2,3,4,6,7,8-Heptachlorodibenzofuran		Y	
Soil	0-10	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin		Y	
Soil	0-10	1,2,3,4,7,8,9-Heptachlorodibenzofuran		Y	
Soil	0-10	1,2,3,4,7,8-Hexachlorodibenzofuran		Y	
Soil	0-10	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin		Y	
Soil	0-10	1,2,3,6,7,8-Hexachlorodibenzofuran		Y	
Soil	0-10	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin		Y	
Soil	0-10	1,2,3,7,8,9-Hexachlorodibenzofuran		Y	
Soil	0-10	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin		Y	
Soil	0-10	1,2,3,7,8-Pentachlorodibenzofuran		Y	
Soil	0-10	1,2,3,7,8-Pentachlorodibenzo-p-dioxin		Y	
Soil	0-10	1,2,4-Trimethylbenzene		N	< 5% Detection
Soil	0-10	1-Methyl naphthalene		Y	
Soil	0-10	2,3,4,6,7,8-Hexachlorodibenzofuran		Y	
Soil	0-10	2,3,4,7,8-Pentachlorodibenzofuran		Y	

Table I.4-1
Chemicals of Potential Concern for Human Health
PDU RFI Site

Medium	Depth (ft.)	Chemical	Exceeds Background? (Y/N)	Selected as COPC?	Reason for Exclusion
Soil	0-10	2,3,7,8-Tetrachlorodibenzofuran		Y	
Soil	0-10	2-Methylnaphthalene		Y	
Soil	0-10	Acenaphthene		Y	
Soil	0-10	Acenaphthylene		Y	
Soil	0-10	Acetone		Y	
Soil	0-10	Aluminum	N	N	Below Background
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 1248		Y	
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	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	Bromide		N	No Toxicity Factors
Soil	0-10	Butyl benzyl phthalate		Y	
Soil	0-10	Cadmium	Y	Y	
Soil	0-10	Chromium	N	N	Below Background
Soil	0-10	Chrysene		Y	
Soil	0-10	Cobalt	Y	Y	
Soil	0-10	Copper	N	N	Below Background
Soil	0-10	Cyanides		N	No Toxicity Factors
Soil	0-10	Dibenzo(a,h)anthracene		Y	
Soil	0-10	Dichlorodifluoromethane		N	< 5% Detection
Soil	0-10	Gasoline Range Hydrocarbons (C8-C11)		N	See BTEX, PAHs
Soil	0-10	Kerosene Range Hydrocarbons (C12-C14)		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	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	Diethyl phthalate		N	< 5% Detection
Soil	0-10	Dimethyl phthalate		Y	
Soil	0-10	Di-n-butyl phthalate		Y	
Soil	0-10	Di-n-octyl phthalate		Y	
Soil	0-10	DioxinFuran_TEQ_Mammal		Y	
Soil	0-10	Fluoranthene		Y	
Soil	0-10	Fluorene		Y	
Soil	0-10	Fluoride		Y	
Soil	0-10	Heptachlorodibenzofurans	N	Y	
Soil	0-10	Heptachlorodibenzo-p-dioxins	Y	Y	
Soil	0-10	Hexachlorodibenzofurans	N	Y	
Soil	0-10	Hexachlorodibenzo-p-dioxins	N	Y	
Soil	0-10	Hexavalent Chromium		N	Below Background
Soil	0-10	Indeno(1,2,3-cd)pyrene		Y	
Soil	0-10	Iron	N	N	Below Background

Table I.4-1
Chemicals of Potential Concern for Human Health
PDU RFI Site

Medium	Depth (ft.)	Chemical	Exceeds Background? (Y/N)	Selected as COPC?	Reason for Exclusion
Soil	0-10	Lead	N	N	Below Background
Soil	0-10	Lithium	Y	Y	
Soil	0-10	Manganese	N	N	Below Background
Soil	0-10	Mercury	N	N	Below Background
Soil	0-10	Methyl ethyl ketone		N	< 5% Detection
Soil	0-10	Methylene chloride		N	< 5% Detection
Soil	0-10	Molybdenum	N	N	Below Background
Soil	0-10	m-Xylene & p-Xylene		N	< 5% Detection
Soil	0-10	Naphthalene		Y	
Soil	0-10	Nickel	N	N	Below Background
Soil	0-10	Nitrate-N		Y	
Soil	0-10	Nitrite-N		Y	
Soil	0-10	Octachlorodibenzofuran		Y	
Soil	0-10	Octachlorodibenzo-p-dioxin		Y	
Soil	0-10	Pentachlorodibenzofurans		Y	
Soil	0-10	Pentachlorodibenzo-p-dioxins		Y	
Soil	0-10	Phenanthrene		Y	
Soil	0-10	Pyrene		Y	
Soil	0-10	Selenium	N	N	Below Background
Soil	0-10	Silver	Y	Y	
Soil	0-10	Styrene		Y	
Soil	0-10	Tetrachlorodibenzofurans		Y	
Soil	0-10	Tetrachlorodibenzo-p-dioxins		Y	
Soil	0-10	Thallium	N	N	Below Background
Soil	0-10	Total Petroleum Hydrocarbons		N	See BTEX, PAHs
Soil	0-10	TRPH		N	See BTEX, PAHs
Soil	0-10	Vanadium	N	N	Below Background
Soil	0-10	Xylenes, Total		N	< 5% Detection
Soil	0-10	Zinc	Y	Y	
Soil	0-10	Zirconium	N	N	Below Background
Soil Vapor	0-10	Benzene		Y	
Soil Vapor	0-10	Ethylbenzene		Y	
Soil Vapor	0-10	Tetrachloroethene		N	< 5% Detection
Soil Vapor	0-10	Toluene		Y	
Soil Vapor	0-10	Trichlorofluoromethane		Y	
Soil Vapor	0-10	Xylenes, Total		Y	
Soil Vapor	0-10	m-Xylene & p-Xylene		N	See Xylenes, Total
Soil Vapor	0-10	o-Xylene		N	See Xylenes, Total
Groundwater	-	1,1,1-Trichloroethane		Y	
Groundwater	-	1,1,2-Trichloro-1,2,2-trifluoroethane		Y	
Groundwater	-	1,1-Dichloroethene		Y	
Groundwater	-	1,2,4-Trimethylbenzene		Y	
Groundwater	-	1,2-Dichlorobenzene		Y	
Groundwater	-	1,2-Dichloroethenes		Y	
Groundwater	-	1,3,5-Trimethylbenzene		Y	
Groundwater	-	1,4-Dichlorobenzene		Y	
Groundwater	-	2,2-Dichloro-1,1,1-trifluoroethane		Y	
Groundwater	-	2-n-Butoxyethanol		Y	
Groundwater	-	Acetone		Y	
Groundwater	-	Aluminum		Y	
Groundwater	-	Antimony	Y	Y	
Groundwater	-	Barium	N	N	Below Background
Groundwater	-	Benzene		Y	

Table I.4-1
Chemicals of Potential Concern for Human Health
PDU RFI Site

Medium	Depth (ft.)	Chemical	Exceeds Background? (Y/N)	Selected as COPC?	Reason for Exclusion
Groundwater	-	Benzo(k)fluoranthene		Y	
Groundwater	-	Boron	N	N	Below Background
Groundwater	-	Boron, Dissolved	Y	Y	
Groundwater	-	Bromide		Y	
Groundwater	-	Cadmium	Y	Y	
Groundwater	-	Carbon Disulfide		Y	
Groundwater	-	Chloromethane		Y	
Groundwater	-	Chromium	N	N	Below Background
Groundwater	-	cis-1,2-Dichloroethene		Y	
Groundwater	-	Copper	N	N	Below Background
Groundwater	-	Fluoride	N	N	Below Background
Groundwater	-	Iron	N	N	Below Background
Groundwater	-	Lead	N	N	Below Background
Groundwater	-	Manganese	Y	Y	
Groundwater	-	Mercury	N	N	Below Background
Groundwater	-	Methyl ethyl ketone		Y	
Groundwater	-	Methylene chloride		Y	
Groundwater	-	Molybdenum		Y	
Groundwater	-	Nitrate-NO3		Y	
Groundwater	-	Perchlorate		Y	
Groundwater	-	Strontium, Dissolved	N	N	Below Background
Groundwater	-	Tetrachloroethene		Y	
Groundwater	-	Toluene		Y	
Groundwater	-	trans-1,2-Dichloroethene		Y	
Groundwater	-	Trichloroethene		Y	
Groundwater	-	Zinc	N	N	Below Background

Table I.4-2
Human Health Risk Estimates[1]
PDU 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	0.000001	-	0.00007		1E-07	- 3E-05	a, b, c	NA	-	NA		NA	- NA		<0.01	-	<0.01		1E-07	- 3E-05	a, b, c
Future Child Recreator	0.00003	-	0.0002		1E-06	- 2E-05	a, b	NA	-	NA		NA	- NA		<0.01	-	<0.01		1E-06	- 2E-05	a, b
Future Adult Resident	0.01	-	0.06		1E-06	- 4E-05	a, b, c, d, e	1	-	2	f	2E-07	- 7E-07		1	-	2	f	2E-06	- 4E-05	a, b, c, d, e, h
Future Child Resident	0.1	-	0.5		1E-05	- 8E-05	a, b, c, d, e, g	4	-	6	f	7E-07	- 7E-07		4	-	7	f	1E-05	- 8E-05	a, b, c, d, e, g, h

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 = Indeno(1,2,3-cd)pyrene
c = Benzo(b)fluoranthene
d = Benzo(k)fluoranthene
e = Dioxin/Furan TEQ
f = Antimony
g = Benzo(a)anthracene
h = Tetrachloroethene

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

Table I.4-3
Human Health Risk Assessment Uncertainty Analysis
PDU RFI Site

Assessment Element	Uncertainty	Magnitude of Impact	Direction of Impact
COPC Selection	Several inorganics were selected as COPCs since it could not be demonstrated that they are 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, PCE and TCE were selected as soil vapor COPCs since they were directly detected in soil vapor. Several other VOCs were also selected as soil vapor COPCs because they were detected in soil but not analyzed for	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
EPC Calculations	EPCs are based on some data that are over 20 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 several VOCs 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 h	Moderate	Conservative
	The maximum detected concentration of each COPC detected in groundwater was used as the EPC.	Moderate	Conservative
	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

Table I.4-3
Human Health Risk Assessment Uncertainty Analysis
PDU RFI Site

Assessment Element	Uncertainty	Magnitude of Impact	Direction of Impact
	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, PC	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 partition coefficient
OEHHA - Office of Environmental Health Hazard Assessment
PAH - polycyclic aromatic hydrocarbon
TPH - total petroleum hydrocarbons
UCL - upper confidence limit
USEPA - United States Environmental Protection Agency

Table I.4-4
Chemicals of Ecological Concern - Soil
PDU RFI Site

	Range of HQs - RME Exposure (Refined Calculations)																Identification of COECs	
Preferred Analyte Name	**Terrestrial Plant**	**Soil Invertebrate**	**Hermit Thrush**			**Red-Tailed Hawk**			**Deer Mouse**			**Bobcat**			**Mule Deer**			**COEC**	**Rationale**
Cadmium	<1	<1	<1	--	**58**	<1	--	<1	**1.1**	--	**48**	<1	--	<1	<1	--	**1.1**	**Yes (hot spot)**	-Estimated risks >1 for only 2 receptors (thrush and mouse) at the Low TRV only. -Estimated risks driven by single high detect (14.7 mg/kg) at PUBS1009. -Of remaining results only 8-15% exceed the maximum detected background concentration (depending on depth interval).
Silver	**2.0**	No TRV	No TRV	--	<1	No TRV	--	<1	<1	--	**5.1**	<1	--	<1	<1	--	<1	**Yes**	-Estimated risks for two receptors (terrestrial plants and mouse). -Incremental risks >1 -Over 40% of the site results exceed the maximum background concentration.
Zinc	**1.8**	**1.2**	**1.01**	--	**9.1**	<1	--	<1	<1	--	**8.5**	<1	--	<1	<1	--	<1	**Yes (hot spot)**	-Estimated risks >1 for 3 receptors (plants, thrush, and mouse) at the Low TRV only. -Estimated risks driven by several high detects (>200 mg/kg) around locations PUBS06, PUBS07, PUBS08, PUBS09, PUBS10,PUBS11, PUBS1042, PUBS1044, PUBS046, and PUBS1048. -Of remaining results 13-20% exceed the maximum detected background concentration (depending on depth interval).
2,4-Dinitrophenol	No TRV	No TRV	**1.3**	--	**13.2**	<1	--	<1	<1	--	**1.8**	<1	--	<1	<1	--	<1	No	-Chemical was never detected.
Aroclor 1248	<1	<1	<1	--	**1.6**	<1	--	<1	<1	--	**3.1**	<1	--	<1	<1	--	<1	**Yes**	-Estimated risks for this analyte (HQ) exceeded 1 for thrush and mouse at the Low TRV. -Summed risk estimate (HI) for Aroclors exceeded 1 for thrush and mouse.
Aroclor 1260	<1	<1	<1	--	**1.2**	<1	--	<1	<1	--	<1	<1	--	<1	<1	--	<1	**Yes**	-Estimated risks for this analyte (HQ) exceeded 1 for thrush at the Low TRV. -HQ for thrush was very close to 1 (1.2), but -Summed risk estimate (HI) for Aroclors exceeded 1 for thrush and mouse.
Benzo(a)anthracene	**1.2**	<1	No TRV	--	<1	No TRV	--	<1	<1	--	<1	<1	--	<1	<1	--	<1	**Yes**	-Estimated risks for this analyte (HQ) exceeded 1 for terrestrial plants only, but -Summed risk estimate (Hazard Index) for PAHs exceeded 1 for thrush and mouse.
Benzo(a)pyrene	**2.7**	<1	No TRV	--	<1	No TRV	--	<1	<1	--	<1	<1	--	<1	<1	--	<1	**Yes**	-Estimated risks for this analyte (HQ) exceeded 1 for terrestrial plants only, but -Summed risk estimate (Hazard Index) for PAHs exceeded 1 for thrush and mouse.
Benzo(b)fluoranthene	**2.3**	<1	No TRV	--	<1	No TRV	--	<1	<1	--	<1	<1	--	<1	<1	--	<1	**Yes**	-Estimated risks for this analyte (HQ) exceeded 1 for terrestrial plants only, but -Summed risk estimate (Hazard Index) for PAHs exceeded 1 for thrush and mouse.
Benzo(ghi)perylene	**6.5**	<1	No TRV	--	<1	No TRV	--	<1	<1	--	<1	<1	--	<1	<1	--	<1	**Yes**	-Estimated risks for this analyte (HQ) exceeded 1 for terrestrial plants only, but -Summed risk estimate (Hazard Index) for PAHs exceeded 1 for thrush and mouse.
Benzo(k)fluoranthene	**2.0**	<1	No TRV	--	<1	No TRV	--	<1	<1	--	<1	<1	--	<1	<1	--	<1	**Yes**	-Estimated risks for this analyte (HQ) exceeded 1 for terrestrial plants only, but -Summed risk estimate (Hazard Index) for PAHs exceeded 1 for thrush and mouse.
Chrysene	**1.7**	<1	No TRV	--	<1	No TRV	--	<1	<1	--	<1	<1	--	<1	<1	--	<1	**Yes**	-Estimated risks for this analyte (HQ) exceeded 1 for terrestrial plants only, but -Summed risk estimate (Hazard Index) for PAHs exceeded 1 for thrush and mouse.
DioxinFuranPCB_TEQ_Bird	No TRV	<1	**1.7**	--	**17**	<1	--	<1	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	**Yes**	-Estimated risks for multiple receptors for Low and High TRV.
DioxinFuranPCB_TEQ_Mammal	No TRV	<1	n/a	--	n/a	n/a	--	n/a	**7.6**	**--**	**76**	<1	--	<1	<1	--	<1	**Yes**	-Estimated risks >10 at the Low TRV
Hexachlorobenzene	Not CPEC	Not CPEC	Not CPEC	--	Not CPEC	Not CPEC	--	Not CPEC	**24**	--	**88**	Not CPEC	--	Not CPEC	Not CPEC	--	Not CPEC	No	-Chemical was never detected.
Indeno(1,2,3-cd)pyrene	**5.7**	<1	No TRV	--	<1	No TRV	--	<1	<1	--	<1	<1	--	<1	<1	--	<1	**Yes**	-Estimated risks for this analyte (HQ) exceeded 1 for terrestrial plants only, but -Summed risk estimate (Hazard Index) for PAHs exceeded 1 for thrush and mouse.

	Terrestrial Plants	Soil Invertebrates	Hermit Thrush			Red-Tailed Hawk			Deer Mouse			Bobcat			Mule Deer		
Cadmium	<1	<1	<1	--	**30**	<1	--	<1	<1	--	**17**	<1	--	<1	<1	--	<1
Silver	**1.5**	--	--	--	<1	--	--	<1	<1	--	**3.4**	<1	--	<1	<1	--	<1
Zinc	**1.4**	<1	<1	--	**6.8**	<1	--	<1	<1	--	**5.7**	<1	--	<1	<1	--	<1
2,4-Dinitrophenol	n/a	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a
Aroclor 1248	n/a	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a
Aroclor 1260	n/a	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a
Benzo(a)anthracene	n/a	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a
Benzo(a)pyrene	n/a	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a
Benzo(b)fluoranthene	n/a	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a
Benzo(ghi)perylene	n/a	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a
Benzo(k)fluoranthene	n/a	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a
Chrysene	n/a	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a
DioxinFuranPCB_TEQ_Bird	n/a	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a
DioxinFuranPCB_TEQ_Mammal	n/a	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a
Hexachlorobenzene	n/a	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a
Indeno(1,2,3-cd)pyrene	n/a	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a	n/a	--	n/a

Table I.4-4
Chemicals of Ecological Concern - Soil
PDU RFI Site

	Range of HQs - RME Exposure (Refined Calculations)																			Identification of COECs	
Preferred Analyte Name	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
Phenanthrene	No TRV	<1	<1	--	**1.0**	<1	--	<1	<1	--	<1	<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 for this analyte (HQ) exceeded 1 for thrush only, but -Summed risk estimate (Hazard Index) for PAHs exceeded 1 for thrush and mouse.
Pyrene	No TRV	<1	<1	--	**2.0**	<1	--	<1	<1	--	<1	<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 for this analyte (HQ) exceeded 1 for thrush only, but -Summed risk estimate (Hazard Index) for PAHs exceeded 1 for thrush and 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
CTE - central tendency exposure
HI - hazard index
HQ - hazard quotient
RME - reasonable maximum exposure
TRV - toxicity reference value

Table I.4-5
Ecological Risk Assessment Uncertainty Analysis
PDU 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 analyzed only for perchlorate making them of limited usefulness for evaluating potential exposure and risk to ecological receptors.	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

Table I.4-5
Ecological Risk Assessment Uncertainty Analysis
PDU RFI Site

Assessment Element	Uncertainty	Magnitude of Impact	Direction of Impact
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
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
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

Table I.4-5
Ecological Risk Assessment Uncertainty Analysis
PDU RFI Site

Assessment Element	Uncertainty	Magnitude of Impact	Direction of Impact
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 I.5-1
Surficial Media Site Action Recommendations
PDU RFI Site

Area	Chemical Use Area Name	CMS Area (1)	Recommended for further consideration in CMS based on:				
			Residential Receptor (2)	Recreational Receptor (2)	Ecological Receptor (2)		
1	Building 4005	PDU-2	HRA COC:	HRA COC:	***Soil Results***		
2	Building 4006	PDU-1			Any HQ>1?	COEC?	Rationale
4	Building 4027	NFA	***Soil Results:***	***Surface Soil Results:***	Cadmium	Yes	ERA-4
5	Building 4032	NFA	Benzo(a)anthracene	Benzo(a)pyrene,	Silver	Yes	ERA-1
6	Building 4042	PDU-2	Benzo(a)pyrene,	Benzo(b)fluoranthene,	Zinc	Yes	ERA-5
7	Former PDU Area	PDU-2	Benzo(b)fluoranthene,	Indeno(1,2,3-cd)pyrene	2,4-Dintrophenol	No	ERA-6
11	Building 4402	NFA	Benzo(k)fluoranthene,		Aroclor 1248	Yes	ERA-7
13	Building 4616	NFA	Dioxin/Furan TEQ,		Aroclor 1260	Yes	ERA-7
14	Coal Storage Yard	NFA	Indeno(1,2,3-cd)pyrene,		Benzo(a)anthracene	Yes	ERA-7
17	Transformer 4706	NFA			Benzo(a)pyrene	Yes	ERA-7
20	Transformer 4742	NFA	***Near Surface Groundwater Results:***		Benzo(b)fluoranthene	Yes	ERA-7
21	Building 4005/4006 Leach Field	NFA	Antimony		Benzo(ghi)perylene	Yes	ERA-7
22	Bag House	PDU-4			Benzo(k)fluoranthene	Yes	ERA-7
23	Catchment Basin	NFA	***Soil Vapor Results:***		Chrysene	Yes	ERA-7
24	17 St. Drainage area	PDU-3	Tetrachloroethene		DioxinFuranPCB_TEQ_Bird	Yes	ERA-3
25	Building 4037	NFA			DioxinFuranPCB_TEQ_Mammal	Yes	ERA-3
					Hexachlorobenzene	No	ERA-6
					Indeno(123-cd)pyrene	Yes	ERA-7
					Phenanthrene	Yes	ERA-7
					Pyrene	Yes	ERA-7
					Soil Vapor Results		
					Any HQ>1?	COEC	Rationale
					None	None	ERA-2
					Surface Water Results		
					Any HQ>1?	COEC	Rationale
					None	None	ERA-2

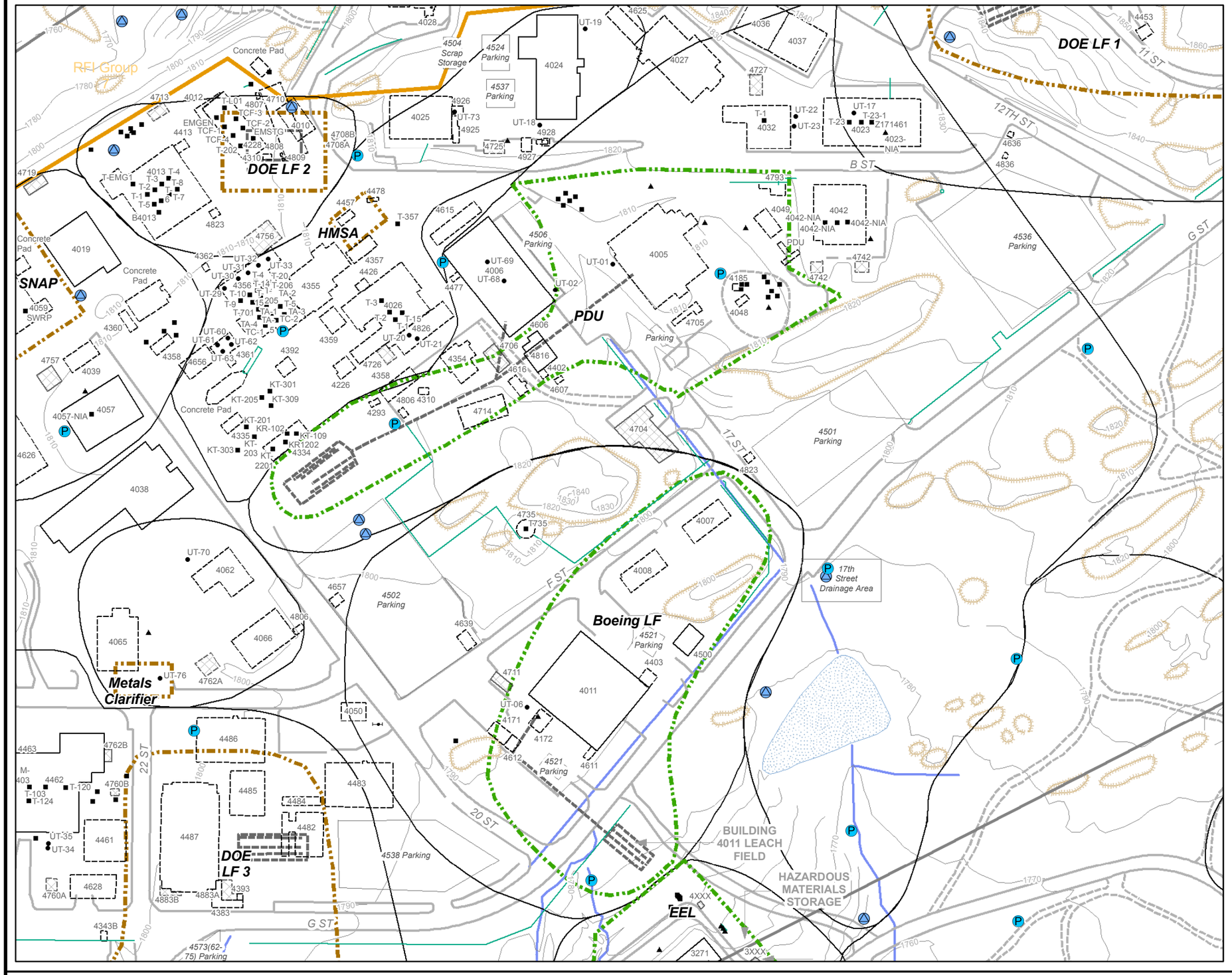
Notes:
1. NFA - Indicates area is recommended for No Further Action (NFA) for the CUA; not recommended for CMS evaluation.
2. CMS recommendations are based on compounds considered risk drivers (excess cancer risk > 1 x 10^{-6} or hazard index > 1) and/or significant risk contributors.

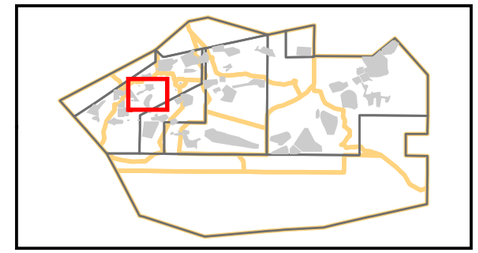
ERA-1 Estimated risks and or incremental risks >1 for 1 or more receptors. Magnitude of exceedance indicate potential risk.
ERA-2 No chemicals of potential ecological concern exceeded Low or High TRVs under either the CTE or RME scenarios.
ERA-3 Estimated risks >1 for 1 or more receptors. Chemical class Hazard Index >1.
ERA-4 Estimated risks >1 at the Low TRV only. Estimated risks driven by single high detect (14.7 mg/kg) at PUBS1009.
ERA-5 Estimated risks 3 receptors at the Low TRV only. Estimated risks driven by several high detects (>200 mg/kg) around locations PUBS06, PUBS07, PUBS08, PUBS09, PUBS10,PUBS11, PUBS1042, PUBS1044, PUBS046, and PUBS1048.
ERA-6 Chemical was not detected on site, but was retained in the evaluations as part of the SQL/ESL screen. Actual presence and concentration is uncertain
ERA-7 Retained primarily because individual chemical HQ and chemical class HI >1.

Table I.5-2
Summary of Site Surficial Media CMS Recommendations
PDU RFI Site

CMS Area	Description	Chemical Risk Drivers and Contributors	Rationale
PDU - 1	Building 4006 area	Metals (cadmium and silver) and PCBs (Aroclor 1260)	Metals concentrations exceed background concentrations and Eco RBSLs in samples from 28 borehole locations. Nine samples contained PCB concentrations above Eco RBSLs
PDU - 2	Former PDU Area and Buildings 4005, 4705, 4042, and 4742	Metals (cadmium, silver, and zinc)	Metals concentrations exceed background concentrations and Residential and/or Eco RBSLs in 20 samples.
PDU - 3	17th Street Drainage Area	SVOCs, metals (cadmium, silver, and zinc), PCBs (Aroclor 1248 and Aroclor 1260), and dioxins	SVOC concentrations exceed Residential and/or Eco RBSLs in samples from 10 boring locations. Metals concentrations exceed background and Eco RBSLs in samples from 28 boring locations. PCBs exceed Eco RBSLs in three samples. Dioxins were detected above background and Residential and/or Eco RBSLs in one sample.
PDU - 4	Former Bag House Area	PCE	PCE concentrations exceed Residential RBSLs in samples from 1 soil vapor probe location.

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
PDU RFI Site

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

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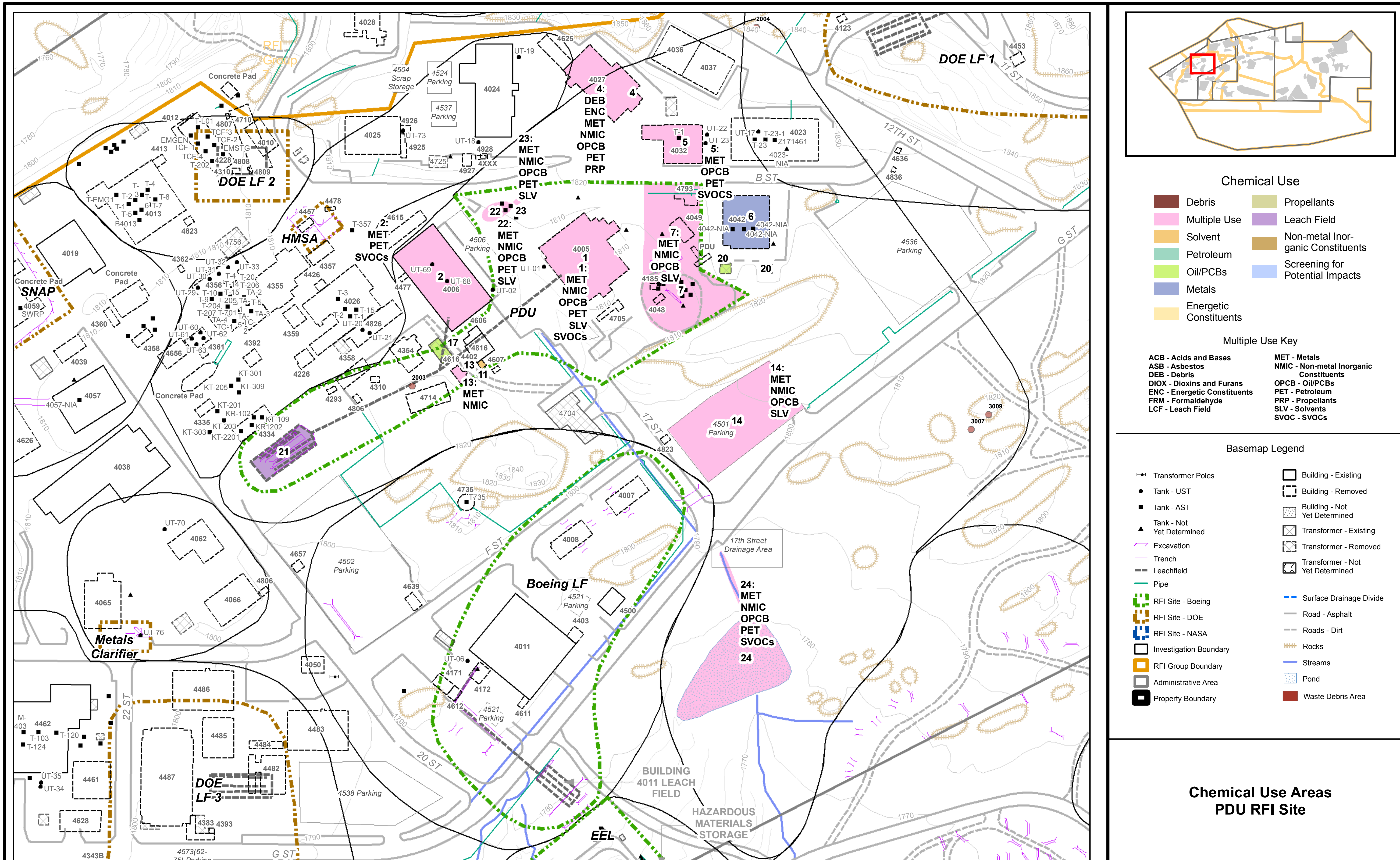
1 inch equals 150 feet

0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure I.1-1



Date: September 17, 2008 WORKING DRAFT

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SANTA SUSANA FIELD LABORATORY

Chemical Use Areas
PDU RFI Site

CH2MHILL

Figure I.2-1

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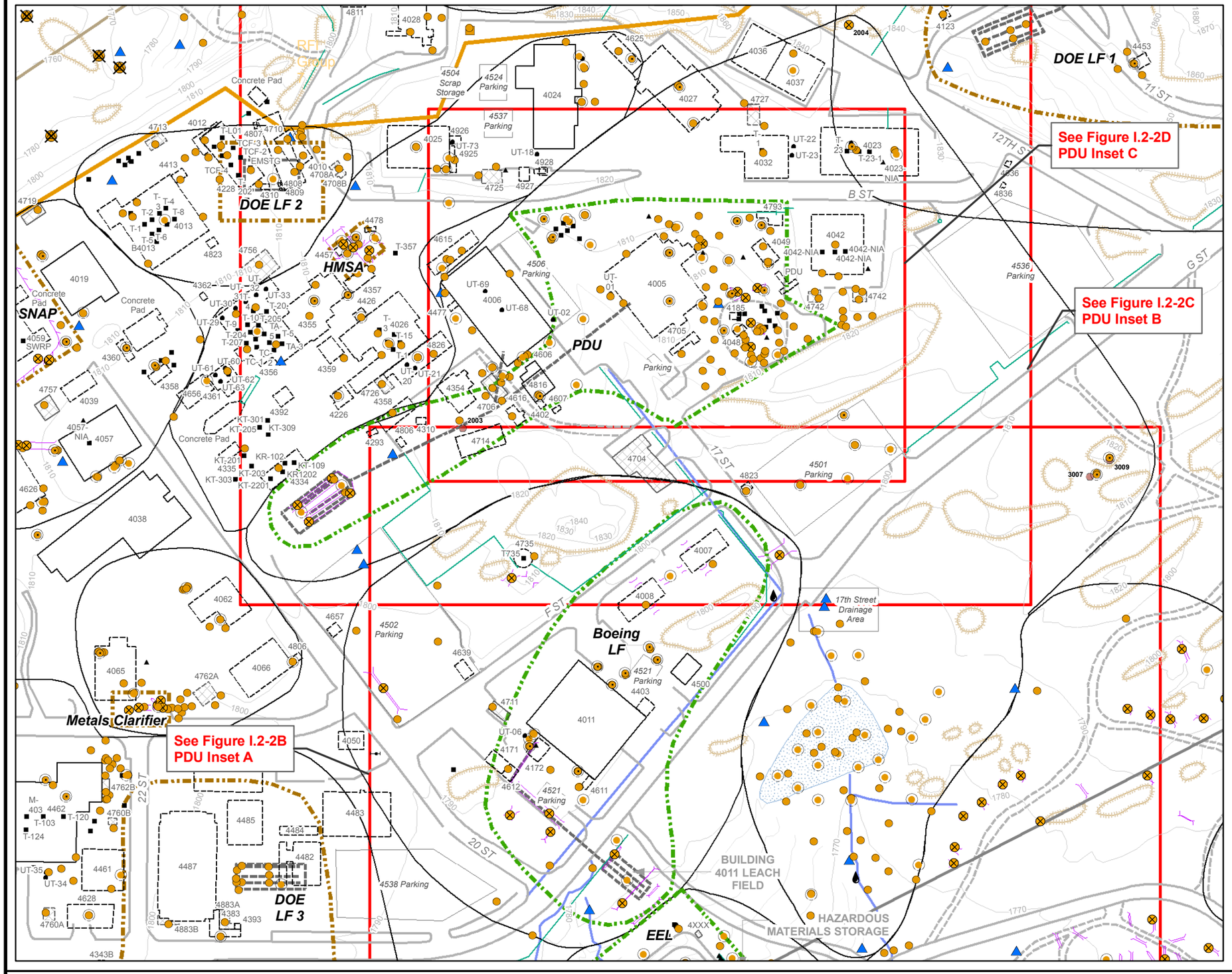

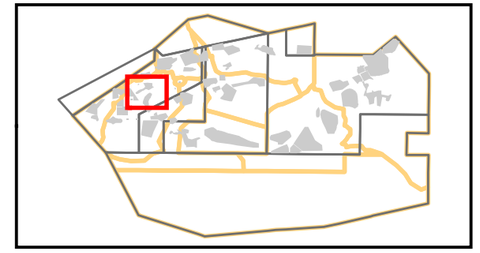

Sample Type

- 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 PDU RFI Site

Date: November 04, 2008 WORKING DRAFT

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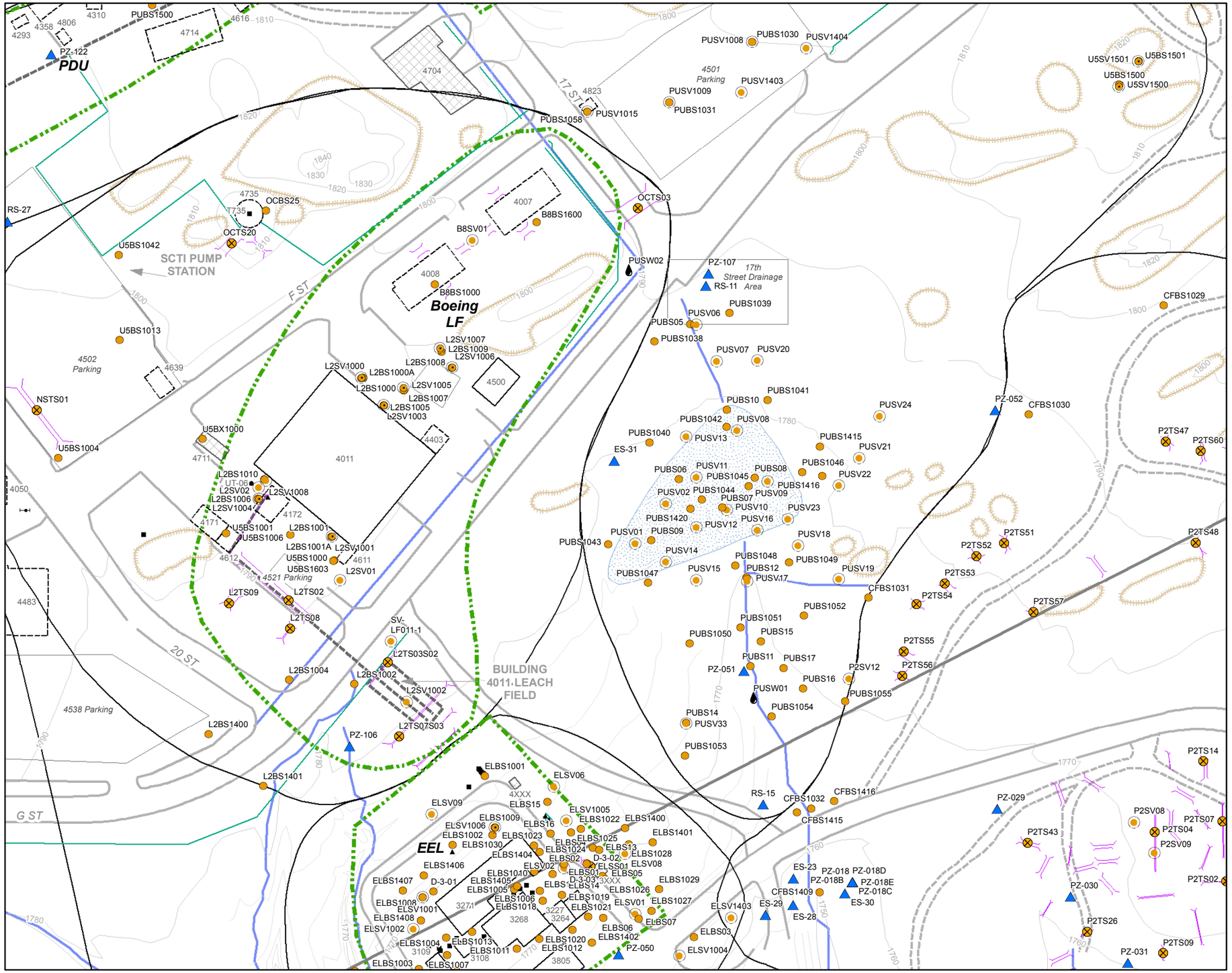
1 inch equals 150 feet

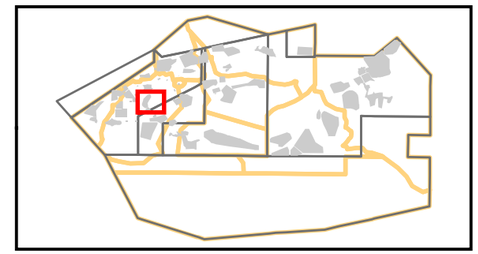
0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure I.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
PDU RFI Site

Date: October 30, 2008 WORKING DRAFT

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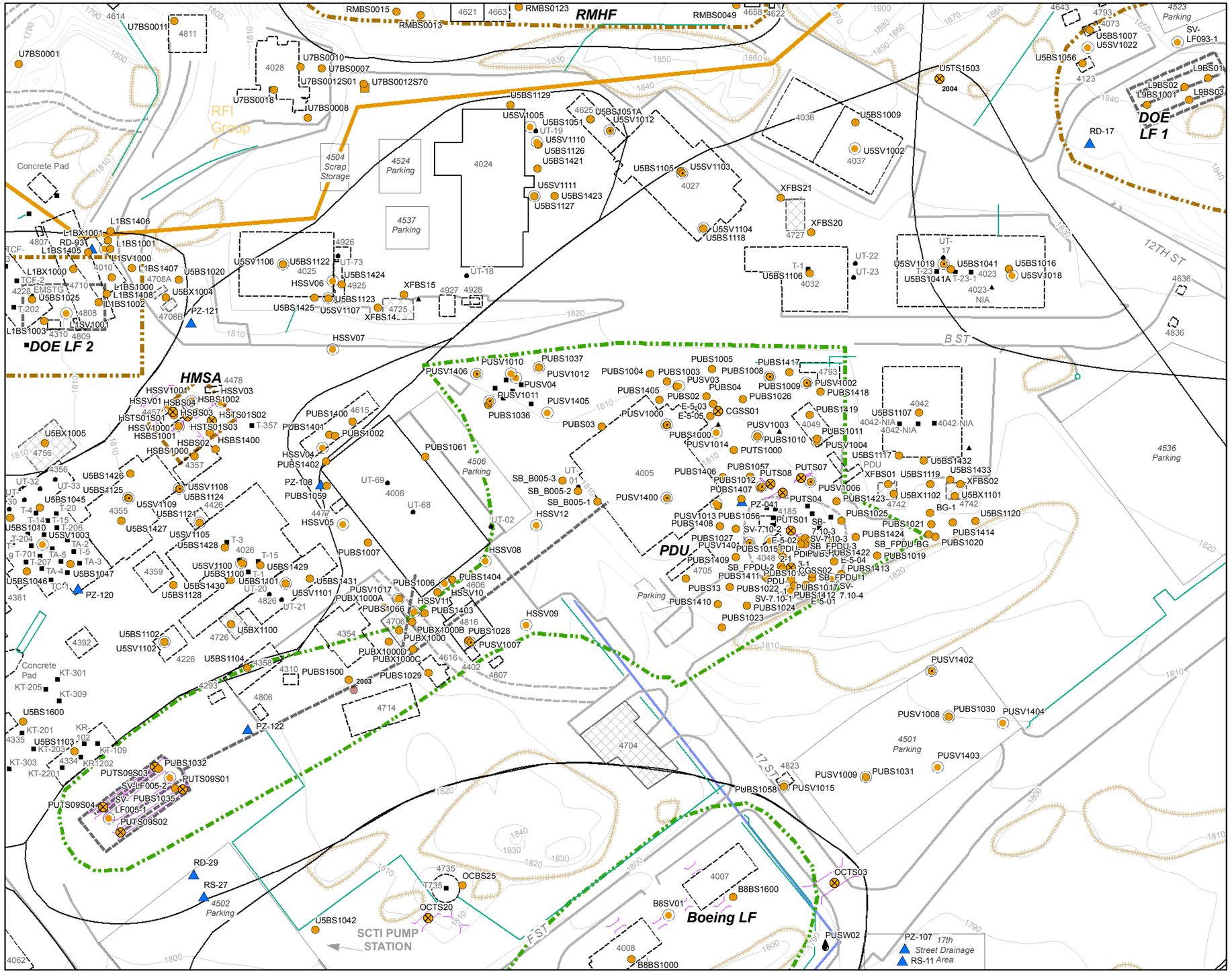
1 inch equals 100 feet

0 100 200 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure I.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)
- 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 B
PDU RFI Site

Date: October 30, 2008

WORKING DRAFT

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1 inch equals 100 feet

0 100 200 Feet

SANTA SUSANA FIELD LABORATORY

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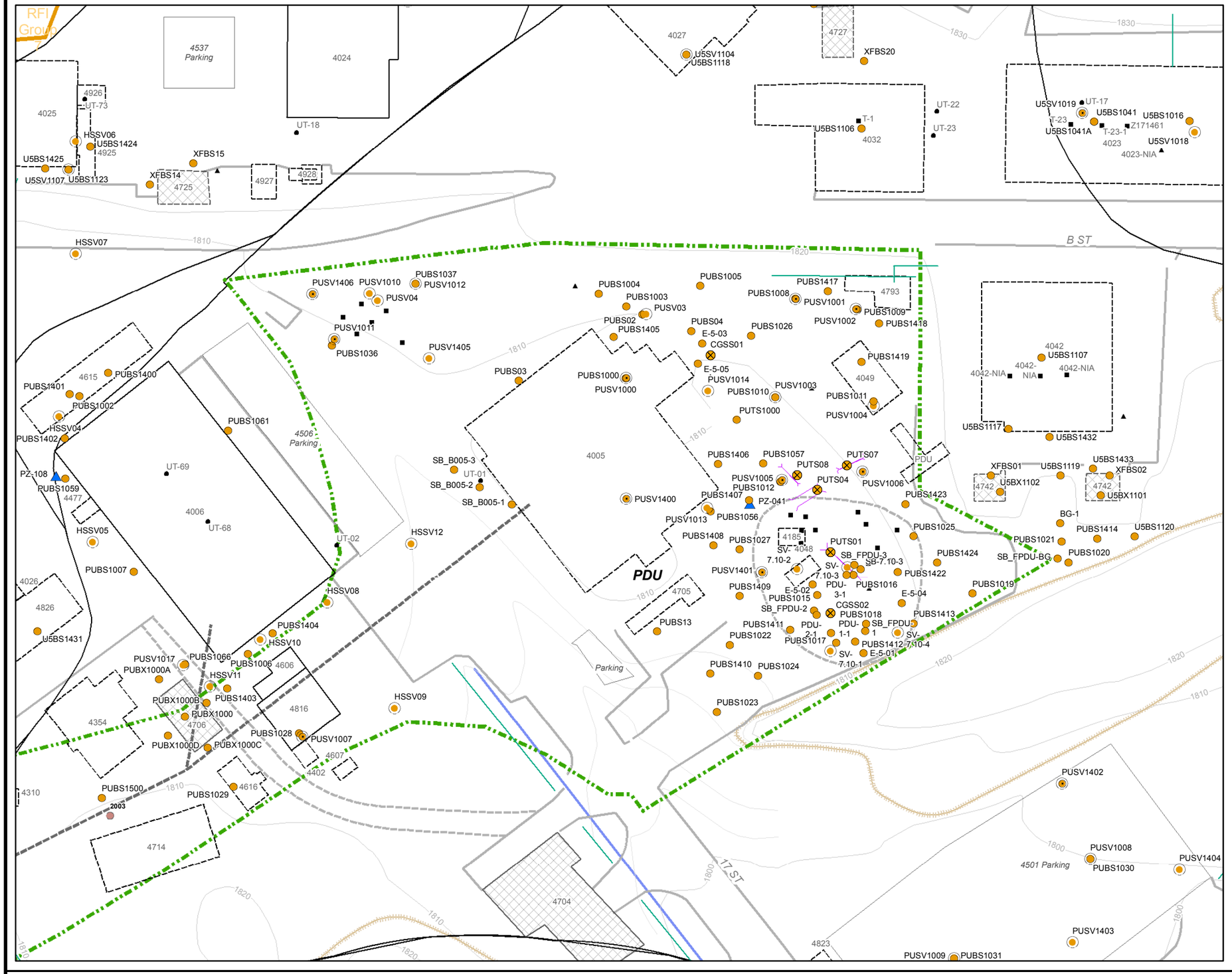
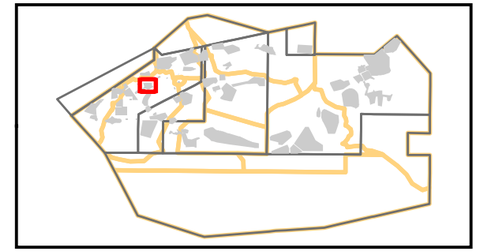
Figure I.2-2C





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 C
PDU RFI Site

Date: October 30, 2008 WORKING DRAFT

\\..MapFiles\RFI_05\RFI_Report\RFISites_SampleLocs_BL_PLTS.mxd

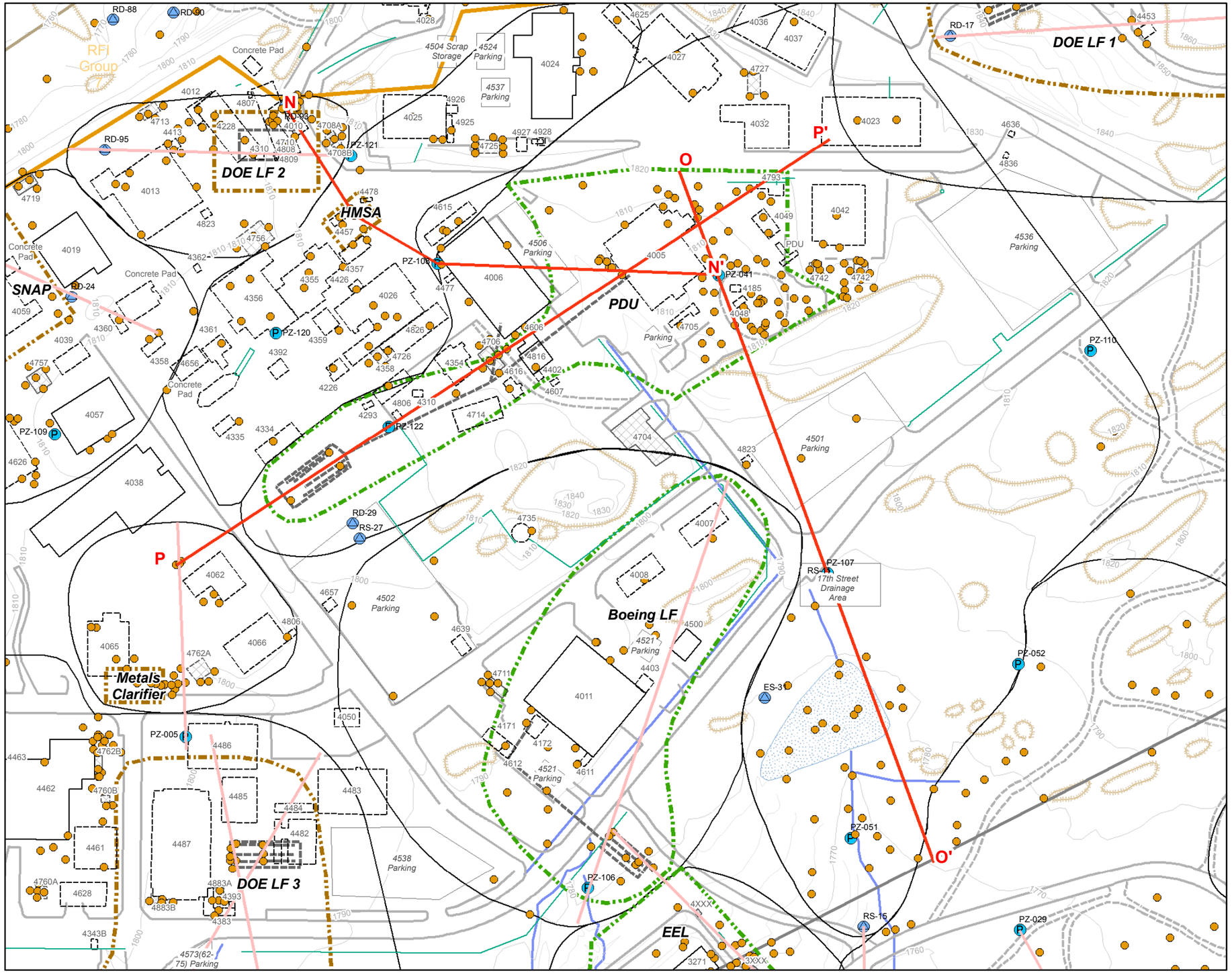
1 inch equals 60 feet

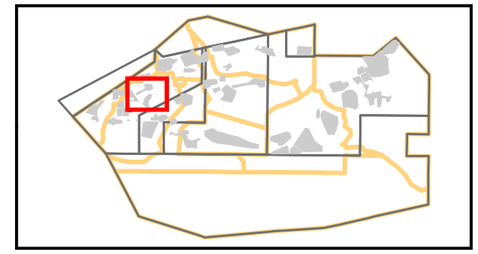
0 60 120 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure I.2-2D





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

PDU Cross Section Locations
N-N',O-O', and P-P'

Date: September 18, 2008 WORKING DRAFT

\\..RFI_05\RFISites\ColorDot_BL\RFISites_CDotMtlsSoil_BL_PLTS.mxd

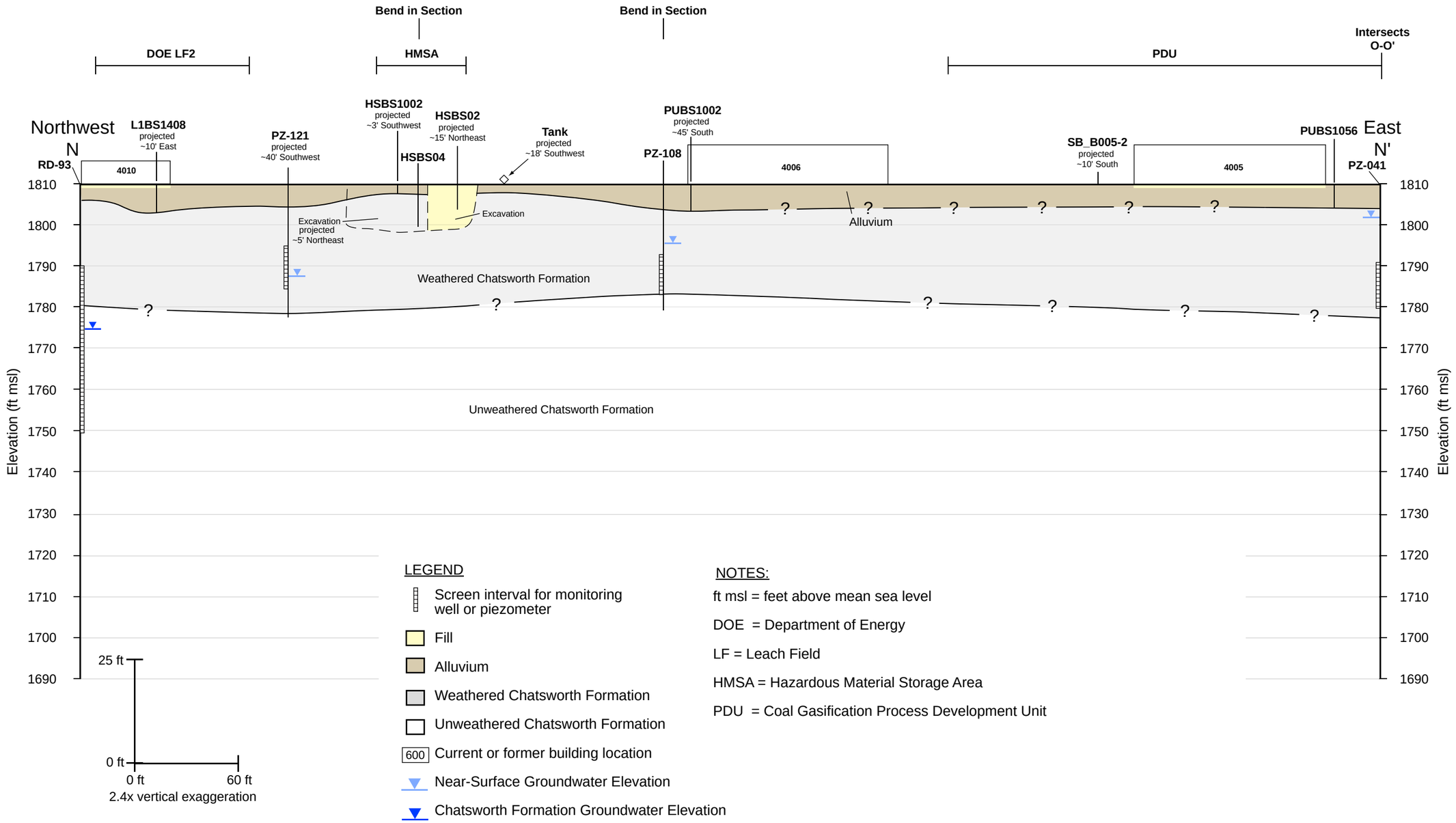
1 inch equals 150 feet

0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure I.2-3A



LEGEND

- Screen interval for monitoring well or piezometer
- Fill
- Alluvium
- Weathered Chatsworth Formation
- Unweathered Chatsworth Formation
- 600 Current or former building location
- Near-Surface Groundwater Elevation
- Chatsworth Formation Groundwater Elevation

NOTES:

ft msl = feet above mean sea level

DOE = Department of Energy

LF = Leach Field

HMSA = Hazardous Material Storage Area

PDU = Coal Gasification Process Development Unit

FIGURE I.2-3B
Surficial Cross Section N-N'
PDU
Santa Susana Field Laboratory

CH2MHILL

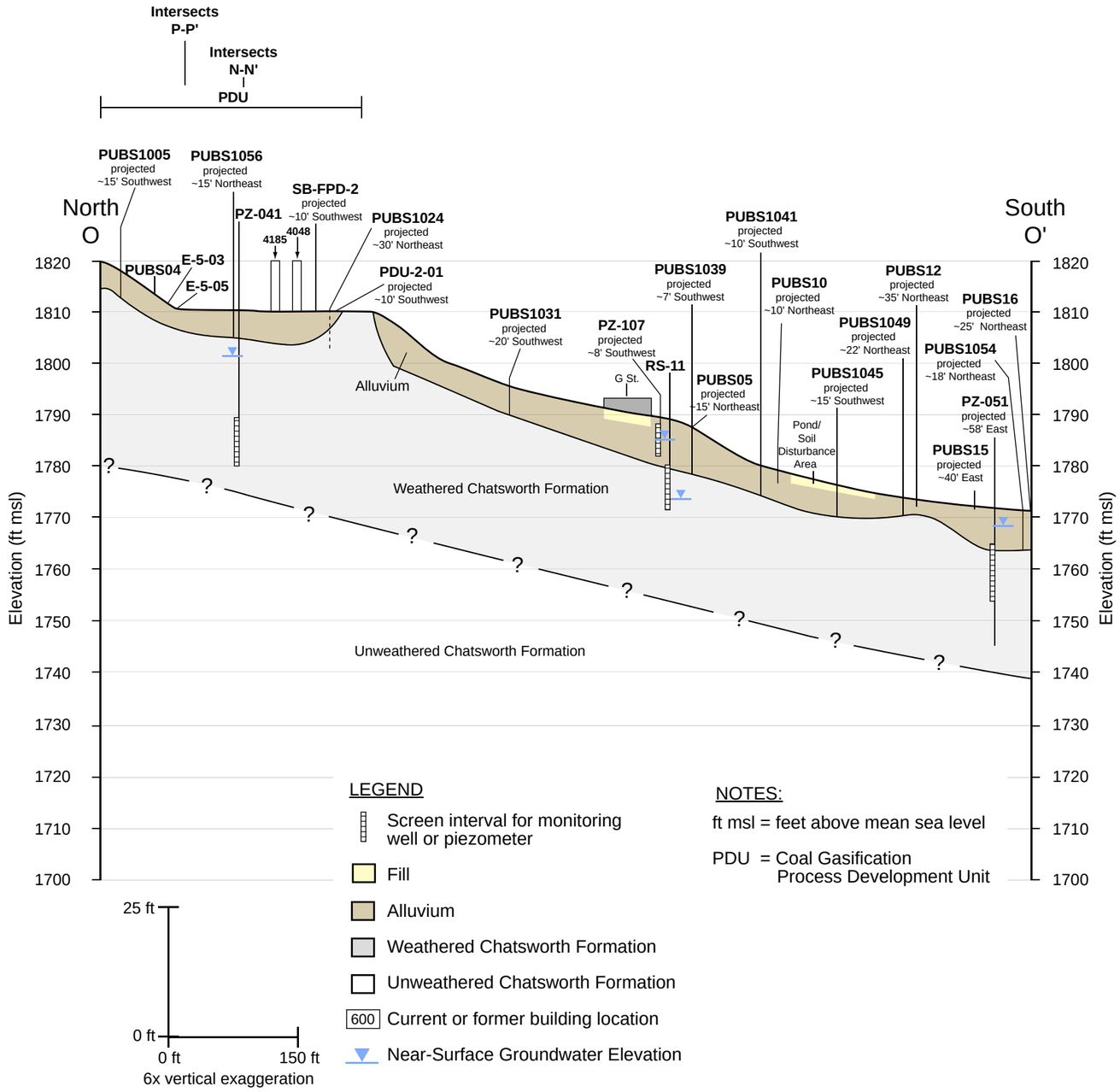


FIGURE I.2-3C
Surficial Cross Section O-O'
PDU
Santa Susana Field Laboratory

ES072007017SCO362070.FP.5A.05.BO CrossSect_OO.ai 11/08

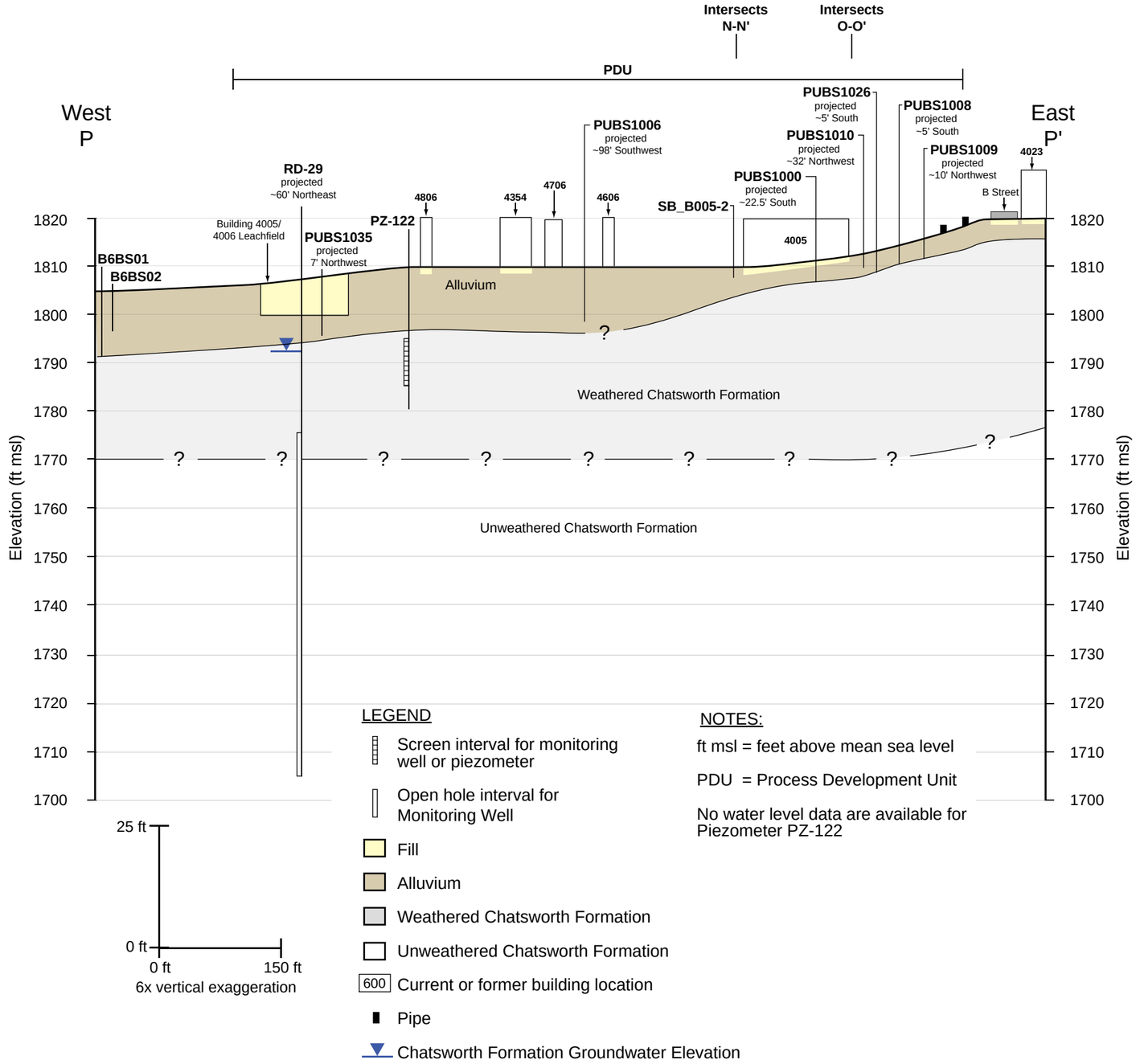
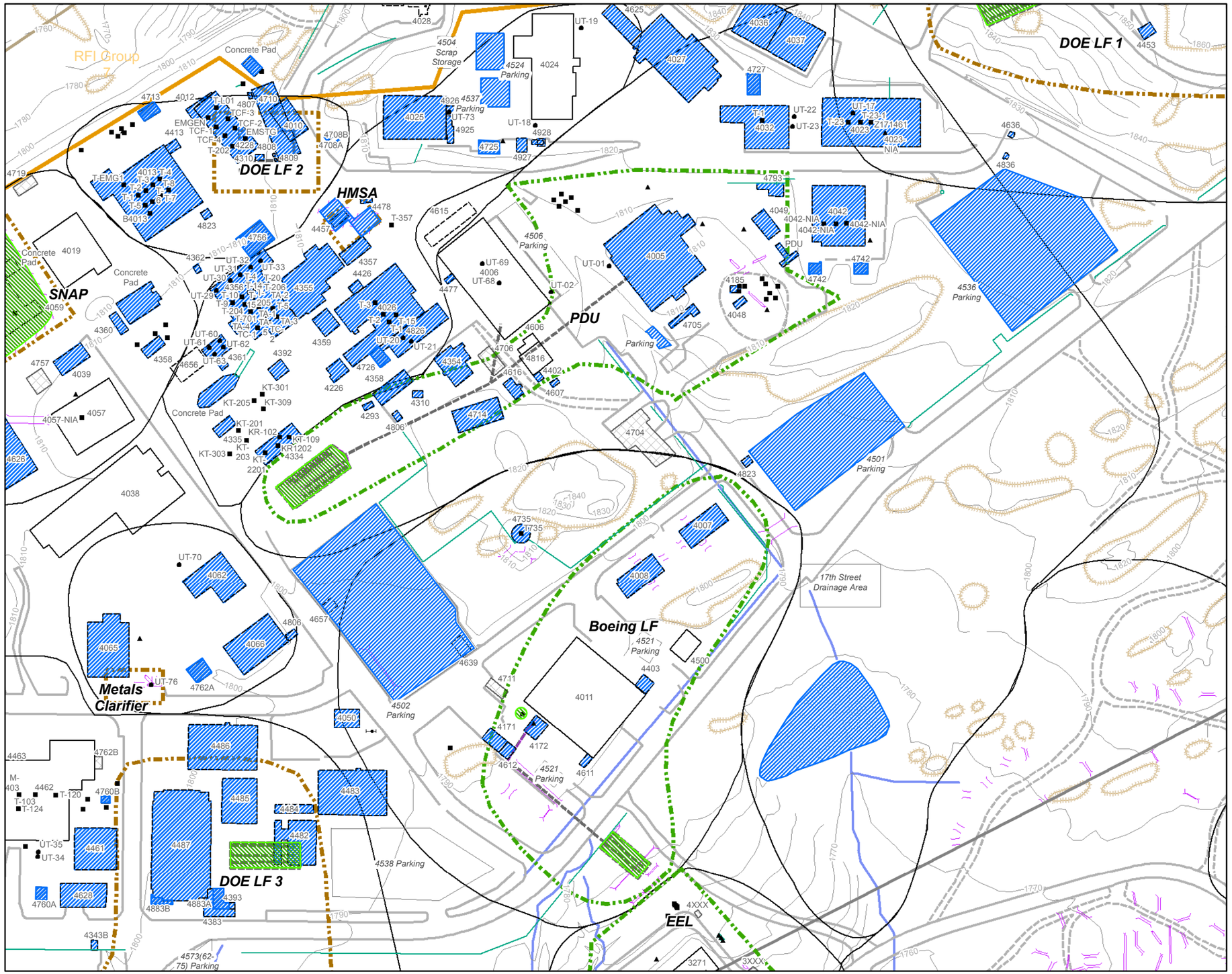
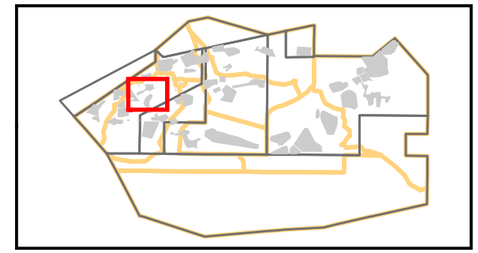


FIGURE I.2-3D
Surficial Cross Section P-P'
PDU
Santa Susana Field Laboratory
CH2MHILL





Approximate Areas of Soil Disturbance

- Grading
- Excavation - Backfill

Basemap Legend

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

Soil Disturbance Area
PDU RFI Site

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

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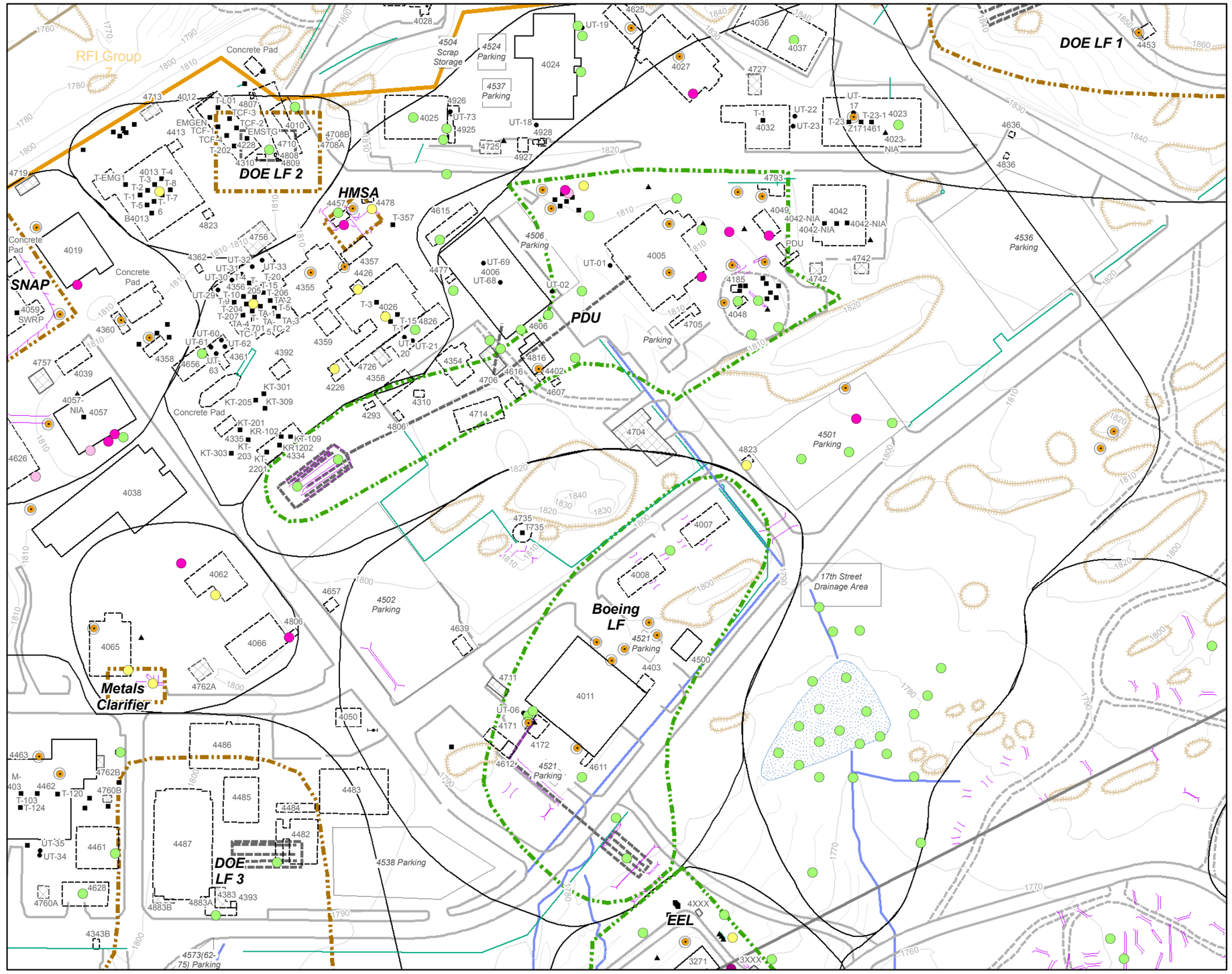
1 inch equals 150 feet

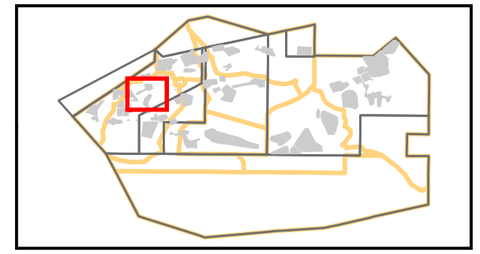
0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure I.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
PDU RFI Site

Date: November 03, 2008

WORKING DRAFT

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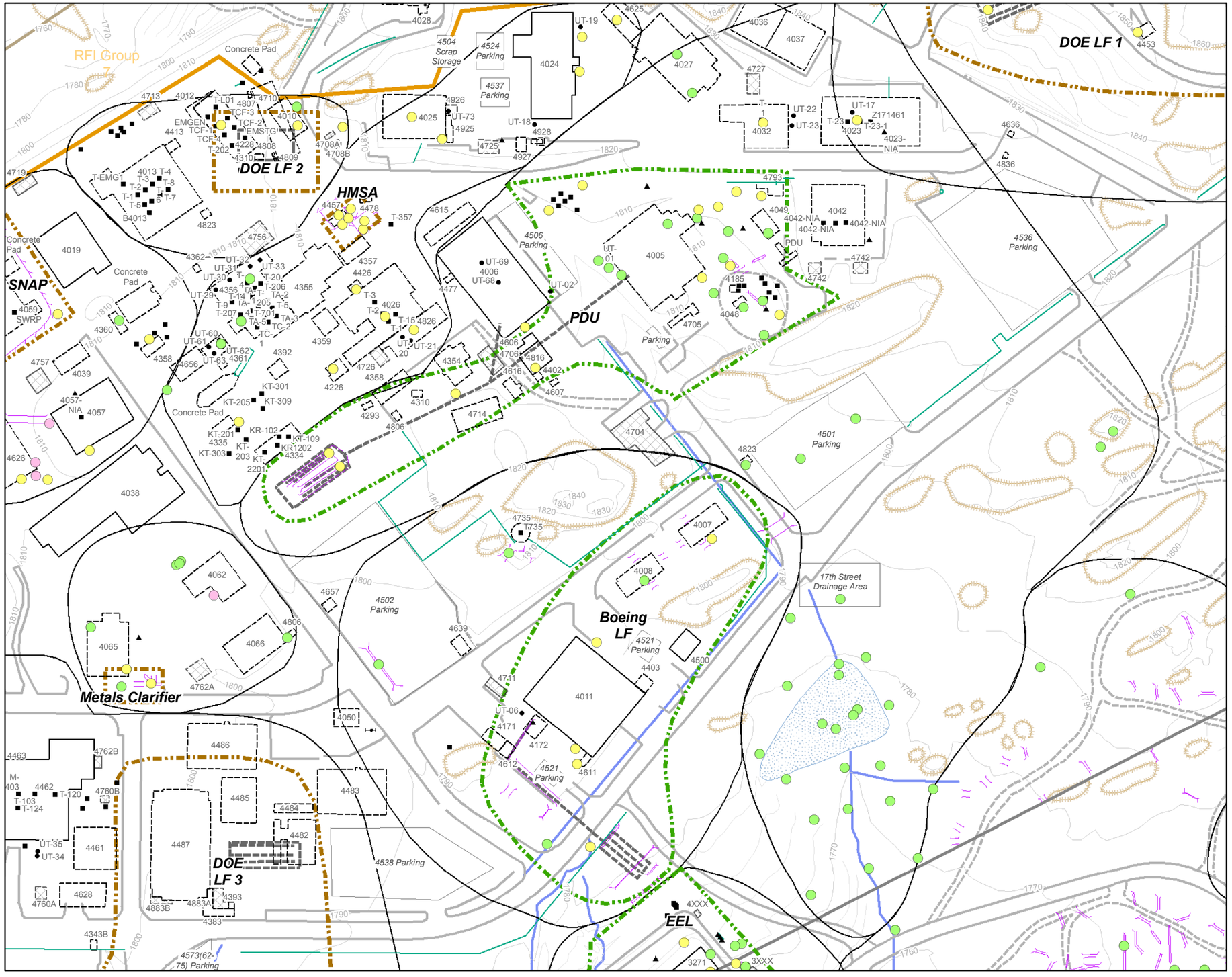
1 inch equals 150 feet

0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure I.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
PDU RFI Site

Date: October 30, 2008

WORKING DRAFT

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

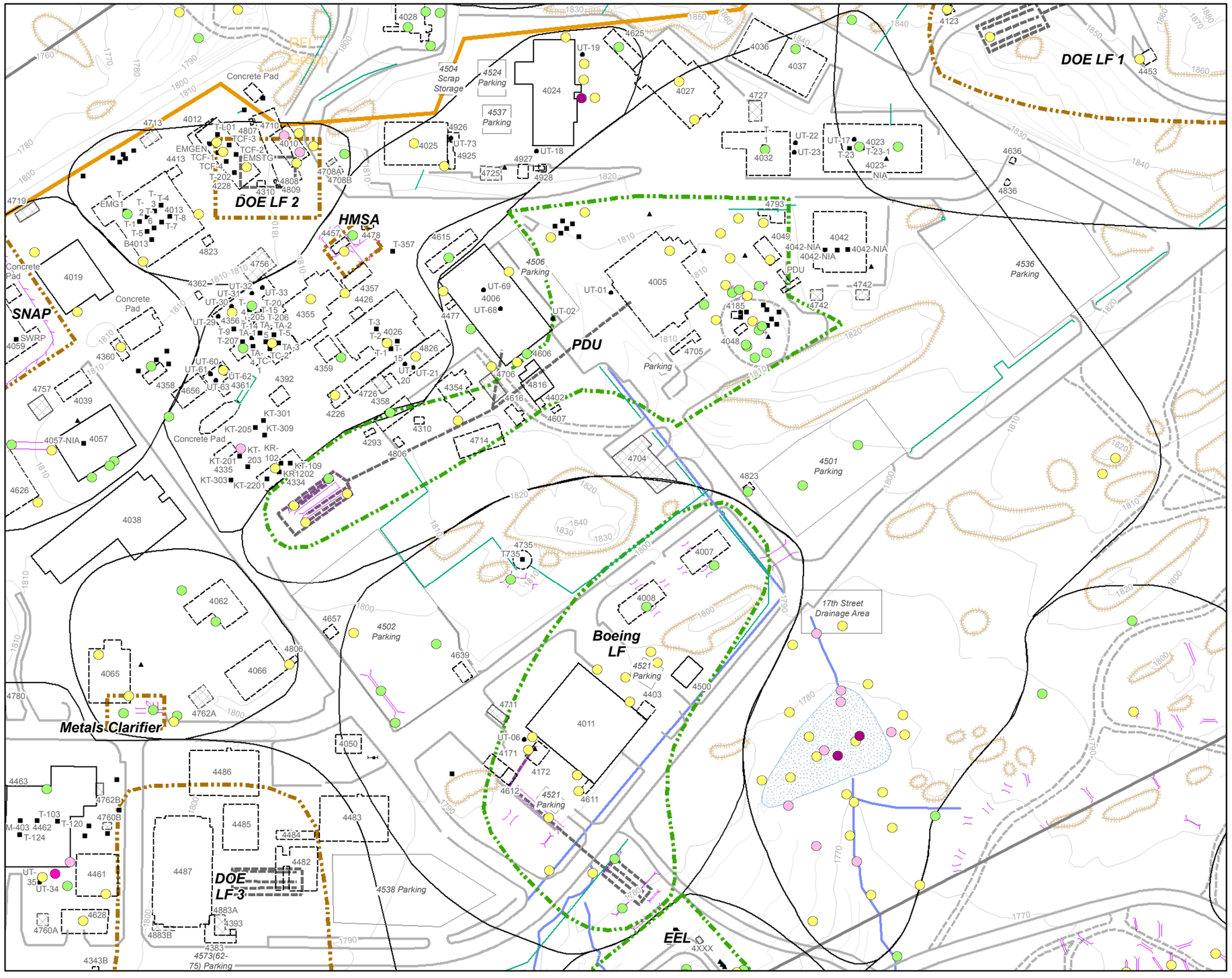
1 inch equals 150 feet

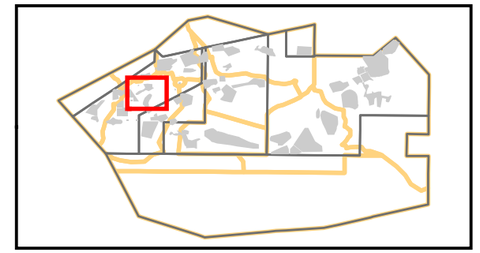
0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure I.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
PDU RFI Site

Date: September 16, 2008

WORKING DRAFT

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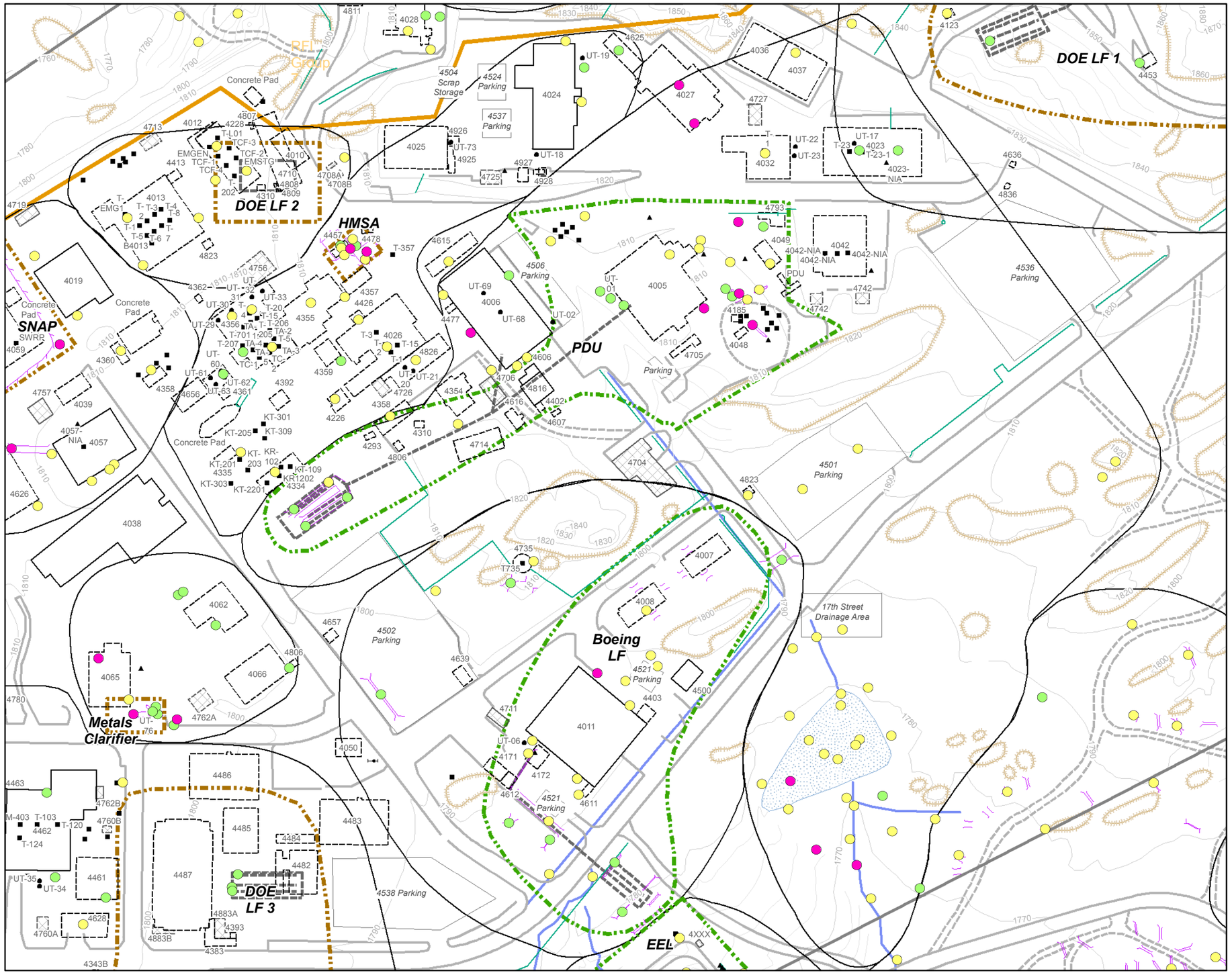
1 inch equals 150 feet

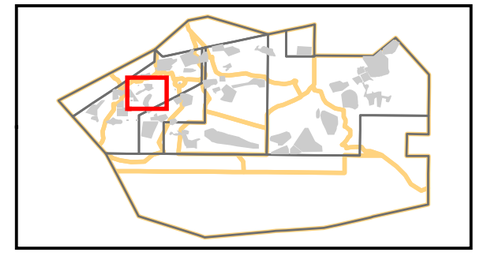
0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure I.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
PDU RFI Site

September 16, 2008 WORKING DRAFT

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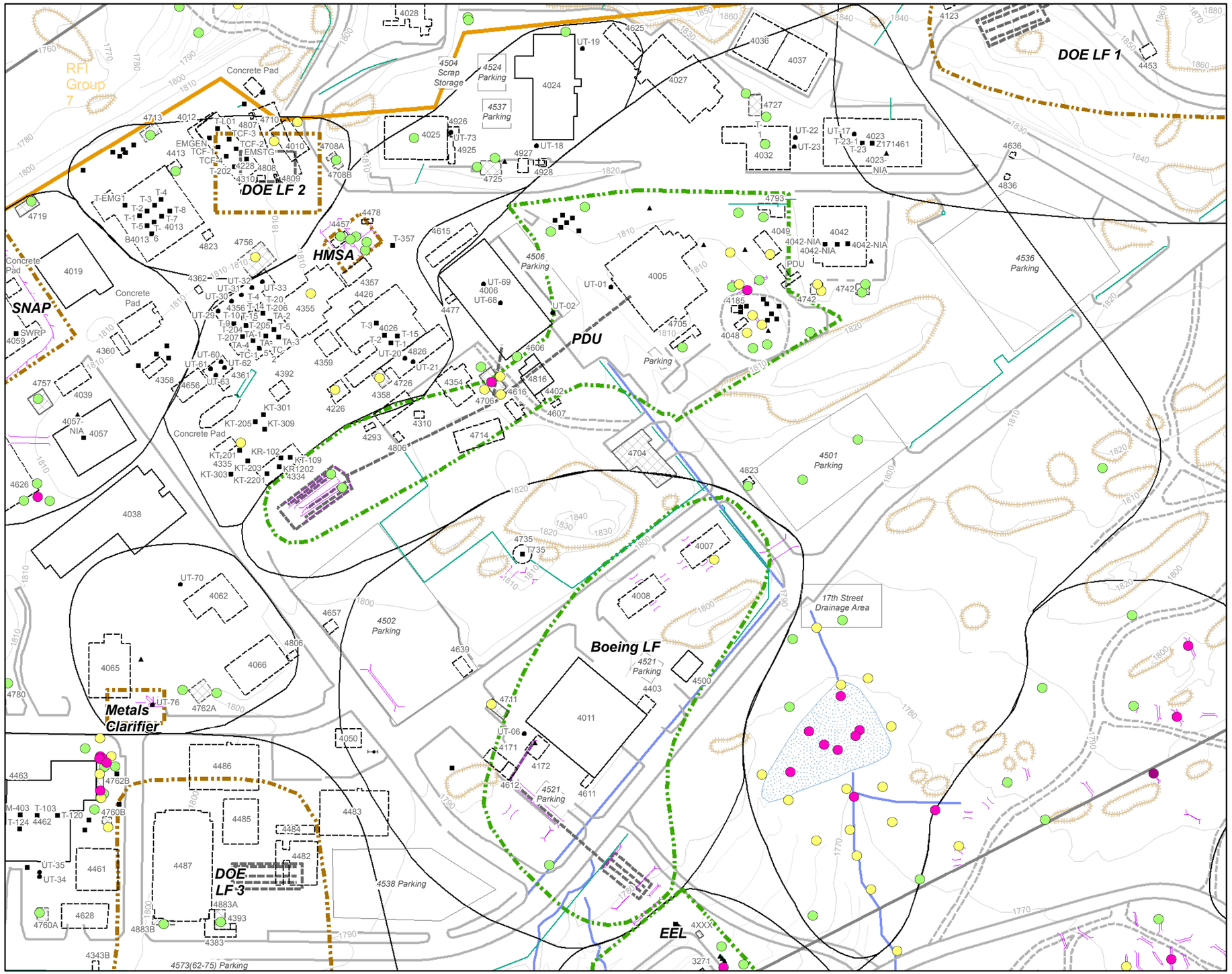
1 inch equals 150 feet

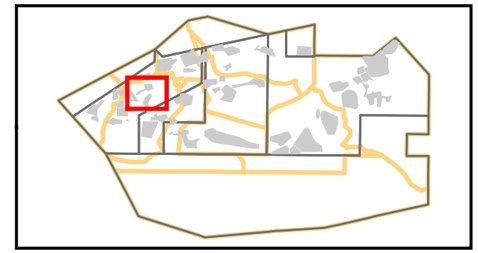
0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure I.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
PDU RFI Site

Date: September 11, 2008 WORKING DRAFT

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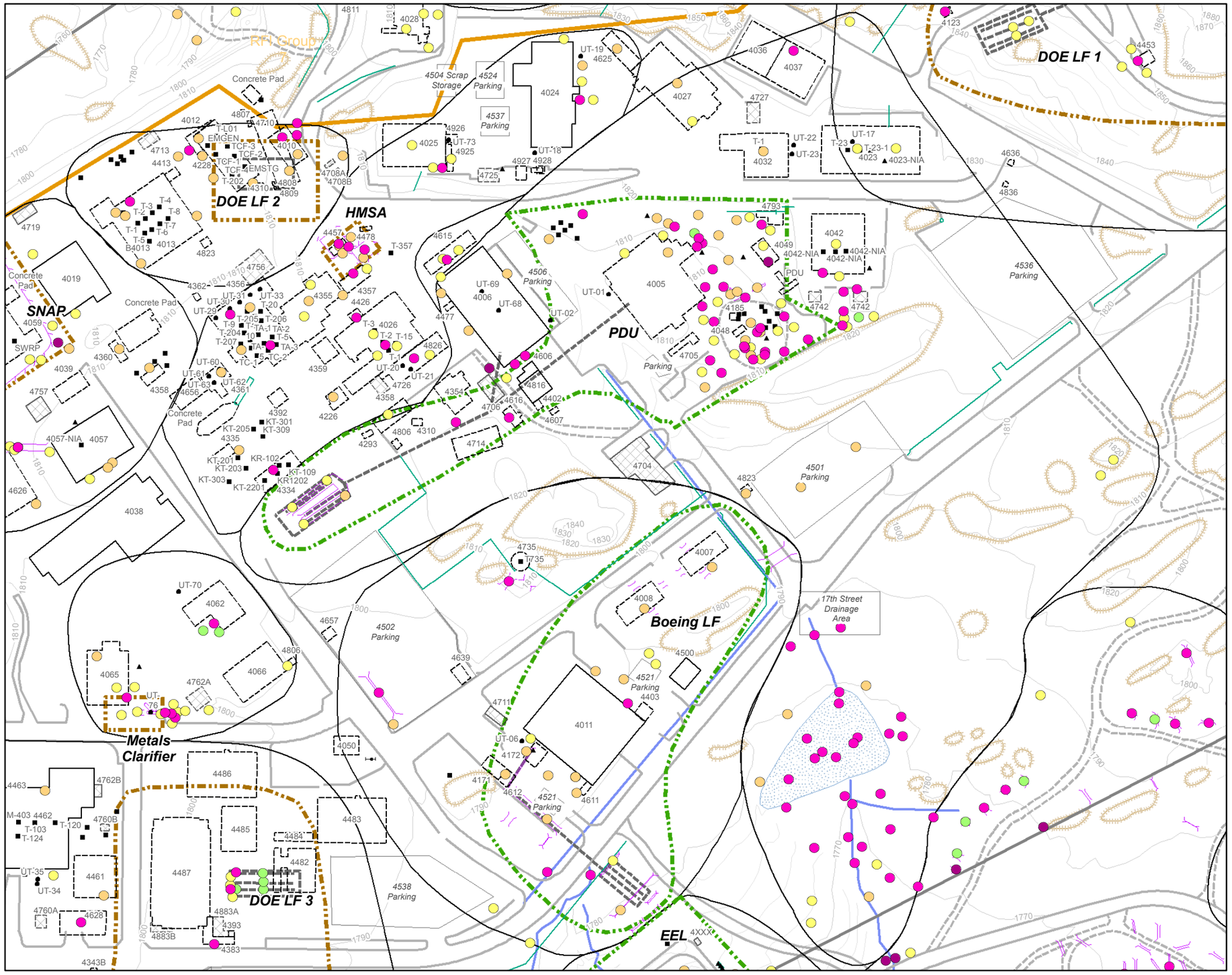
1 inch equals 150 feet

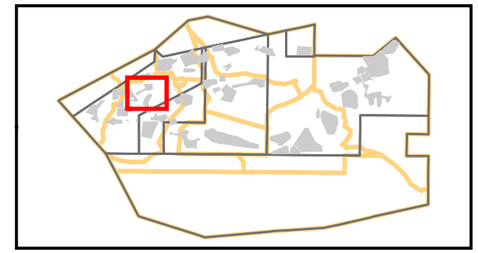
0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure I.3-4





Metals in Soil

- Exceeds Background + Residential RBSL + Eco RBSL
- 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
- 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

Metals in Soil
PDU RFI Site

Date: September 11, 2008 WORKING DRAFT

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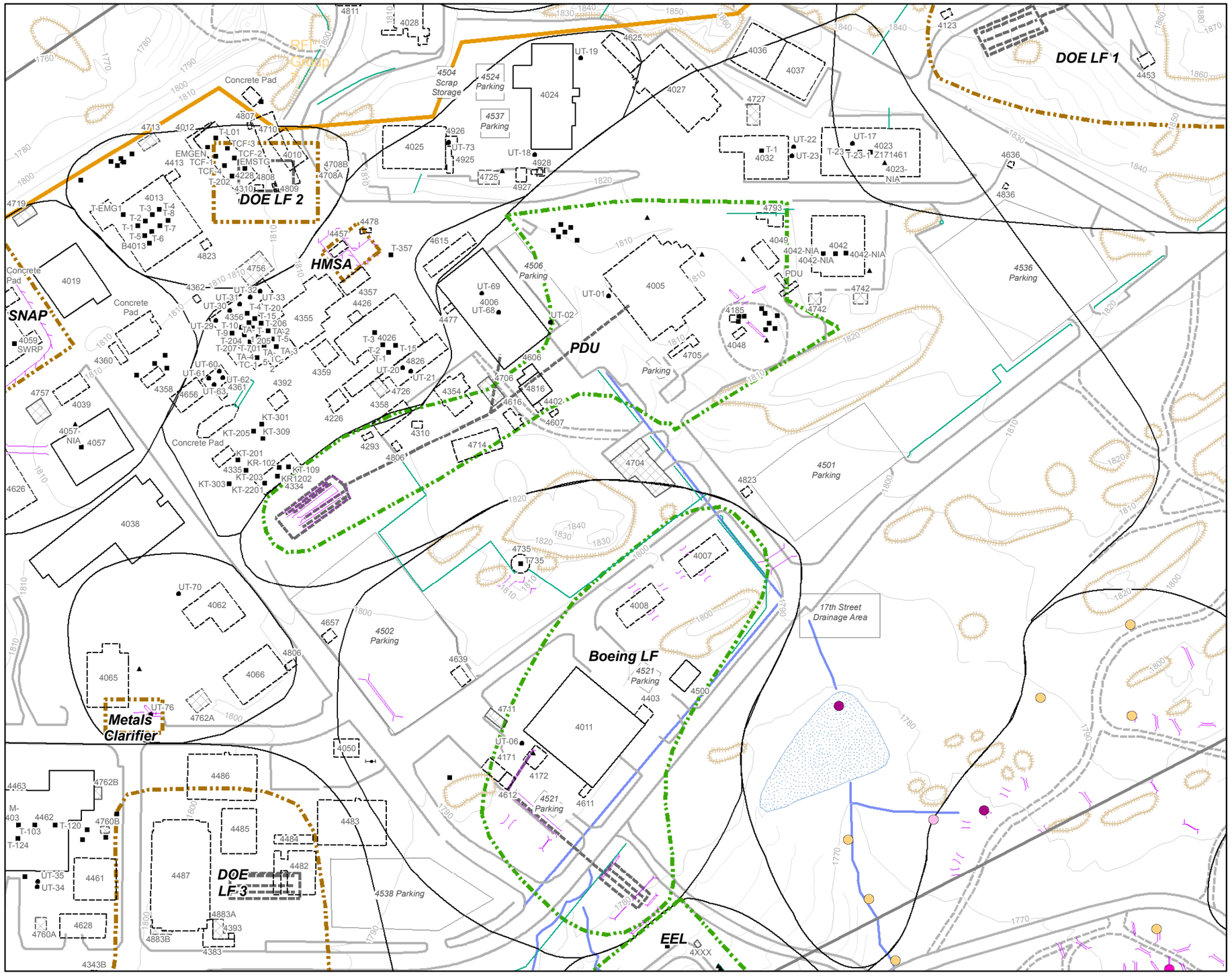
1 inch equals 150 feet

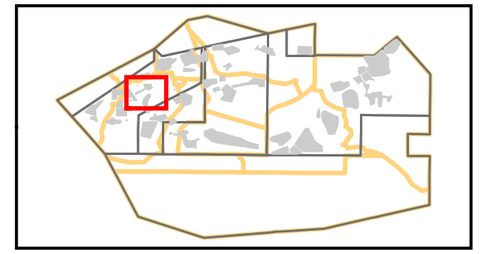
0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure I.3-5





Dioxins in Soil

- Exceeds Background + Residential RBSL + Eco RBSL
- Exceeds Background + Eco RBSL
- Exceeds Background + Residential RBSL
- Exceeds Background
- Detect, Below Background Concentration
- 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

Dioxins in Soil
PDU RFI Site

Date: September 11, 2008 WORKING DRAFT

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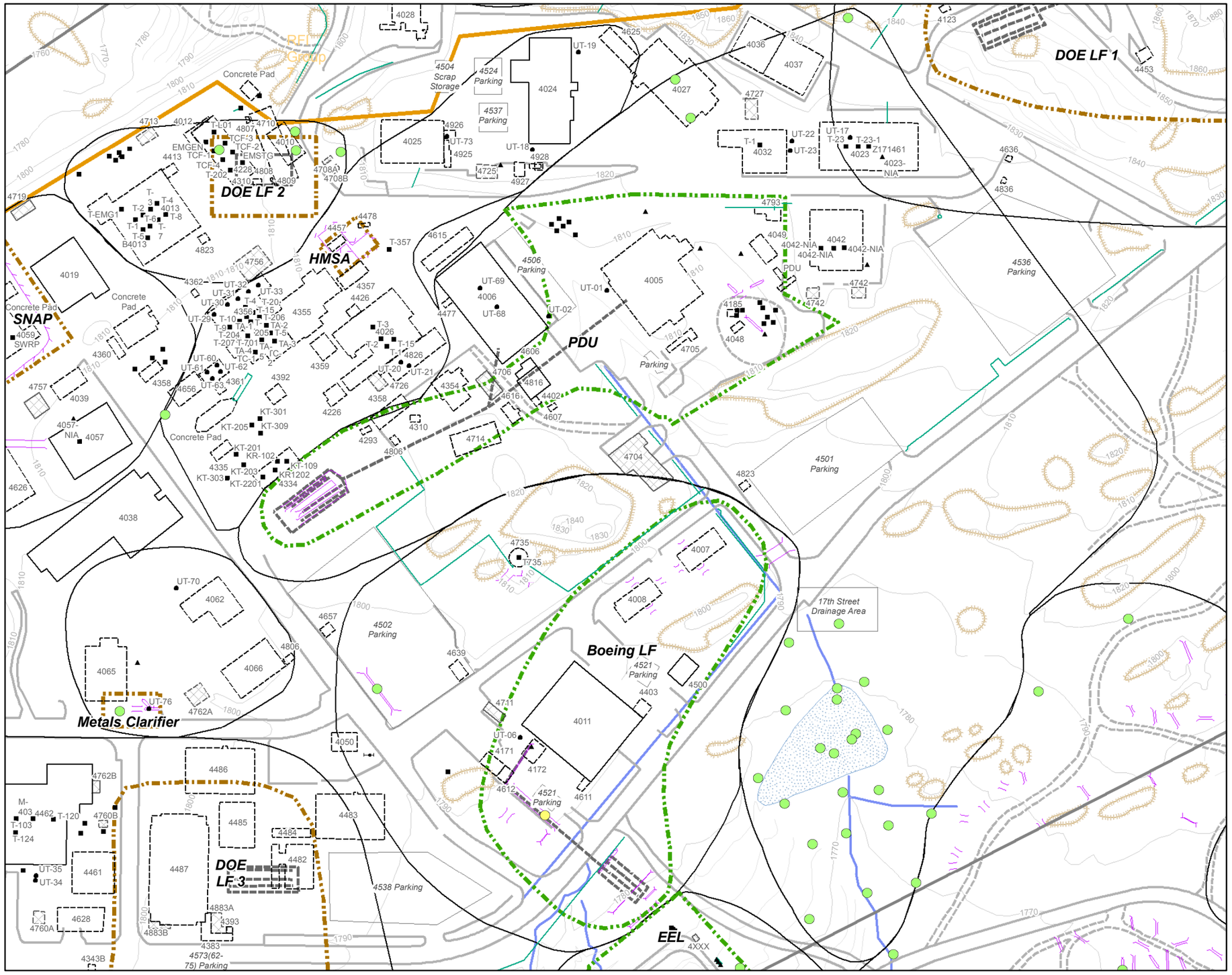
1 inch equals 150 feet

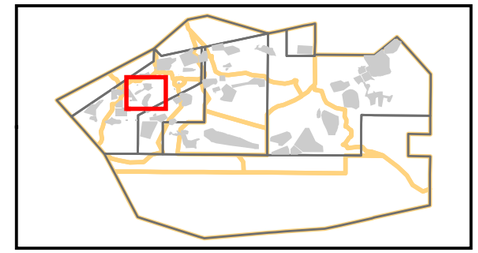
0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure I.3-6





Energetics in Soil

- Detect, Below All Screening Levels
- Non-detect; Soil, energetics, light green

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

Energetics in Soil
PDU RFI Site

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

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1 inch equals 150 feet

0 150 300 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure I.3-7

Soil Sample Locations

- ● Soil Sample Location With Detected VOCs Data
- ○ Soil Sample Location Not Analyzed for VOCs Data
- ● (green) 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

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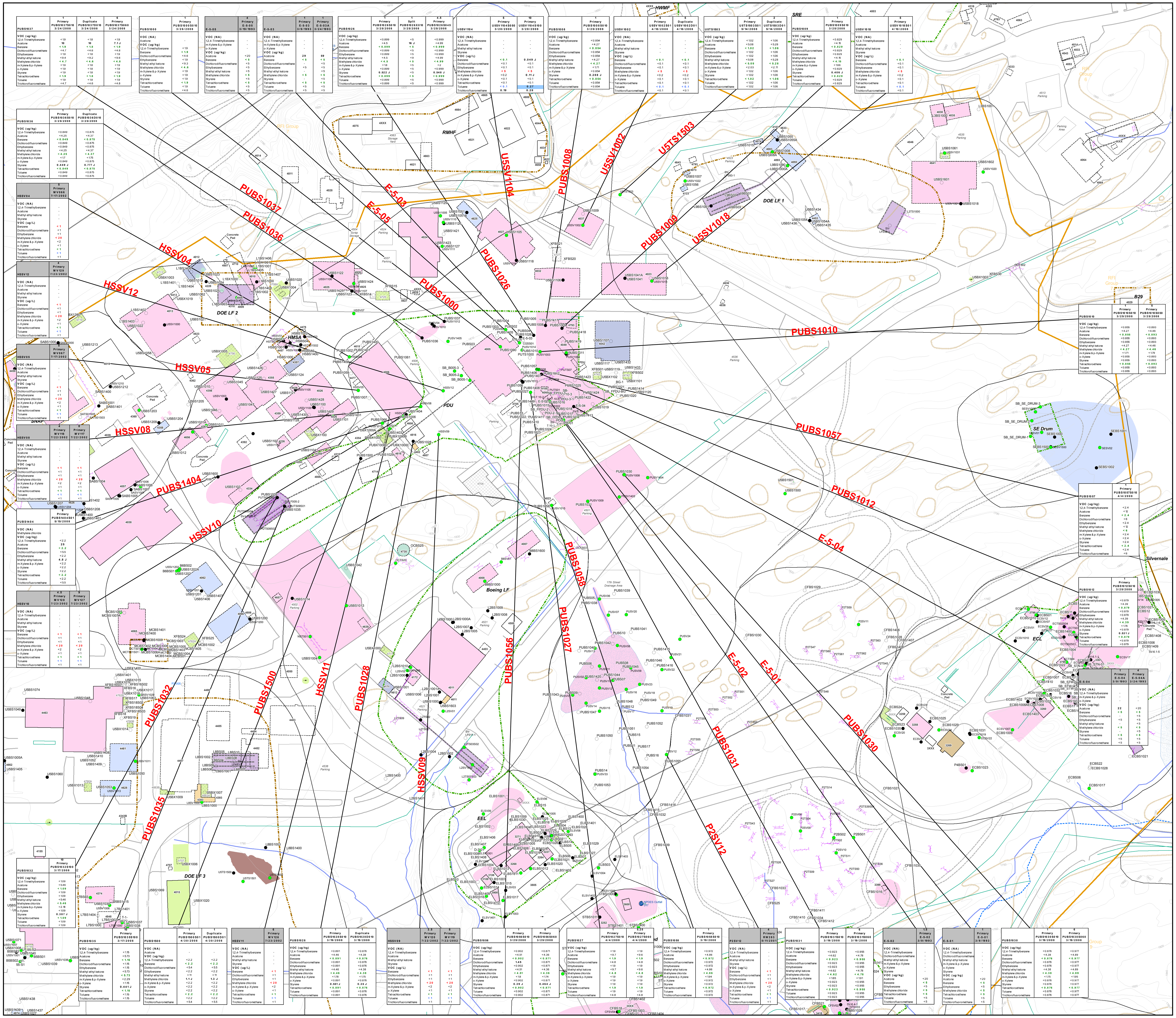
0 75 150 Feet — 1 inch equals 75 feet



PUBS1037	1 Primary PUBS1037S010 3/24/2008	1 Duplicate PUBS1037D010 3/24/2008	6 Primary PUBS1037S060 3/24/2008
VOC (ug/kg)			
1,2,4-Trimethylbenzene	<1.9	<1.8	<1.9
Acetone	10	10	7.1 J
Benzene	< 1.9	< 1.8	< 1.9
Dichlorodifluoromethane	<4.7	<4.6	<4.8
Ethylbenzene	<1.9	<1.8	<1.9
Methyl ethyl ketone	<9.4	<9.2	<9.6
Methylene chloride	< 4.7	< 4.6	< 4.8
m-Xylene & p-Xylene	<1.9	<1.8	<1.9
o-Xylene	<1.9	<1.8	<1.9
Styrene	<1.9	<1.8	<1.9
Tetrachloroethene	< 1.9	< 1.8	< 1.9
Toluene	<1.9	<1.8	<1.9
Trichlorofluoromethane	<4.7	<4.6	<4.8

PUBS1000	1 Primary PUBS1000S010 3/26/2008
VOC (NA)	
Acetone	-
VOC (ug/kg)	
1,2,4-Trimethylbenzene	<1.9
Benzene	< 1.9
Dichlorodifluoromethane	<4.6
Ethylbenzene	<1.9
Methyl ethyl ketone	<9.3
Methylene chloride	< 4.6
m-Xylene & p-Xylene	<1.9
o-Xylene	<1.9
Styrene	<1.9
Tetrachloroethene	< 1.9
Toluene	<1.9
Trichlorofluoromethane	<4.6

E-5-05	4 Primary E-5-05 3/19/1993
VOC (NA)	
1,2,4-Trimethylbenzene	-
m-Xylene & p-Xylene	-
o-Xylene	-
VOC (ug/kg)	
Acetone	<20
Benzene	< 5
Dichlorodifluoromethane	<5
Ethylbenzene	<5
Methyl ethyl ketone	<5
Methylene chloride	< 5
Styrene	<5
Tetrachloroethene	< 5
Toluene	<5
Trichlorofluoromethane	<5

E-5-03	1 Primary E-5-03 3/9/1993	1 Primary E-5-03A 3/24/1993
VOC (NA)		
1,2,4-Trimethylbenzene	-	-
m-Xylene & p-Xylene	-	-
o-Xylene	-	-
VOC (ug/kg)		
Acetone	29	59
Benzene	< 5	< 5
Dichlorodifluoromethane	<5	<5
Ethylbenzene	<5	<5
Methyl ethyl ketone	-	<5
Methylene chloride	< 5	< 5
Styrene	-	<5
Tetrachloroethene	< 5	< 5
Toluene	<5	<5
Trichlorofluoromethane	<5	<5

PUBS1026	1 Primary PUBS1026S010 3/25/2008	1 Split PUBS1026X010 3/25/2008	4.5 Primary PUBS1026S045 3/25/2008
VOC (ug/kg)			
1,2,4-Trimethylbenzene	<0.899	<5	<0.999
Acetone	<4.5	16 J	<4.99
Benzene	< 0.899	< 5	< 0.999
Dichlorodifluoromethane	<0.899	<5	<0.999
Ethylbenzene	<0.899	<5	<0.999
Methyl ethyl ketone	<4.5	<9	<4.99
Methylene chloride	< 4.5	< 5	< 4.99
m-Xylene & p-Xylene	<1.8	<5	<2
o-Xylene	<0.899	<5	<0.999
Styrene	0.522 J	<5	0.548 J
Tetrachloroethene	< 0.899	< 5	< 0.999
Toluene	<0.899	<5	<0.999
Trichlorofluoromethane	<0.899	<5	<0.999

U5SV1104	5 Primary U5SV1104S050 3/28/2008	10 Primary U5SV1104S100 3/28/2008
VOC (NA)		
1,2,4-Trimethylbenzene	-	-
Acetone	-	-
Methyl ethyl ketone	-	-
Styrene	-	-
VOC (ug/L)		
Benzene	< 0.1	0.049 J
Dichlorodifluoromethane	<0.1	<0.1
Ethylbenzene	<0.1	<0.1
Methylene chloride	< 5	< 5
m-Xylene & p-Xylene	<0.2	0.11 J
o-Xylene	<0.1	<0.1
Tetrachloroethene	<0.1	<0.1
Toluene	< 0.1	0.27
Trichlorofluoromethane	0.19	0.28

PUBS1008	1 Primary PUBS1008S010 3/25/2008
VOC (ug/kg)	
1,2,4-Trimethylbenzene	<0.854
Acetone	<4.27
Benzene	< 0.854
Dichlorodifluoromethane	<0.854
Ethylbenzene	<0.854
Methyl ethyl ketone	<4.27
Methylene chloride	< 4.27
m-Xylene & p-Xylene	<1.71
o-Xylene	<0.854
Styrene	0.288 J
Tetrachloroethene	< 0.854
Toluene	<0.854
Trichlorofluoromethane	<0.854

U5SV1002	5 Primary U5SV1002S01 4/18/2008	5 Duplicate U5SV1002D01 4/18/2008
VOC (NA)		
1,2,4-Trimethylbenzene	-	-
Acetone	-	-
Methyl ethyl ketone	-	-
Styrene	-	-
VOC (ug/L)		
Benzene	< 0.1	< 0.1
Dichlorodifluoromethane	<0.1	<0.1
Ethylbenzene	<0.1	<0.1
Methylene chloride	< 5	< 5
m-Xylene & p-Xylene	<0.2	<0.2
o-Xylene	<0.1	<0.1
Tetrachloroethene	<0.1	<0.1
Toluene	< 0.1	< 0.1
Trichlorofluoromethane	<0.1	<0.1

U5TS1503	2 Primary U5TS1503S01 5/14/2008	2 Duplicate U5TS1503D01 5/14/2008
VOC (ug/kg)		
1,2,4-Trimethylbenzene	<1.02	<1.06
Acetone	<5.08	<5.28
Benzene	< 1.02	< 1.06
Dichlorodifluoromethane	<1.02	<1.06
Ethylbenzene	<1.02	<1.06
Methyl ethyl ketone	<5.08	<5.28
Methylene chloride	< 5.08	< 5.28
m-Xylene & p-Xylene	<2.03	<2.11
o-Xylene	<1.02	<1.06
Styrene	<1.02	<1.06
Tetrachloroethene	< 1.02	< 1.06
Toluene	<1.02	<1.06
Trichlorofluoromethane	<1.02	<1.06

PUBS1009	1 Primary PUBS1009S010 3/25/2008
VOC (ug/kg)	
1,2,4-Trimethylbenzene	<0.829
Acetone	<4.15
Benzene	< 0.829
Dichlorodifluoromethane	<0.829
Ethylbenzene	<0.829
Methyl ethyl ketone	<4.15
Methylene chloride	< 4.15
m-Xylene & p-Xylene	<1.66
o-Xylene	<0.829
Styrene	0.406 J
Tetrachloroethene	< 0.829
Toluene	<0.829
Trichlorofluoromethane	<0.829

U5SV1018	5 Primary U5SV1018S01 4/10/2008
VOC (NA)	
1,2,4-Trimethylbenzene	-
Acetone	-
Methyl ethyl ketone	-
Styrene	-
VOC (ug/L)	
Benzene	< 0.1
Dichlorodifluoromethane	<0.1
Ethylbenzene	<0.1
Methylene chloride	< 5
m-Xylene & p-Xylene	<0.2
o-Xylene	<0.1
Tetrachloroethene	<0.1
Toluene	< 0.1
Trichlorofluoromethane	<0.1

PUBS1036	1 Primary PUBS1036S010 3/25/2008	1 Duplicate PUBS1036D010 3/25/2008
VOC (ug/kg)		
1,2,4-Trimethylbenzene	<0.849	<0.875
Acetone	<4.25	<4.37
Benzene	< 0.849	< 0.875
Dichlorodifluoromethane	<0.849	<0.875
Ethylbenzene	<0.849	<0.875
Methyl ethyl ketone	<4.25	<4.37
Methylene chloride	< 4.25	< 4.37
m-Xylene & p-Xylene	<1.7	<1.75
o-Xylene	<0.849	<0.875
Styrene	0.449 J	0.777 J
Tetrachloroethene	< 0.849	< 0.875
Toluene	<0.849	<0.875
Trichlorofluoromethane	<0.849	<0.875

HSSV04	5 Primary MV066 7/17/2002
VOC (NA)	
1,2,4-Trimethylbenzene	-
Acetone	-
Methyl ethyl ketone	-
Styrene	-
VOC (ug/L)	
Benzene	< 1
Dichlorodifluoromethane	<1
Ethylbenzene	<1
Methylene chloride	< 20
m-Xylene & p-Xylene	<2
o-Xylene	<1
Tetrachloroethene	< 1
Toluene	< 1
Trichlorofluoromethane	<1

HSSV12	4 Primary MV129 7/23/2002
VOC (NA)	
1,2,4-Trimethylbenzene	-
Acetone	-
Methyl ethyl ketone	-
Styrene	-
VOC (ug/L)	
Benzene	< 1
Dichlorodifluoromethane	<1
Ethylbenzene	<1
Methylene chloride	< 20
m-Xylene & p-Xylene	<2
o-Xylene	<1
Tetrachloroethene	< 1
Toluene	< 1
Trichlorofluoromethane	<1

HSSV05	5 Primary MV067 7/17/2002
VOC (NA)	
1,2,4-Trimethylbenzene	-
Acetone	-
Methyl ethyl ketone	-
Styrene	-
VOC (ug/L)	
Benzene	< 1
Dichlorodifluoromethane	<1
Ethylbenzene	<1
Methylene chloride	< 20
m-Xylene & p-Xylene	<2
o-Xylene	<1
Tetrachloroethene	< 1
Toluene	< 1
Trichlorofluoromethane	<1

HSSV08	4 Primary MV118 7/22/2002	8 Primary MV117 7/22/2002
VOC (NA)		
1,2,4-Trimethylbenzene	-	-
Acetone	-	-
Methyl ethyl ketone	-	-
Styrene	-	-
VOC (ug/L)		
Benzene	< 1	< 1
Dichlorodifluoromethane	<1	<1
Ethylbenzene	<1	<1
Methylene chloride	< 20	< 20
m-Xylene & p-Xylene	<2	<2
o-Xylene	<1	<1
Tetrachloroethene	< 1	< 1
Toluene	< 1	< 1
Trichlorofluoromethane	<1	<1

PUBS1404	6 Primary PUBS1404S01 5/15/2008
VOC (NA)	
Methylene chloride	-
VOC (ug/kg)	
1,2,4-Trimethylbenzene	<2.2
Acetone	25
Benzene	< 2.2
Dichlorodifluoromethane	<5.5
Ethylbenzene	<2.2
Methyl ethyl ketone	4.8 J
m-Xylene & p-Xylene	<2.2
o-Xylene	<2.2
Styrene	<2.2
Tetrachloroethene	< 2.2
Toluene	<2.2
Trichlorofluoromethane	<5.5

HSSV10	4.5 Primary MV128 7/23/2002	9 Primary MV127 7/23/2002
VOC (NA)		
1,2,4-Trimethylbenzene	-	-
Acetone	-	-
Methyl ethyl ketone	-	-
Styrene	-	-
VOC (ug/L)		
Benzene	< 1	< 1
Dichlorodifluoromethane	<1	<1
Ethylbenzene	<1	<1
Methylene chloride	< 20	< 20
m-Xylene & p-Xylene	<2	<2
o-Xylene	<1	<1
Tetrachloroethene	< 1	< 1
Toluene	< 1	< 1
Trichlorofluoromethane	<1	<1

PUBS1032	10 Primary PUBS1032S100 3/17/2008
VOC (ug/kg)	
1,2,4-Trimethylbenzene	<1.09
Acetone	<5.46
Benzene	< 1.09
Dichlorodifluoromethane	<1.09
Ethylbenzene	<1.09
Methyl ethyl ketone	<5.46
Methylene chloride	< 5.46
m-Xylene & p-Xylene	<2.18
o-Xylene	<1.09
Styrene	0.387 J
Tetrachloroethene	< 1.09
Toluene	<1.09
Trichlorofluoromethane	<1.09

PUBS1035	10 Primary PUBS1035S100 3/17/2008
VOC (ug/kg)	
1,2,4-Trimethylbenzene	<1.15
Acetone	<5.73
Benzene	< 1.15
Dichlorodifluoromethane	<1.15
Ethylbenzene	<1.15
Methyl ethyl ketone	<5.73
Methylene chloride	< 5.73
m-Xylene & p-Xylene	<2.29
o-Xylene	<1.15
Styrene	0.441 J
Tetrachloroethene	< 1.15
Toluene	<1.15
Trichlorofluoromethane	<1.15

PUBS1500	1 Primary PUBS1500S01 4/30/2008	1 Duplicate PUBS1500D01 4/30/2008
VOC (NA)		
Acetone	-	-
VOC (ug/kg)		
1,2,4-Trimethylbenzene	<2.2	<2.2
Benzene	< 2.2	< 2.2
Dichlorodifluoromethane	<5.4	<5.5
Ethylbenzene	<2.2	<2.2
Methyl ethyl ketone	<11	<11
Methylene chloride	1.1 J	1.3 J
m-Xylene & p-Xylene	<2.2	<2.2
o-Xylene	<2.2	<2.2
Styrene	<2.2	<2.2
Tetrachloroethene	< 2.2	< 2.2
Toluene	<2.2	<2.2
Trichlorofluoromethane	<5.4	<5.5

HSSV11	6 Primary MV126 7/23/2002
VOC (NA)	
1,2,4-Trimethylbenzene	-
Acetone	-
Methyl ethyl ketone	-
Styrene	-
VOC (ug/L)	
Benzene	< 1
Dichlorodifluoromethane	<1
Ethylbenzene	<1
Methylene chloride	< 20
m-Xylene & p-Xylene	<2
o-Xylene	<1
Tetrachloroethene	< 1
Toluene	< 1
Trichlorofluoromethane	<1

PUBS1028	1 Primary PUBS1028S010 3/19/2008	1 Duplicate PUBS1028D010 3/19/2008
VOC (ug/kg)		
1,2,4-Trimethylbenzene	<0.891	<0.876
Acetone	<4.46	<4.38
Benzene	< 0.891	< 0.876
Dichlorodifluoromethane	<0.891	<0.876
Ethylbenzene	<0.891	<0.876
Methyl ethyl ketone	<4.46	<4.38
Methylene chloride	< 4.46	< 4.38
m-Xylene & p-Xylene	<1.78	<1.75
o-Xylene	<0.891	<0.876
Styrene	0.551 J	0.35 J
Tetrachloroethene	< 0.891	< 0.876
Toluene	<0.891	<0.876
Trichlorofluoromethane	<0.891	<0.876

HSSV09	3.5 Primary MV120 7/22/2002	8 Primary MV119 7/22/2002
VOC (NA)		
1,2,4-Trimethylbenzene	-	-
Acetone	-	-
Methyl ethyl ketone	-	-
Styrene	-	-
VOC (ug/L)		
Benzene	< 1	< 1
Dichlorodifluoromethane	<1	<1
Ethylbenzene	<1	<1
Methylene chloride	< 20	< 20
m-Xylene & p-Xylene	<2	<2
o-Xylene	<1	<1
Tetrachloroethene	< 1	< 1
Toluene	< 1	< 1
Trichlorofluoromethane	<1	<1

PUBS1056	1 Primary PUBS1056S010 3/25/2008	6 Primary PUBS1056S060 3/25/2008
VOC (ug/kg)		
1,2,4-Trimethylbenzene	<0.902	<0.871
Acetone	<4.51	<4.36
Benzene	< 0.902	< 0.871
Dichlorodifluoromethane	1.45	<0.871
Ethylbenzene	<0.902	<0.871
Methyl ethyl ketone	<4.51	<4.36
Methylene chloride	< 4.51	< 4.36
m-Xylene & p-Xylene	<1.8	<1.74
o-Xylene	<0.902	<0.871
Styrene	0.39 J	0.464 J
Tetrachloroethene	< 0.902	< 0.871
Toluene	<0.902	<0.871
Trichlorofluoromethane	<0.902	<0.871

PUBS1027	1 Primary PUBS1027S010 4/4/2008	5.25 Primary PUBS1027S060 4/4/2008
VOC (ug/kg)		
1,2,4-Trimethylbenzene	<1.9	<1.9
Acetone	<9.7	<9.6
Benzene	< 1.9	< 1.9
Dichlorodifluoromethane	<4.8	<4.8
Ethylbenzene	<1.9	<1.9
Methyl ethyl ketone	<9.7	<9.6
Methylene chloride	< 4.8	< 4.8
m-Xylene & p-Xylene	<1.9	<1.9
o-Xylene	<1.9	<1.9
Styrene	<1.9	<1.9
Tetrachloroethene	< 1.9	< 1.9
Toluene	<1.9	<1.9
Trichlorofluoromethane	<4.8	<4.8

PUBS1058	1 Primary PUBS1058S010 3/19/2008
VOC (ug/kg)	
1,2,4-Trimethylbenzene	<0.972
Acetone	<4.86
Benzene	< 0.972
Dichlorodifluoromethane	<0.972
Ethylbenzene	<0.972
Methyl ethyl ketone	<4.86
Methylene chloride	< 4.86
m-Xylene & p-Xylene	<1.94
o-Xylene	<0.972
Styrene	<0.972
Tetrachloroethene	< 0.972
Toluene	<0.972
Trichlorofluoromethane	<0.972

P2SV12	4 Primary RW393 5/11/2001
VOC (NA)	
1,2,4-Trimethylbenzene	-
Acetone	-
Methyl ethyl ketone	-
Styrene	-
VOC (ug/L)	
Benzene	< 1
Dichlorodifluoromethane	<1
Ethylbenzene	<1
Methylene chloride	< 20
m-Xylene & p-Xylene	<2
o-Xylene	<1
Tetrachloroethene	< 1
Toluene	< 1
Trichlorofluoromethane	<1

PUBS1031	1 Primary PUBS1031S010 3/19/2008	6 Primary PUBS1031S060 3/19/2008
VOC (ug/kg)		
1,2,4-Trimethylbenzene	<0.923	<0.955
Acetone	<4.62	<4.78
Benzene	< 0.923	< 0.955
Dichlorodifluoromethane	<0.923	<0.955
Ethylbenzene	<0.923	<0.955
Methyl ethyl ketone	<4.62	<4.78
Methylene chloride	< 4.62	< 4.78
m-Xylene & p-Xylene	<1.85	<1.91
o-Xylene	<0.923	<0.955
Styrene	<0.923	<0.955
Tetrachloroethene	< 0.923	< 0.955
Toluene	<0.923	<0.955
Trichlorofluoromethane	<0.923	<0.955

E-5-02	1 Primary E-5-02 3/9/1993
VOC (NA)	
1,2,4-Trimethylbenzene	-
Dichlorodifluoromethane	-
Methyl ethyl ketone	-
m-Xylene & p-Xylene	-
o-Xylene	-
Styrene	-
VOC (ug/kg)	
Acetone	<20
Benzene	< 5
Ethylbenzene	<5
Methylene chloride	< 5
Tetrachloroethene	< 5
Toluene	<5
Trichlorofluoromethane	<5

E-5-01	1 Primary E-5-01 3/9/1993
VOC (NA)	
1,2,4-Trimethylbenzene	-
Dichlorodifluoromethane	-
Methyl ethyl ketone	-
m-Xylene & p-Xylene	-
o-Xylene	-
Styrene	-
VOC (ug/kg)	
Acetone	<20
Benzene	< 5
Ethylbenzene	<5
Methylene chloride	< 5
Tetrachloroethene	< 5
Toluene	<5
Trichlorofluoromethane	<5

PUBS1030	1 Primary PUBS1030S010 3/19/2008	6 Primary PUBS1030S060 3/19/2008
VOC (ug/kg)		
1,2,4-Trimethylbenzene	<0.876	<0.977
Acetone	<4.38	<4.89
Benzene	< 0.876	< 0.977
Dichlorodifluoromethane	<0.876	<0.977
Ethylbenzene	<0.876	<0.977
Methyl ethyl ketone	<4.38	<4.89
Methylene chloride	< 4.38	< 4.89
m-Xylene & p-Xylene	<1.75	<1.95
o-Xylene	<0.876	<0.977
Styrene	<0.876	<0.977
Tetrachloroethene	< 0.876	< 0.977
Toluene	<0.876	<0.977
Trichlorofluoromethane	<0.876	<0.977

PUBS1010	1 Primary PUBS1010S010 3/25/2008	5 Primary PUBS1010S050 3/25/2008
VOC (ug/kg)		
1,2,4-Trimethylbenzene	<0.855	<0.893
Acetone	<4.27	<4.46
Benzene	< 0.855	< 0.893
Dichlorodifluoromethane	<0.855	<0.893
Ethylbenzene	<0.855	<0.893
Methyl ethyl ketone	<4.27	<4.46
Methylene chloride	< 4.27	< 4.46
m-Xylene & p-Xylene	<1.71	<1.79
o-Xylene	<0.855	<0.893
Styrene	<0.855	<0.893
Tetrachloroethene	< 0.855	< 0.893
Toluene	<0.855	<0.893
Trichlorofluoromethane	<0.855	<0.893

PUBS1057	1 Primary PUBS1057S010 4/4/2008
VOC (ug/kg)	
1,2,4-Trimethylbenzene	<2.4
Acetone	<12
Benzene	< 2.4
Dichlorodifluoromethane	<6
Ethylbenzene	<2.4
Methyl ethyl ketone	<12
Methylene chloride	< 6
m-Xylene & p-Xylene	<2.4
o-Xylene	<2.4
Styrene	<2.4
Tetrachloroethene	< 2.4
Toluene	<2.4
Trichlorofluoromethane	<6

PUBS1012	1 Primary PUBS1012S010 3/25/2008
VOC (ug/kg)	
1,2,4-Trimethylbenzene	<0.879
Acetone	<4.39
Benzene	< 0.879
Dichlorodifluoromethane	<0.879
Ethylbenzene	<0.879
Methyl ethyl ketone	<4.39
Methylene chloride	< 4.39
m-Xylene & p-Xylene	<1.76
o-Xylene	<0.879
Styrene	0.531 J
Tetrachloroethene	< 0.879
Toluene	<0.879
Trichlorofluoromethane	<0.879

E-5-04	1 Primary E-5-04 3/9/1993	4 Primary E-5-04A 3/24/1993
VOC (NA)		
1,2,4-Trimethylbenzene	-	-
m-Xylene & p-Xylene	-	-
o-Xylene	-	-
VOC (ug/kg)		
Acetone	22	<20
Benzene	< 5	< 5
Dichlorodifluoromethane	-	<5
Ethylbenzene	<5	<5
Methyl ethyl ketone	-	<5
Methylene chloride	< 5	< 5
Styrene	-	<5
Tetrachloroethene	< 5	< 5
Toluene	<5	<5
Trichlorofluoromethane	<5	<5

CH2MHILL

SANTA SUSANA FIELD LABORATORY

VOCs Data Results PDU RFI Site

FIGURE I.3-8A

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 RBS, (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

0 75 150

1 inch equals 75 feet

Feet