GROUP 7 –NORTHERN PORTION AREA IV
RCRA FACILITY INVESTIGATION REPORT
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

VOLUME II – RFI SITE REPORTS

APPENDIX A

BUILDING 4029 REACTIVE METALS STORAGE YARD (SWMU 7.11)

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June 2009

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LIST OF ACRONYMS AND ABBREVIATIONS

AI	Atomics International
AOC	Area of Concern
AST	aboveground storage tank
B4029	Building 4029
bgs	below ground surface
BMP	best management practice
Boeing	The Boeing Company
CCR	Current Conditions Report
CFOU	Chatsworth Formation Operable Unit
CMS	Corrective Measures Study
Co-60	cobalt 60
COPC	chemical of potential concern
CPEC	chemical of potential ecological concern
Cs-137	cesium-137
CUA	chemical use area
DHS	Department of Health Services
Dioxins/Furans	(a) - *see table below*
DOE	Department of Energy
DTSC	Department of Toxic Substances Control
D&D	Decontamination and Decommissioning
ECL	Environmental Chemistry Laboratory
EcoRBSL	ecological risk-based screening level
EPC	Exposure Point Concentration
ERA	Ecological risk assessment
ETEC	Energy Technology Engineering Center
E&E	Ecology and Environment, Inc.
H&A	Haley and Aldrich
HI	hazard index
HQ	hazard quotient
HRA	human health risk assessment
HSA	Historical Site Assessment

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

HWMF	Hazardous Waste Management Facility
HWSF	Hazardous Waste Storage Facility
HWTF	Hazardous Waste Treatment Facility
ICF	ICF Kaiser Engineers
ILCR	Incremental Lifetime Cancer Risks
ISF	Interim Storage Facility
K	potassium
KOH	potassium hydroxide
Li	lithium
LMEC	Liquid Metal Engineering Center
mg/kg	milligrams per kilogram
mR/hr	miliroentgen per hour
mrad/hr	milirad per hour
msl	mean sea level
MWH	MWH, Inc
NAA	North American Aviation
Na	sodium
NaK	sodium-potassium alloy
NaOH	sodium hydroxide
NFA	No Further Action
NPDES	National Pollutant Discharge Elimination System
NSGW	near-surface groundwater
Ogden	Ogden Environmental and Energy Services Company, Inc.
ORISE	Oak Ridge Institute for Science and Education
OU	operable unit
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PoBe	polonium beryllium
PuBe	plutonium beryllium
QA	quality assurance
Ra-226	radium-226

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

RBSL	risk-based screening level
RCRA	Resource Conservation and Recovery Act
ResRBSL	residential risk-based screening level
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RME	reasonable maximum exposure
RMHF	Radioactive Materials Handling Facility
Rockwell	Rockwell International
SAIC	Science Applications International Corporation
Sapere	Sapere Consulting Inc.
SRAM	Standardized Risk Assessment Methodology
SRE	Sodium Reactor Experiment
SSFL	Santa Susana Field Laboratory
Surficial OU	Surficial Media Operable Unit
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TCE	trichloroethene
TPH	total petroleum hydrocarbons
USEPA	United States Environmental Protection Agency
UST	underground storage tank
µg/kg	micrograms per kilogram
VOC	volatile organic compound
WPA	RFI Work Plan Addendum
WPAA	RFI Work Plan Addendum Amendment
Zr	zirconium

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A.1 INTRODUCTION

This appendix to the Group 7 Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI) Report presents a site report detailing findings and recommendations for the investigation of the Building 4029 (B4029) RFI Site at the Santa Susana Field Laboratory (SSFL). The B4029 RFI Site is comprised of Solid Waste Management Unit (SWMU) 7.11 and additional chemical use areas (CUAs). 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 B4029 RFI Site is one of three RFI sites included in the Group 7 RFI Report. An RFI site is defined to comprise SWMUs and AOCs, and includes all associated operational areas where site activities were conducted. In addition, surrounding areas are investigated as needed to evaluate potential chemical impacts from peripheral activities or migration. The other two Group 7 RFI sites are the Radioactive Materials Handling Facility (RMHF) (SWMU 7.6 and AOC) and the Building 4133 Sodium Burn Facility (SWMU 7.2). Buildings 4133 and 4029 previously operated as the Hazardous Waste Management Facility (HWMF), a RCRA permitted hazardous treatment and storage facility for non-radiological chemical wastes generated onsite.

The B4029 RFI Site is located in the northeast portion of Area IV, approximately 900 feet southeast of the Building 4133 RFI Site, and is not contiguous with the rest of the Group 7 Reporting Area. The location of the Building 4133 RFI Site within the SSFL and Group 7 Reporting Area is shown on Figure A.1-1.

The B4029 RFI Site was operated by the Energy Technology and Engineering Center (ETEC) division of Rockwell International (predecessor companies of The Boeing Company [Boeing]), on behalf of the Department of Energy (DOE). Prior to 1978, ETEC was known as the Liquid Metal Engineering Center (LMEC).

The SSFL RFI is being conducted to characterize the presence of SSFL operation-related chemicals in environmental media. Results of this investigation will be used to estimate risks to human health and the environment (i.e., the ecosystem), gather data for the next phase of RCRA Corrective Action the Corrective Measures Study (CMS), and identify areas for further work.

The SSFL has been divided into two operable units (OUs): the Surficial Media Operable Unit (Surficial OU) and the Chatsworth Formation Operable Unit (CFOU). The B4029 RFI Site characterization presented in this site report comprises data for both the Surficial OU and CFOU. The Surficial OU includes soil, sediment, surface water, air, biota, and near-surface groundwater (NSGW). NSGW is defined as groundwater occurring within alluvium or weathered bedrock of the Chatsworth formation. Vadose zone bedrock and deeper groundwater that occurs within unweathered Chatsworth formation bedrock is defined as the CFOU.

DOE SWMUs and AOCs at the SSFL identified as having potential radioactive contamination are addressed by DOE site closure programs under RCRA permits. Any potential chemical contamination within the permitted units is also addressed under the closure programs. Potential chemical contamination outside these permitted facilities is addressed by the RFI (this report) under DTSC oversight, as described in Section A.3.

Typically, RFI fieldwork and reporting at radiological facilities is conducted after DOE has investigated and released the facilities for unrestricted use. In December 2006, DTSC approved the RCRA Closure Plan for the HWMF. The implementation of the closure plan began in 2007 with characterization wipe sampling of the building structures and features at Buildings 4133 and 4029 (see Section A.2.2). However, since May 24, 2007, Decontamination and Decommissioning (D&D) activities in Area IV have been on hold. Due to the delay in radiological closure programs, the RFI fieldwork at the HWMF was conducted prior to full implementation of the closure plan to allow timely reporting of potential impacts for the RFI. Closure plan samples collected as part of the RFI for the B4029 RFI site are noted on tables presented in this report, and results from these samples included for description of nature and extent and risk assessment evaluations.

A.1.1 Report Organization

This B4029 RFI Site report provides detailed sampling data and evaluation pertaining to the B4029 RFI Site, which includes the relevant information needed to evaluate the completeness of characterization, risk assessment results, and site recommendations based on the receptors evaluated. This information is presented in sections organized as follows:

- **Section A.2 – Site History, Chemical Use, and Current Conditions.** Presents the site history and chemical use, and the current conditions including geology and groundwater conditions.

- **Section A.3 – Nature and Extent of Chemical Impacts.** Presents a summary of Surficial OU, NSGW, and CFOU characterization information for the B4029 RFI Site.
- **Section A.4 – Risk Assessment Findings Summary**. Presents a summary of the human health risk assessment (HRA) and ecological risk assessment (ERA) results; the complete Building 4029 RFI Risk Assessment is included in Appendix E, Attachment E-8.
- **Section A.5 – Site Actions Recommandations**. Presents a summary of chemical use areas recommended for no further action (NFA), further characterization in the CMS, and areas identified for stabilization to prevent chemical contaminant migration.
- **Section A.6 – References.** Presents the references cited in this site report.

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

- **Attachment A-1**: Site-specific regulatory agency documents and correspondence.
- **Attachment A-2**: Subsurface information (soil borings, trench, piezometer, and well logs).
- **Attachment A-3**: Data quality, validation, and laboratory reports.
- **Attachment A-4:** Building Evaluation Documentation Logs. Includes documentation (maps, logs, and photos) for building features as outlined in the Standard Operating Procedure: Building Features Evaluation and Sampling (MWH/CH2M Hill, 2008b).

Information regarding characterization for the B4029 RFI Site is provided in the following figures and tables:

- **Figure A.1-1**: Presents the location of the B4029 RFI Site within the SSFL and the Group 7 Reporting area.
- **Figure A.2-1**: Present views of the B4029 RFI Site, showing known and potential chemical use areas. Tables A.2-1 through A.2-6 present summaries of buildings, tanks, transformers, other features, chemicals used, and spills at the B4029 RFI Site.
- **Figure A.2-2**: Present views of the B4029 RFI Site, showing soil and vapor sampling locations, and nearby monitoring wells.
- **Figure A.2-3**: Presents geologic cross-sections locations and geologic cross sections across the B4029 RFI Site.
- **Figure A.2-4:** Presents a plan view of the soil disturbance areas at the B4029 RFI Site.
- **Figures A.3-1 through A.3-6**: Present characterization details for all soil and vapor sampling at the B4029 RFI Site. Soil and vapor sampling results are shown on the maps and correlate with appropriate sections of Table A.3-2A.

- **Table A.3-2A:** Presents a description of chemical use areas and a summary of soil and vapor sampling results.
- **Table A.3-2B**: Presents a summary of groundwater characterization.

Information regarding Group 7 area-wide conditions, transport and fate of chemicals between RFI sites, and other evaluations of area-wide issues are contained in the Group 7 RFI Report, and appendices. Pertinent appendices to this Group 7 RFI Report are:

- **Appendix D:** Presents information regarding groundwater conditions in the Group 7 reporting area, including the B4029 RFI Site. Information includes groundwater occurrence and quality, chemical transport, data set representativeness, and supporting data (monitoring results, time-series plots, and hydrographs), as well as an evaluation of naturally occurring constituents.
- **Appendix E:** Presents risk assessment information including a description of any methodology variances from the Standardized Risk Assessment Methodology (SRAM) Work Plan, risk calculations, result tables, and all transport and fate modeling (except groundwater).
- **Appendix F:** Presents the results of the waste debris survey activities performed in 2008 at the SSFL, which consisted of systematic visual inspections of the SSFL for surficial evidence of solid waste (MWH/CH2M Hill, 2008a).
- **Appendix G:** Presents the documentation (maps, logs, and photos) for sewer inspection, in which 2 out of the 2 manholes located in Group 7 were inspected to assess potential releases from the sewer lines.

A.1.2 Historical Reference Documents

Historical documents for the Group 7 Reporting Area are being submitted to DTSC along with this report (Boeing, 2009). These documents represent a compilation of information from multiple sources that were searched to find SSFL documents relevant to the Group 7 RFI. Included in the document submittal are the available photographs, maps and drawings, manifests, memoranda, tabulations, facility records, correspondence, and reports relevant to site operations and types and sources of chemicals that may have been used, handled, or released in the Group 7 Reporting Area. Documents pertaining to the entire SSFL are also included if they have relevant information also specific to Group 7. These documents were reviewed to: (1) evaluate the history of site operations, (2) identify areas of known or potential chemical use for evaluation in the RFI, (3) compile site characterization data, and (4) identify areas where additional data were required to adequately characterize environmental site conditions. The results of the historical document review and sampling data collected relevant to the B4029 RFI Site are presented in this site report. This document review, coupled with the site characterization data, provides a basis for the recommendations

provided in Section A.5 of this report, including areas that are recommended for further evaluation in the CMS and areas that are recommended for NFA.

It is worth noting that information presented in this B4029 RFI Site report is also supplemented by other environmental reports that contain information about site and facility background, Surficial OU Program background, and methodologies/procedures. Key historical documents are listed below with brief descriptions:

- RCRA Facility Assessment (RFA) (Science Applications International Corporation [SAIC], 1991 and 1994):
  - 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):
  - 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.
  - Descriptions of SWMUs and AOCs, including a 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), and RFI Work Plan Addendum Amendments (WPAA); (Ogden 2000a; 2000b):
  - Sampling procedures and rationale.
  - RFI site descriptions and operational history.
  - Shallow groundwater characterization sampling and analysis plan for the SSFL.
- RFI Program Report (MWH, 2004a):
  - A general description of the SSFL facility, including an operational history, physical setting information, and regulatory programs and oversight.
  - A summary of the RCRA Corrective Action Program being conducted at the SSFL and a description of the OUs.

  - A comprehensive description of the Surficial OU field sampling program, including work plans followed, overall sampling scope, sampling methods and subcontractors used, and protocol followed.
  - Details of the analytical program for the Surficial OU RFI, including laboratories used, data validation findings, and Data Quality Assessment findings.
  - Programmatic key decision points or significant issues that influenced sampling, laboratory procedures, methodologies, or step-out requirements.

- Standardized Risk Assessment Methodology (SRAM) Work Plan, Revision 2 (MWH, 2005):
  - 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, 2003a):
  - Nature and extent of NSGW 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; 2003):
  - Geologic framework at the SSFL and hydrogeologic conditions of both NSGW and CFOU groundwater.
  - Transport and fate of TCE, and the occurrence and transport of other chemicals of concern in the CFOU.
- Annual and quarterly groundwater monitoring reports, including:
  - Annual Groundwater Monitoring Report (Haley & Aldrich, Inc. [H&A], 2008a).
  - First Quarter 2008 Groundwater Monitoring Report (H&A, 2008b).
  - Second Quarter 2008 Groundwater Monitoring Report (H&A, 2008c).
  - Third Quarter 2008 Groundwater Monitoring Report (H&A, 2008d).
- Historical Site Assessment (Sapere, 2005). This report contains:
  - Facility descriptions and historical operational information for all buildings in Area IV.
  - Information regarding demolition activities, radiological surveys, releases, and removal actions conducted for radiological areas within Area IV.

- Building Feature Evaluation and Sampling Standard Operating Procedure (MWH/CH2M Hill, 2008b):
  - Procedure for evaluation of environmental conditions associated with existing building and other miscellaneous building support infrastructure.
  - Describes approach for building feature inspection and sampling activities.

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A.2 SITE HISTORY, CHEMICAL USE AND CURRENT CONDITIONS

The B4029 RFI Site consists of approximately 1/3 acre located in the central portion of Area IV at the SSFL. The site location within the SSFL is shown on Figure A.1-1, which also shows the Group 7 Reporting Area boundary. The site layout and locations of identified and potential chemical use areas are shown on Figure A.2-1. Sampling locations are shown on Figure A.2-2, and locations of surficial cross-sections across the site are shown on Figure A.2-3.

During the RFA, various SMWUs and AOCs were identified within the SSFL. Building 4029 was identified as SWMU 7.11 (SAIC, 1994). The B4029 RFI Site was defined to include this SWMU. No other SWMUs or AOCs were identified at the B4029 RFI Site.

A comprehensive review of historical documents generated during facility operations or in subsequent environmental investigations was performed to identify known or potential chemical use areas at or near the B4029 RFI Site. As provided in the documents submitted in conjunction with this report (Boeing, 2009), thousands of records (some dating back to 1958) were reviewed to identify areas of potential environmental concern at the Group 7 RFI sites or elsewhere within the Group 7 Reporting Area. As described in Section A.1, documents reviewed included facility operational reports, maps and drawings, internal and external correspondence, regulatory compliance information, historical and aerial photographs, facility personnel interview records, and previous environmental reports.

Based on a comprehensive review of this compiled information, the Building 4029 RFI reporting area was defined to include operations associated with the SWMU identified above, but also one nearby feature aside from those associated with the SWMU that warranted assessment in the RFI. This feature is a section of the Former Old Conservation Yard Tank Pipeline, which runs through the Group 7 area north of Building 4029. Three known and potential chemical use areas at the B4029 RFI Site are shown on Figure A.2-1.

The following sections describe the SWMU 7.11, site history and operations, chemical use areas, and current conditions at the B4029 RFI Site.

A.2.1 SWMUs and AOCs at the B4029 RFI Site

A brief summary of SWMU (7.11) that is included in this RFI site report is presented below.

Building 4029 (SWMU 7.11)

Building 4029 is a prefabricated metal building, covered with corrugated sheet steel on the exterior. The building is bolted on an 800-square foot concrete floor and is elevated above the surrounding grade so that it is protected from flooding by stormwater runoff. (Rockwell, 1993) The building is located off an access road south of G Street in the northeast portion of Area IV of the SSFL. From 1959 to 1974, Building 4029 was known as the Radiation Measurements Facility, or the Old Calibration Facility, and was used to store radioactive source materials for use in calibrating radiation detection equipment. The radioactive materials stored at Building 4029 were radium-226 (Ra-226), cesium-137 (Cs-137), cobalt-60 (Co-60), polonium beryllium (PoBe), and plutonium beryllium (PuBe) (NAA, 1959b). All source materials were stored in below grade concrete structures. In 1974, when the Radiation Measurements Facility was shut down, all radioactive materials were removed from the building. In 1988 the below grade structures (radiologic source storage wells) were removed and disposed of as low-level radioactive waste and non-contaminated debris (following radiological survey), and the areas were backfilled with gravel and concrete. (Rockwell, 1988a; Rockwell, 1990)

The Hazardous Waste Management Facility (HWMF), which consisted of the Hazardous Waste Storage Facility (HWSF) (Building 4029) and the Hazardous Waste Treatment Facility (HWTF) (Building 4133), operated from 1978 to 1997. In 1983, the HWMF was permitted as a RCRA hazardous waste treatment and storage facility for non-radiological chemical wastes generated onsite. Building 4029 was used to store reactive metal waste material and equipment components until they could be treated at Building 4133, the Hazardous Waste Treatment Facility (HWTF). During this period of time, Building 4029 was also known as the Reactive Metals Storage Yard.

As the HWSF, Building 4029 provided hazardous waste storage for ETEC operations that generated alkali metal wastes. Alkali metals were used as heat transfer media at ETEC facilities in Area IV. The waste material and associated contaminated equipment/components were then transferred to Building 4029 for storage, then the Building 4133 treatment chamber when capacity became available (MWH, 2003b). The predominant alkali metal wastes stored were sodium (Na) and sodium-potassium (NaK) alloy, but forms of potassium (K), lithium (Li), and zirconium (Zr) were also stored (Rockwell, 1991; and MWH, 2003b). Containers used for storage of sodium, potassium, lithium, and zirconium included drums or container boxes, while NaK (a liquid at room temperature) was usually stored in 30-gallon drums placed inside 85-gallon overpack drums (Rockwell, 1993).

In 1997 the HWMF was deactivated and all operations at Buildings 4133 and 4029 were halted. During this deactivation all remaining hazardous waste stored at Building 4029 was removed. Final closure, decontamination and demolition for the HWMF will be implemented under the 2003 DTSC approved HWMF Closure Plan.

A.2.2 B4029 RFI Site History

A summary of the site chronology, description of operations, and investigation activities for the B4029 RFI Site is presented below. Facility correspondence, investigation reports, waste disposal records, facility maps, drawings, photographs, and personnel interviews were reviewed and evaluated to compile the site history information presented below. Primary sources of information include:

- RFA (SAIC, 1991 and 1994)
- CCR (ICF, 1993)
- RFI WPA (Ogden, 1996)
- Closure Plan for the HWMF Buildings 4029 and 4133 (MWH, 2003b)
- RFI WPAA (MWH, 2004a)
- HSA (Sapere, 2005)
- Historical Photographs (various sources and dates)

Site Chronology

1959 - 1974	In 1959 Building 4029 was designed to store and use radioactive materials for the purpose of calibrating radiation detection equipment, and was known as the Radiation Measurements Facility (NAA, 1959b). The Radiation Measurements Facility was commissioned to support the Sodium Reactor Experiment (SRE), Organic Moderated Reactor, Uranium Carbide Pilot Fuel Facility, as well as other facilities. (Rockwell, 1988a) Radioactive materials were stored at three below grade locations within Building 4029. The structures included a 10 foot deep concrete well with three separate source storage areas (used to store Ra-226 and later Cs-137), a 14 foot concrete well (4 feet of which was above grade) with lead lining (used to store Co-60), and a 33.25 in. x 33.25 in. x 1 foot deep concrete pit (used to store PoBe and PuBe) (NAA, 1959b).
March 1964	During removal a plastic capsule containing Ra-226 was fractured, and radioactive material was released into radiologic source storage well. Personnel were decontaminated and monitored. After Building 4029 was decontaminated, the Ra-226 sources were replaced by Cs-137. (NAA, 1964)

1974	The Radiation Measurements Facility was closed and all radioactive source materials were removed from the building (Rockwell, 1988a).
1978 – 1997	In 1978 the HWMF was activated in order reactive alkali metals, and metal contaminated equipment, so that waste could be disposed of offsite. The HWMF comprised Buildings 4029 and 4133. Building 4029 was designated as the HWSF where alkali metal waste was stored while awaiting treatment at the HWTF (Building 4133). Building 4029 was also known as the Reactive Metals Storage Yard during this time. Building 4029 was used to store reactive forms of sodium, potassium, sodium-potassium alloy, lithium, and zirconium (Rockwell, 1991; MWH, 2003b). Materials stored at Building 4029 were stored in 5- to 55-gallon drums, 85-gallon overpack drums, and containers such as 44-cubic foot container boxes. Overall, the building has capacity to store approximately 5,500 gallons in drums and containers (Rockwell, 1993). Containers were placed on pallets and then on racks along the walls inside the building.
1983	The HWMF was permitted as a RCRA hazardous waste treatment and storage facility for non-radiological chemical wastes generated onsite. The RCRA permit was renewed in 1988 and 1993 (MWH, 2003b).
1988	Rocketdyne performed a radiological survey of Building 4029 measuring the gamma exposure rate at the building, surrounding area, and entrance road identify areas needing further radiological inspection or requiring remedial action. The survey concluded that, with the exception of the radiologic source storage wells, the facility was clean of any residual radioactive contamination (Rockwell, 1988a). All below grade structures within Building 4029 (the Ra-226 source storage well, Co-60 source storage well, and pit) were removed. The materials removed were taken to the Radioactive Materials Disposal Facility and disposed of as low level radioactive and non-contaminated debris (following radiological survey) and the areas were backfilled with gravel and concrete (Rockwell, 1996a; Rockwell, 1990). The amount of soil removed during the Ra-226 source storage well excavation is believed to be approximately 1/3 cubic yard, based on an approximate 15 x 60 inch area excavated to bedrock (18 inches based on nearby sample boring measurements). No soil was excavated during the Co-60 source storage well and pit removals (Rockwell, 1990).
October 1989	The Energy Technology Engineering Center (ETEC) assumed control of HWMF operations from Atomics International (AI) (Rockwell, 1989).

1990	Seventy-five 30-ounce containers of metallic sodium abandoned by an unknown party in Butte County, CA, were treated at the HWMF in accordance with an emergency permit issued by the Department of Health Services (DHS) (DHS, 1990).
1993	The Oak Ridge Institute for Science and Education (ORISE) conducted an independent verification survey of Building 4029 which consisted of surface scans for radiation. Results of the survey did not indicate any locations of elevated direct radiation. Based on these results and the 1988 survey ORISE recommended that Building 4029 be released without radiological restrictions (ORISE, 1993).
1995	DHS performed verification sampling (DHS, 1995).
1996	Results of the 1988 sampling are documented in the 1996 Final D&D Report. The survey found all radiation to be within acceptable limits (Sapere, 2005; Rockwell, 1996).
1997	In 1997 the HWMF was inactivated, operations were halted, and all remaining hazardous materials were removed from Building 4029. A certification docket was prepared and Building 4029 was released for unrestricted use by DOE (DOE, 1997a; DOE, 1997b; DOE, 1997c).
2000	The Building 4029 area was included in the site weed abatement program (DTSC, 2000).
2001	The United States Environmental Protection Agency (USEPA) conducted an oversight verification survey of Building 4029 in which swipe and dust samples were collected and analyzed for alpha and beta contamination. The USEPA field measurements confirmed the results of the previous surveys conducted by Rocketdyne and ORISE. The USEPA also conducted a document review of prior surveys (USEPA, 2002a; USEPA, 2002b).
2007	In 2007, implementation of the HWMF Closure Plan began after approval by DTSC in 2006. At Building 4029, this initial effort included sampling of equipment and structures for verification of decontamination levels as required by the Closure Plan (MWH, 2003b), and will provide the basis of management of building material and equipment for the future demolition of Building 4029. Final closure, decontamination, and demolition for the HWMF is currently on hold. Wipe sampling of equipment and structures was performed in accordance with California Code of Regulations Title 22, Section 66261 for verification of decontamination levels as part of the implementation of the DTSC-approved 2003 HWMF Closure Plan. Since May 24, 2007, D&D activities have been on hold.

Spill Record

A summary of documented spills at Building 4029 is provided in Table A.2-6. Two spills were reported in the Building 4029 area, one in 1964 and the other in 1970 (Sapere, 2005; NAA, 1964). Historical releases at the B4029 RFI Site include Cesium-137 and Radium 226.

Site Inventories

Inventories of buildings, tanks, transformers, and chemicals used at the B4029 RFI Site were compiled during preparation of this RFI site report. Historical reports and facility drawings were reviewed and visual site inspections were conducted. The location of Building 4029 and other significant features are shown on Figure A.2-1. The inventories are included as the following tables:

- Building inventory – Table A.2-1
- Fuel, solvent, and other storage tank inventory – Table A.2-2
- Transformer inventory – Table A.2-3
- Other features inventory – Table A.2-4
- Documented chemical use – Table A.2-5
- Spills / Release inventory – Table A.2-6

A.2.3 B4029 RFI Site Chemical Use Areas

Chemical use areas include areas where chemicals were documented to have been (or potentially may have been) used, stored, spilled, discharged, and/or disposed. Chemical use areas at the B4029 RFI Site are shown on Figure A.2-1 and described in detail in Section A.3. The three B4029 RFI Site chemical use areas evaluated at or near the site are listed below in order of chemical use area number:

- 1 – Building 4029 and Concrete Pads
- 2 – Building 4029 Access Road
- 3 – Former Old Conservation Yard Fuel Tank Pipeline

The site characterization information is described relative to these chemical use areas in Section A.3. Potential chemicals used or stored at the B4029 RFI Site are listed on Table A.2-5.

A.2.4 Site Conditions

This section provides summaries of site conditions at and near the B4029 RFI Site including topography, geology, soils, groundwater, surface water, seeps and springs, and biology.

General Conditions and Topography

The B4029 RFI Site is located in the northern portion of Area IV off of an access road just south of G Street. This part of the SSFL consists of a vegetated soil and rocky areas bordered by steep relief to the south and a large sandstone outcrop to the north. Most of the Building 4029 area consists of an asphalt paved access road and an existing metal building.

Surface elevation at the site ranges from about 1,828 feet above mean sea level (msl) along the southern border of the RFI site, to about 1,870 feet msl at the top of the bedrock outcrop in the northeast portion of the site. Topography for the site is shown on one geologic cross section, presented in Figure A.2-3, oriented east-west (Building 4029 Cross Section A-A').

Building 4029 is bordered to the north and east by higher ground and bedrock outcrops. Grades decrease to the south and west into a northeast-southwest trending canyon/drainage area. The building, an asphalt paved access road, surrounding fence remain at the RFI site; however, the former OCY pipeline and interior radiologic source storage wells were removed in 1999 and 1988 respectively. There have been no documented changes in grade at the B4029 RFI Site. The extent of disturbed soil at the B4029 RFI Site is shown on Figure A.2-4.

Geology

The B4029 RFI Site is located on alluvium overlaying the Lower Burro Flats Member of the Chatsworth formation south of the ELV member (MWH 2002) and fill at the Building 4029 Access Road. The Upper Chatsworth formation is a series of interbedded sandstone and shale units that generally strike north 70 degrees east and dip 25 degrees northwest. The Lower Burro Flats Member consists predominantly of medium-grained sandstone but also contains significant siltstone/shale interbeds, and occurs between the finer-grained ELV and Spa members. Additional geologic information can be found in Figure 2-5 and 2-6 of the Group 7 RFI Report.

Soils

Surface conditions at the B4029 RFI Site are characterized by asphalt and concrete surfaces over most of the former areas of operation, with the remaining area comprised of both sandstone outcrops and shallow soils. Based on soil borings, soil thickness at the B4029 RFI Site ranges from less than 1 foot to 10.5 feet (Attachment A-2) with fill soils ranging from less than 1 foot to 9 feet at Building 4029, less than 1 foot to 6 feet at the access road, and alluvial soils ranging from less than 1 foot to 5.5 feet. A map depicting the general distribution of alluvial soils within the Group 7 Reporting Area is provided as Figure 2-4 in the Group 7 RFI Report (main report). Soils are generally comprised of silty sands with occasional clayey sands and silty sandstone, interpreted to be weathered products of the Chatsworth formation Lower Burrow Flats member interbedded sandstone, siltstone, and shale bedrock. Soil boring logs are included as Attachment A-2 to this site report.

Known soil disturbances at the B4029 RFI Site include the construction of the building and asphalt access road in 1959 and the removal of the radiologic source storage locations in 1988.

Groundwater

Chatsworth formation groundwater in the vicinity of the B4029 RFI Site is monitored by wells RD-16 and RD-92. Although neither of these monitoring locations are within the Group 7 Reporting Area boundary, they are less than 500 feet from the B4029 RFI Site. Groundwater elevations at these monitoring wells range from 1755 to 1780 feet msl (37 feet to 64 feet bgs) and are typically 10 to 15 feet higher at RD-92. Water levels at RD-16 are more responsive to seasonal changes in precipitation than those at RD-92, and may rise or fall by up to 15 feet throughout the course of a year.

NSGW in the vicinity of the B4029 RFI Site is monitored at three piezometers (PZ-055, PZ-112, and PZ-113) and one shallow well (RS-24). As with the Chatsworth formation monitoring wells, none of the NSGW monitoring locations are within the Group 7 Reporting Area boundary, but all are located less than 500 feet from the B4029 RFI Site. Groundwater elevations at these monitoring locations range between 1786 and 1818 feet msl (8 and 32 feet bgs). A comprehensive study of NSGW occurrence performed from 2001 through 2003 shows that PZ-055 and PZ-112 were typically saturated while PZ-113 and RS-24 were typically dry (MWH, 2003a). An updated interpretation of NSGW occurrence at PZ-055, PZ-112, and PZ-113 is not available at this time, as water levels at these locations are not

routinely monitored. RS-24 is part of the quarterly groundwater monitoring program, however, and NSGW has not been present at this location since 1998.

Although NSGW occurrence is intermittent in the vicinity of the B4029 RFI Site, historical monitoring data suggests that NSGW may perched above Chatsworth formation groundwater during periods of heavy seasonal precipitation. When present, NSGW at RS-24 and PZ-112 is encountered at depths ranging from 2 to 22 feet bgs, which is approximately 20 to 30 feet shallower than water levels measured in nearby Chatsworth formation wells RD-16 and RD-92.

Figure A.2-2 shows well and piezometer locations within this RFI Site Report. The groundwater system and monitoring network in RFI Group 7 is presented in detail in Appendix D.

Surface Water

Surface water flow at the B4029 RFI Site is shown on Figure 2-7B of the Group 7 RFI Report. Surface water runoff around Building 4029 flows to a topographic low point, just outside the southeast corner of the building. At this point a 4-inch polyvinyl chloride (PVC) drain line conveys flow approximately 6 feet southeast, where it discharges to a south-facing slope with sheet flow south-southwest. Surface water runoff on the Building 4029 Access Road collects in a natural swale along the north side of the road, and flows west until the access road turns north, approximately 150 feet west of the building. Surface water discharge then flows underneath the road via a sub-grade pipeline, and continues south-southwest within the Group 5 Reporting Area, ultimately leading to a drainage south of Silvernale Reservoir (SWMU 6.8). Similarly, any surface water runoff south of Building 4029 and the access road drains via sheet flow to the south, leading to the drainage below the Silvernale Reservoir (SWMU 6.8). Surface water discharge from the drainage south of the Silvernale Reservoir is to the R-2 Pond (SWMU 5.26) where it is monitored at NPDES Outfall 018.

Seeps and Springs

No seeps or springs are located within or near the B4029 RFI Site.

Biology

Biological conditions at the B4029 RFI Site, including vegetation types and sensitive species, are shown on Figure 2-13 of the Group 7 RFI Report. The majority of the area within the RFI

site boundary is comprised of paved surfaces including a driveway and building. The area around the paved surfaces is vegetated mainly by non-native annual grasses and narrow-leaved milkweed. Native vegetation consists mainly of scattered laurel sumac and several coast live oak trees around the site perimeter. A large rock outcrop runs along the northern site border. Sensitive species identified at or in the vicinity of the B4029 RFI Site include: the Santa Susana tarplant (observed along a rock outcrop north of the site), and the coastal western whiptail, legless lizard, ring-neck snake, rufous-crowned sparrow, and sage sparrow, which were not observed but are believed to occur in the area (Padre, 2005).

During the September/October 2005 Topanga Fire, most of the vegetation at the B4029 RFI Site was burned and significant ash deposited. In areas with limited vegetation (e.g., rock outcrops or developed areas), effects of the fire were minimal. Areas with more vegetation (e.g., trees and chaparral), including surface water drainages, were impacted significantly by burning and deposition of ash. At the time of this site report, the plant community at the B4029 RFI Site is in a transitional state, where early post-fire plant species are growing. It is expected that the plant community will continue to grow and transition until a more stable plant community is established.

In February 2009, a post-fire reconnaissance-level vegetation mapping was conducted at the B4029 RFI Site in support of risk assessment. Findings from this survey are presented in Appendix E, Attachment E-5.

A.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 B4029 RFI Site. The presentation includes sampling objectives, scope, key decision points related to characterization activities, and findings.

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

- Group 7 RFI Report, Section 5, Contaminant Transport and Fate: Potential migration via surface water flow, soil to groundwater, and groundwater migration.
- Group 7 RFI Report, Appendix D, Groundwater Characterization: Potential migration from soil to groundwater, and groundwater migration.
- Group 7 RFI Report, Appendix E, Risk Assessment: Potential volatile organic compound (VOC) migration from groundwater to soil, soil to indoor air.

A.3.1 Sampling Objectives

Soil and groundwater samples were collected to characterize the extent of potential chemical impacts at the B4029 RFI Site. As described in Section A.1, extensive historical documents (Boeing, 2009) were reviewed to identify potential chemical use areas for RFI sampling. The process of selecting sampling locations, depths, and analytical methods considered the following objectives:

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

To achieve these objectives, soil sampling was conducted as described in the DTSC-approved HWMF Closure Plan (MWH, 2003b). Additional sampling was also performed to achieve objectives outlined above, considering the following:

- Additional information regarding site use and observed site conditions.
- Site sampling results and data trends.
- Knowledge of chemical properties (e.g., mobility, volatility, association with other chemicals, etc.).
- SSFL metals background concentrations.
- SSFL SRAM-based screening concentrations for human health and ecological receptors.

- Risk assessment results and knowledge of areas recommended for requiring further evaluation during the CMS.

Groundwater has been sampled to meet site-wide routine monitoring requirements and additional characterization objectives according to regulatory agency-approved work plans (see Section A.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 b) and the Shallow Zone Groundwater Investigation Work Plan (Ogden, 2000b).

A.3.2 Sampling Scope

A total of 30 soil matrix samples were collected between May 1999 and May 2009 to assess potential impacts associated with chemical use areas at the B4029 RFI Site. Sampling locations and analytical suites were based on DTSC requests, sampling results from previous investigations, additional facility information from historical records, site inspections and/or personnel interviews, and historical and/or aerial photographs. Sampling schedules are presented in Tables A.3-1A through A.3-1D.

Both Chatsworth formation groundwater and NSGW have been sampled and analyzed according to agency-approved work plans (GRC, 1995a; GRC 1995b; Ogden, 2000b). A total of six monitoring wells and/or piezometers were used to characterize groundwater specifically in the vicinity of the B4029 RFI Site (PZ-055, PZ-112, PZ-113, RD-16, RD-92, and RS-24). As described in the risk assessment (Appendix E), groundwater monitoring data from the most impacted well within the Group 7 Reporting Area were used to characterize the potential direct exposure (drinking water) route for human receptors. Groundwater monitoring data collected near the B4029 RFI Site was used for potential indirect groundwater exposures (indoor air) at that site. Groundwater characterization data for the B4029 RFI Site are presented with the entire Group 7 groundwater data set in Appendix D.

Based on quality assurance (QA) review conducted on soil, sediment, and piezometer sampling results, data have been deemed usable and meet RFI program requirements as defined by DTSC-approved Quality Assurance Project Plans (Ogden, 2000a). The RFI QA program included individual sample data validation; assessment of each laboratory's performance; and a qualitative review of the precision, accuracy, representativeness,

reliability, and completeness parameters for the datasets. Overall data quality is described in the RFI Program Report (MWH, 2004a). Site-specific data quality summaries for the B4029 RFI Site are described by media in the sections below.

As an ongoing, additional QA measure, DTSC's Environmental Chemistry Laboratory (ECL, formerly the Hazardous Materials Laboratory) is performing independent data quality audits of approximately 5 to 10 percent of the surficial media analyses performed for the RFI. The ECL data quality audits include data validation, electronic data file audits, and split sample comparisons. The ECL findings are compiled in a report for each audit and those available by 2004 are published in the RFI Program Report (MWH, 2004a).

This site report presents characterization results for soil and groundwater sampled at the B4029 RFI Site.

A.3.3 Key Decision Points

The DTSC has been an integral part of the decision-making process during the SSFL RFI program. DTSC conducted a site walk of the B4029 RFI Site prior to sampling and approved sampling locations (MWH, 2003b) (Table A.3-1C).

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

1) Nature and extent, risk assessments, and site action recommendations presented in this report are based on data that were collected and requested for analysis before December 31, 2008. Two additional data gap soil samples were collected and analyzed at the B4029 RFI Site on May 8, 2009 (Attachment A-3). Results for these data gap samples are included in this site report since they could be reviewed and validated before report completion, and are also considered for site action recommendations presented herein. However, they could not be included in the quantitative site risk assessments, although uncertainty associated with these findings are discussed. These results will be quantitatively included in a revised report following DTSC review of this document.
2) The potential release from the SSFL sewer lines in Group 7 were assessed through sewer manhole inspections. All of the sewer manholes in Group 7 were inspected (two exist at/near the RMHF RFI Site. No manholes or sewer lines exist in the southern portion of Group 7 Reporting Area. Documentation for these inspections can be found in Appendix G of the Group 7 RFI Report.

A.3.4 Soil Matrix and Soil Vapor Findings

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

1. Present summaries of sampling results, including nature and extent of impacts.
2. Demonstrate that soil characterization is adequate for risk assessment, and that no further sampling is warranted.
3. For areas recommended for CMS evaluation, indicate that soil volumes are estimable 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 risk assessment results and CMS recommendations, as well as soil analytical data. For example, if detected chemical concentrations are sufficiently high to indicate that further evaluation in the CMS will be necessary, the data for that chemical 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, types of historical site operations and chemical uses, analytical detection limits, and physical constraints (e.g., soil depth and bedrock occurrence).

Data quality summaries for the B4029 RFI Site are provided in Tables A.3-3A (soil) and A.3-3B (soil vapor), and A.3-3C (surface water).

A.3.4.1 Soil Data Presentation

Relevant site information, sampling rationale, analytical results, and evaluation of results are presented in Table A.3-2A. Table A.3-2A refers to chemical results that are shown by chemical group category on Figures A.3-1 through A.3-6. Figures 4-1 through 4-6 of the Group 7 RFI Report also present chemical results for all of Group 7. Table A.3-2A presents the following site characterization information by each chemical use area (Figure A.2-1) for each relevant chemical group within each chemical use area:

- Relevant site history, site characteristics, and activities related to chemical use for each chemical use area by chemical use number.
- Sampling scope and rationale for each chemical use area by chemical use number.
- Summary of sampling results for soil for each chemical use area by chemical use number. As appropriate, sample results are compared to established SSFL background concentrations (metals and dioxins only) and/or SSFL risk-based

screening levels RBSLs[1]. The screening levels are also displayed on Figures A.3-1 through A.3-6.

- Summary of sampling results and assessment of whether chemical gradient characterization in each chemical group is sufficient for risk assessment.
- Determination if nature and extent of chemicals is defined sufficiently to estimate soil volumes (within a factor of 10) identified for further consideration in the CMS (if needed).

A.3.4.2 Soil Data Summary

Described in detail on Table A.3-2A, the following summary presents detected VOCs, SVOCs, TPH, and metals, in particular, those that exceeded Residential Risk-Based Screening Levels (ResRBSLs) and Ecological Risk-Based Screening Levels (EcoRBSLs) at the three confirmed and potential chemical use areas identified at the B4029 RFI Site (values compared against most conservative screening criteria). For CMS recommendations (see Section 5.0), various land uses or ecological receptors may be used based on physical site conditions and/or future land use.

VOCs

Methylene chloride was detected at 4.38 µg/kg, slightly above the ResRBSL, at the topographic low point/drainage area southeast of Building 4029 (CUA 1). Other VOCs detected at CUA 1, styrene and toluene, were below respective RBSLs. Methylene chloride was also detected below RBSLs along the access road.

SVOCs

Phthalates were detected at two locations up to 5.35 µg/kg (di-n-butyl phthalate) at the Building 4029 Access Road (CUA 2), below RBSLs. No polynuclear aromatic hydrocarbons (PAHs) were detected at the B4029 RFI Site.

[1] The use of the SRAM-based screening levels for comparison purpose does not serve as a risk assessment. These screening levels are not used to determine 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 K.

TPH

Lubricant oil range organics (C21-C30) were detected at several locations, primarily along the Building 4029 Access Road (CUA 2), up to 493 mg/kg at, well below the ResRBSL. No other TPH ranges were detected at the B4029 RFI Site.

Polychlorinated Biphenyls (PCBs)

PCBs were analyzed in the lubricant oil range organics impacted fill soil identified beneath the access road. PCBs were not detected.

Metals

Five metals were detected above background concentrations, below ResRBSLs, at Building 4029 (CUA 1). The highest metals concentrations were generally detected at one location beneath a foundation crack in Building 4029, which contained barium (185 mg/kg; background 140 mg/kg), lithium (60.8 mg/kg; background 37 mg/kg), nickel (37.9 mg/kg; background 29 mg/kg), sodium (220 mg/kg; background 110 mg/kg), and thallium (0.51 mg/kg; background 0.46 mg/kg).

Sodium was detected above background in 10 of 16 samples across the site, up to 245 mg/kg (background 110 mg/kg).

Zinc was detected up to 328 mg/kg (background 110 mg/kg), the maximum located at the topographic low point/drainage area southeast of Building 4029 (CUA 1). The downstream sample was within background range for zinc.

Barium (165 mg/kg), and sodium (up to 144 mg/kg) were detected above background concentrations along the Building 4029 Access Road (CUA 2).

EcoRBSLs for barium, lithium, nickel, and zinc are below background concentrations. There are no established RBSLs for sodium. No metals were detected above respective ResRBSLs.

Topanga Fire Evaluation

The potential contribution of the 2005 Topanga Fire to the concentrations of metals in soil has been considered in the characterization of the nature and extent of chemicals at the B4029 RFI Site. This evaluation was done to determine if the elevated concentrations of metals in the soil samples collected at the B4029 RFI Site after the fire could be due to the

presence of ash and burned materials deposited in surficial soil. Only those surficial soil samples (depths down to 12 inches bgs) collected after the fire were considered in this evaluation. The presence of zinc at SFBS0003 (328 mg/kg at 0.5 feet bgs) may be indicative of fire-related impacts.

A.3.5 Groundwater Findings

Groundwater occurrence and impacts at the B4029 RFI Site are described below.

A.3.5.1 Groundwater Data Presentation

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

- Summarize soil impacts as they potentially relate to groundwater impacts.
- Present 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 A.3-2A, Table A.3-2B describes groundwater data by chemical group (metals, VOCs, SVOCs, etc.). Table A.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 D of this Group 7 RFI Report. The groundwater appendix contains a description of hydrogeologic conditions (occurrence, water levels, recharge, yield, etc.), groundwater quality, and transport and fate. These data include:

- Laboratory analytical results
- Hydrographs
- Time-series plots

A site-wide report on SSFL groundwater will be prepared as part of the RFI Program. This report will contain a site-wide assessment of the characterization and transport and fate issues addressed in Appendix D.

A.3.5.2 Groundwater Data Summary

Chatsworth formation groundwater at the B4029 RFI Site is monitored at two wells completed primarily within unweathered bedrock (RD-16 and RD-92). Near-surface groundwater is monitored at three piezometers (PZ-055, PZ-112, and PZ-113) and one well (RS-24) that are completed primarily within weathered bedrock. Analytical results from these locations are summarized and evaluated in conjunction with soil findings on Table A.3-2.B

As described in Appendix D, analytical results for groundwater are generally characterized by infrequent, inconsistent, or low-level detections of VOCs and SVOCs, many of which are commonly detected as a result of field or laboratory contamination.

Several metals such as manganese, molybdenum, selenium, and vanadium were detected at RD-92 with concentrations less than 30 percent above their respective GWCCs. For each of these metals, at least three other analytical results indicate that concentrations are below the GWCC. As such, none of these metals are considered to be site-related.

A.3.6 Surface Water Findings

Surface water samples have not been collected at the B4029 RFI Site since surface water bodies are not present at the site.

A.4 RISK ASSESSMENT FINDINGS SUMMARY

The following sections summarize the findings of the HRA and ERA performed for the B4029 RFI Site within the Group 7 RFI Report area. Details regarding how the HRA and ERA were conducted are presented in the SRAM (MWH, 2005) and in Appendix E of this Group 7 RFI Report.

A.4.1 Key Decision Points

Site-specific key decision points for the HRA and ERA are listed below and described in more fully in Appendix E. 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, 2004a). Site-specific key decision points include:

1. Direct exposure risks were calculated using the maximum concentrations of compounds detected in well (RD-30), which had the highest concentrations of all the wells assigned to the Group 7 Reporting Area. For metals detected in groundwater from well RD-30, filtered data were used to evaluate risks.
2. Exposure Point Concentration (EPC) calculations were based on collected characterization data, as follows:
    - All groundwater EPCs were based on maximum levels detected in a single highest concentration well at the B4029 RFI Site (RD-92) for indirect exposure, or detected within a single highest-concentration well within the Group 7 Reporting Area (RD-30) for direct exposure.
    - A review of time series plots for chemical constituents, groundwater gradients, and source areas indicates maximum concentrations detected during the last consecutive three years conservatively represent potential future conditions for the purpose of estimating future risks.
    - Soil reasonable maximum exposure (RME) EPCs were based on maximum detected concentrations, or one-half the detection limit for non-detects if there was sufficient evidence that the chemical is present, unless there were sufficient data to calculate a statistical upper bound estimate of the concentration and that estimate was lower than the maximum detected concentration.
3. Large home range receptors were assumed to live only in source areas within the B4029 RFI Site. Risks for these receptors using home range adjusted exposures were calculated for the purpose of comparing to the RFI site only risks. Large home range receptor cumulative risk across SSFL will be presented later in a Site-Wide Summary Large Home Range Receptor Risk Assessment Report.

4. Additional samples were collected after the B4029 RFI Site risk assessment was completed. Data for these samples could not be assessed quantitatively, which results in some uncertainty. The samples were analyzed for SVOCs, PCBs, and TPH. No SVOCs or PCBs were detected in these samples, and the concentrations of detected TPH compounds were within the range of concentrations previously detected and evaluated in the risk assessment. Consequently, including the additional data in the quantitative evaluation would not significantly change risk calculations or overall risk assessment conclusions for this site.

A.4.2 Human Health Risk Assessment Findings

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

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

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

A summary of the HRA findings is presented below. For comparison purposes, excess upper bound theoretical incremental lifetime cancer risks (ILCRs) of 1×10^{-6}, or less, associated with multimedia exposures are considered acceptable. Potential risks between 1×10^{-6} and 1×10^{-4} require risk-management decisions and above 1×10^{-4} usually require remediation. Likewise, Hazard Indices (HIs) below 1.0 are considered acceptable and above 1.0 usually require remediation. Blood lead concentrations less than 10 microgram per deciliter (µg/dL) are generally considered to be acceptable for making remedial decisions (DTSC, 1992). These criteria were used to make evaluation recommendations for the CMS.

Exposure to Surficial Media Plus Indirect Groundwater Exposure

The RME risks presented in this section were based on exposures to all relevant surficial media, plus indirect exposure to VOCs in groundwater due to vapor migration, and included:

- Estimated ILCRs for all receptors ranged up to 2×10^{-7} (child resident) and HIs ranged up to 0.07 (child resident). The risk ranges for all receptors evaluated at the B4029 RFI Site from exposures to surficial media and VOCs due to vapor migration fall below the generally-accepted point of departure of 1×10^{-6} for selection of remedial alternatives. HI values for all receptors evaluated at the B4029 RFI Site

from exposures to surficial media and VOCs due to vapor migration fall below the acceptable point of departure of 1.

- Blood lead levels were not estimated since lead was not determined to be a COPC.

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

A.4.3 Ecological Risk Assessment Findings

The ecological receptors representing the site are deer mouse, hermit thrush, red-tailed hawk, bobcat, mule deer, soil invertebrates, and plants. Supporting information for the ERA is presented in the following tables and figure:

- Chemicals of Potential Ecological Concern (CPEC) – Table A.4-4
- Risk Estimates for Ecological Receptors – Table A.4-5
- Ecological Risk Assessment Uncertainty Analysis – Table A.4-6
- Graphical ERA Conceptual Site Model – Figure A.4-2

A summary of the ERA findings is presented below. For comparison purposes, estimated potential ecological risks were generally considered acceptable for Hazard Quotient (HQ) or HI values less than 1 (HQs are hazard estimates for single CPECs, HIs are cumulative hazard estimates for all exposure pathways for a CPEC or for classes of CPECs). The ERA findings included:

- The deer mouse, hermit thrush, red-tailed hawk, and bobcat had estimated HQs associated with soil exposure from the B4029 RFI Site that was greater than 1. The most sensitive receptor, the deer mouse, had RME HQs greater than 1 for barium (8) and zinc (7). The estimated HQs for the mule deer were below 1.
- HQs were primarily associated with:
  - barium and zinc for the terrestrial ecological receptors.
- The deer mouse burrow air inhalation pathway does not contribute significantly to their risks, compared to the risks from other non-volatile constituents.
- Estimated HQs for soil invertebrates are less than 1 for all CPECs.
- No adverse effects on health or productivity of native plant species were observed within areas potentially impacted that are likely attributable to CPECs.

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

These HRA and ERA results are appropriate to use in making CMS recommendations for the receptors evaluated.

A.5 B4029 RFI SITE ACTION RECOMMENDATIONS

This section presents a summary of RFI reporting requirements as they apply to the B4029 RFI Site. Section A.5.1 describes current RFI reporting requirements, particularly identification of areas for further work, or 'site action' recommendations. The process and criteria used for making site action recommendations is described in Section A.5.2, and site action recommendations for the B4029 RFI Site are summarized in Section A.5.3.

A.5.1 RFI Reporting Requirements

As described in regulatory guidance documents for the SSFL RCRA Corrective Action Program (see Group 7 RFI Report Section 1.2.3), the purpose of the RFI is 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 the completeness of the investigation; and, (3) indicate if additional work is needed.

This B4029 RFI Site Report accomplishes these requirements for the receptors evaluated using currently approved risk assessment methodologies:

1) Presenting detailed chemical 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 A.3-2A and A.3.2B). Section A.3 summarizes the overall characterization of chemical contamination nature and extent, potential source areas, and an assessment of investigation completeness. Assessments of investigation completeness have been made for the known or potential chemical use areas identified in this report based on sampling results, using professional judgment, and considering historical site operations, chemical data concentration gradients or trends, and risk-based screening levels and risk assessment findings for residential, recreational, and ecological receptors.
2) Evaluating groundwater migration pathways in Appendix D of the Group 7 RFI Site report, and other potential transport pathways in Appendix E of the Group 7 RFI Site report.
3) Identifying potential receptors (residential, recreational, and ecological) and estimating potential risks at the B4029 RFI Site (Section A.4 and Appendix E).
4) Identifying B4029 RFI Site areas for chemicals in surficial media requiring further work (this Section).

A.5.2 Basis for Site Action Recommendations

In summary, site action recommendations for chemicals in surficial media included in the B4029 RFI Site Report identify areas for:

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

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

Based on the review and evaluation of extensive historical records and environmental sampling data collected during the RFI, additional sampling was performed in areas where chemicals were potentially used, handled, stored, or released within the Group 7 Reporting Area. Samples were also collected in areas where the existing chemical analytical data were considered to be inadequate for site characterization and/or risk assessment (including down-gradient locations). Similarly, for areas where no historical chemical use, storage, or handling was indicated in the historical documents (i.e., for areas determined to have very limited or no potential for environmental concern), no samples were collected. Based on the documents reviewed and nearby sampling results, if any, these non-chemical use areas are recommended for NFA.

NFA and CMS recommendations for the areas sampled within the Group 7 Reporting Area are based on an integrated evaluation of characterization and risk assessment results for the receptors evaluated. Information in the historical documents indicating past chemical use practices and areas, coupled with site characterization data indicating environmental impacts or lack thereof, provide a solid basis for the NFA and CMS recommendations for chemicals in surficial media made in this site report. Stabilization Area recommendations rely on

characterization evaluations, including transport and fate analysis, and comparison to risk-based levels. Each process is described further below.

The determination of characterization and risk assessment requirements associated with SB990 is ongoing. Once these determinations are made, RFI Group documents (including the site action recommendations provided herein), will be reviewed and revised if required. The evaluation and site action recommendations presented below are based on an evaluation of chemical impacts and risk assessment findings for residential, recreational, and ecological receptors performed using currently approved RFI work plans for characterization and risk assessment.

CMS and NFA Area Site Action Evaluation Process

CMS or NFA site action recommendations for chemicals in surficial media are based on a four-step process that evaluates risk assessment results for residential, recreational, and ecological receptors in the context of characterization results and considers potential migration from identified source areas. This process is presented in detail in Section 7.1 of the Group 7 RFI Report and 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 greater than 1 (non-cancer and ecological risks), each RFI site's risks are reviewed on a chemical-by-chemical basis to identify risk-drivers and significant risk contributors to cumulative, total risk for each evaluated receptor.
- **Site Action Evaluation Step 3.** Characterization findings from the entire RFI site are evaluated to spatially 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 evaluated following currently approved RFI work plans.
- **Site Action Evaluation Step 4.** The fourth step identifies any uncertainties in B4029 RFI Site characterization and risk assessments that affect 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.

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

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

Two additional aspects of RFI reporting will serve to confirm and/or finalize the areas recommended in Group RFI Site 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.

Stabilization Area Site Action Evaluation Process

Chemical data collected during the RFI is evaluated for chemical 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:

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

Each criterion is considered important, and a weight-of-evidence evaluation is used to make a recommendation for chemical 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 include the installation of straw bales, fiber rolls, silt fencing, and covering areas with plastic tarp. Erosion control measures have been applied to many surficial soil source areas at the SSFL to prevent chemical contaminant migration. These are described in the SSFL Storm Water Pollution and Prevention Plan (MWH, 2006a).

A.5.3 B4029 RFI Site Recommendations

The B4029 RFI Site action recommendations are listed in Table A.5-1 and are presented on Figure A.5-1. Table A.5-1 lists CMS and NFA recommendations and includes identification of chemical risk drivers and contributors for each appropriate receptor. CMS Areas shown on Figure A.5-1 are approximate and represent evaluations inclusive of the receptors and land use evaluated. As noted above, recommendations reported in this document will be reviewed upon completion of the site-wide groundwater report and large-home range receptor evaluations, and updates to this report prepared as needed.

No CMS areas were identified at the B4029 RFI Site. Although barium and zinc were identified as risk drivers for the thrush and deer mouse, each was detected at a concentration slightly above background at only one location; thus, no areas were recommended for further evaluation in the CMS.

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TABLES

Table A.2-1
B4029 RFI Site Building Inventory
(Page 1 of 1)

Building	Chemical Use Area Location	Use Period	Current / Former Use	Operational Status Existing / Removed	DTSC Site Visit Date	Notes	Reference
Building 4029	1	1959 - 1974	Radiation Measurement Facility, Old Calibration Facility	Existing	Not Visited	No radioactive materials storage after 1974. Released for unrestricted use by DOE in 1997.	HDMSe00379191 HDMSp00063578 HDMSe00032615 HDMSe00375599 HDMSp00040439 HDMSp00040444 HDMSp00040446 HDMSe00375599
		1978 - 1997	HWMF Hazardous Waste Storage Facility, Reactive Metals Storage Yard.			Permitted by DTSC as a RCRA treatment and storage of non-radiological hazardous waste chemicals generated onsite.	HDMSe00032615 HDMSp00089125

Notes:
(a) Buildings are often identified with or without the Administrative Area Number followed by the building number

Acronyms:
DOE - Department of Energy
DTSC - Department of Toxic Substances Control
HWMF - Hazardous Waste Management Facility
RCRA - Resource Conservation and Recovery Act
RFI - Resource Conservation and Recovery Act Facility Investigation

Table A.2-2
B4029 RFI Site Tank Inventory
(Page 1 of 1)

Tank Designator	Chemical Use Area Location	Use Period	Location	Contents	Tank Size (gallons)	Operational Status Existing / Removed	Notes	Reference

There were no tanks located at the Building 4029 RFI Site

Acronyms:
RFI - Resource Conservation and Recovery Act Facility Investigation

Table A.2-3
B4029 RFI Site Transformer Inventory
(Page 1 of 1)

SSFL Identification Number	Chem Use Area Location	Use Period	Description	Location	Status	Oil Sampled for PCBs (Date/ Results)	Visual Site Inspection (Date/ Findings)	References

There were no transformers located at the Building 4029 RFI Site

Notes:
1. Only transformers potentially containing PCB oils were included in this table.

Acronyms:
RFI - Resource Conservation and Recovery Act Facility Investigation

TABLE A.2-4
B4029 RFI Site Other Features Inventory
(Page 1 of 1)

Feature [(a)]	Chem Use Area Location	Use Period	Current / Former Use	Operational Status Existing / Removed	Notes	References
Ra-226 Source Storage Well	1	1959 - 1974	Storage of radioactive material	Removed	Stored Ra-226 and later Cs-137. The well was a below grade 12-in diameter, 10-foot long Schedule 40 galvanized pipe with three 1-in source storage tubes.	HDMSe00375599 HDMSp00063578 HDMSe00731223 HDMSe00731225
Co-60 Storage Storage Well	1	1959 - 1974	Storage of radioactive material	Removed	Stored Co-60. A 12-inch diameter, 14-foot (10 feet below grade and 4 feet above) pipe. Above grade, the pipe was enclosed with lead shielding and covered by a 77-inch square rolling door.	HDMSe00375599 HDMSp00063578 HDMSe00731223 HDMSe00731225
Pit	1	1959 - 1974	Storage of radioactive material	Removed	Stored PoBe and PuBe. 33.25 inches by 33.25 inches by 1 foot deep.	HDMSe00375599 HDMSp00063578 HDMSe00731223 HDMSe00731225
Former OCY Pipeline	3	1977 - 1990	Transported fuel oil from the OCY to Fuel Tank 4735 (Group 5), which held the fuel for use as the SCTI.	Removed	Carbon steel pipeline, removed in 1999.	HDMSe00032615
Stormwater drain pipe	NA	Unknown	Drained stormwater runoff from a low point, southeast of 4092, to a downslope location approximately six feet to the southeast	Existing	4 inch PVC located at a stormwater collection area just south of the southeast corner of Building 4029	HDMSp00089125

Notes:

(a) Features listed within this inventory table are features (not included in buildings, tanks, and transformers which are included in other tables) that are of known or suspected chemical use.

Acronyms:

Co-60 - cobalt 60
Cs-137 - cesium 137
PoBe - polonium berylium
PuBe - plutonium berylium
OCY - Old Conservation Yard
Ra-226 - radium 226
RFI - Resource Conservation and Recovery Act Facility Investigation
SCTI - Sodium Component Test Installation

Table A.2-5
B4029 RFI Site Chemicals Used
(Page 1 of 1)

Chemicals Used	Reference
Sodium metal	HDMSe00375326 HDMSe00669401 HDMSe00121589
Sodium hydroxide	HDMSe00375326 HDMSe00669401
Sodium oxide	HDMSe00375326
Sodium peroxide	HDMSe00669401
Sodium-potassium alloy	HDMSe00375326 HDMSe00121589
Sodium carbonate	HDMSe00375326
Potassium metal	HDMSe00669401
Potassium oxide	HDMSe00375326
Potassium hydroxide	HDMSe00375326
Zirconium hydride	HDMSp00089125 HDMSe00121589
Lithium metal	HDMSp00089125 HDMSe00121589
Lithium hydride	HDMSp00089125
Lead	HDMSe00731225
Cesium-137[(a)]	HDMSp00063578
Radium-226[(a)]	HDMSp00063578
Cobalt-60[(a)]	HDMSp00063578
Polonium berylium[(a)]	HDMSp00063578
Plutonium berylium[(a)]	HDMSp00063578

Notes:
(a) - This is a radioactive source material.

Acronyms:
RFI - Resource Conservation and Recovery Act Facility Investigation

Table A.2-6
B4029 RFI Site Spill Inventory
(Page 1 of 1)

Date of Spill	Material Spilled	Amount Spilled	Unit	Building Number	Location	Description	Reference
3/24/1964	Ra-226	Unknown	NA	4029	Ra-226 storage well	Radioactivity was released when a Ra-226 source capsule was dropped 13 feet to the bottom of the well. The area outside the source holder was decontaminated and surveyed, and the damaged source was removed and sealed to prevent further leakage.	HDMSp00049398 HDMSe00032615
1/20/1970	Cs-137	Unknown	NA	4029	4029	The encapsulation of a 4.6 Ci Cs-137 source failed and dropped 10 feet to the bottom of the well. It was estimated that external radiation level of the source was 16 R/hr one foot away from the source.	HDMSe00032615 HDMSe00375599

Acronyms:
Ci - Curie
Cs-137 - Cesium 137
NA - not applicable
Ra-226 - Radium 226
RFI - Resource Conservation and Recovery Act Facility Investigation

TABLE A.3-1A
B4029 RFI SITE SAMPLING SUMMARY
(Page 1 of 1)

Sample Type (1,5)	Total Number of Samples (2)	Total QC Samples (3)	Total Agency Samples (4)	Total Validated Samples
Soil Vapor Samples (Table A.3-1B)	0	0	0	0
Soil Matrix Samples (Table A.3-1C)	24	4	0	28
Surface Water Samples (Table A.3-1D)	0	0	0	0

* Soil sampling and analytical summary includes only samples collected prior to May 8, 2009. For information regarding additional samples collected on May 8, 2009, see the 'Additional Data' folder of Attachment A-3 of this report. These Group 7 data gap sample results are considered for site action recommendations presented in the Group 7 RFI Report, but could not be included in the quantitative site risk assessments.

Notes:

1. Detailed sample and analytical program information is contained in Tables A.3-1B , A.3-1C and A.3-1D as indicated above.
2. Total samples = total primary site investigation samples, including historical samples and composite samples.
3. QC samples = Site-specific QC Samples, co-located duplicates and laboratory split samples.
   The total QC sample count in this table DOES NOT include Trip Blanks, Equipment Rinsates or Field Blanks.
   According to RFI sampling protocols, these types of QC samples are not site-specific and findings will be summarized in the RFI Program report.
4. Agency Samples = DTSC or USEPA split samples.
5. All groundwater data presented in Appendix D of the Group 7 RFI Report.

Acronyms:

DTSC - Department of Toxic Substances Control
QC - Quality control
RFI - Resource Conservation and Recovery Act Facility Investigation
USEPA - United States Environmental Protection Agency

TABLE A.3-1B
B4029 RFI SITE SOIL VAPOR SAMPLING AND ANALYTICAL SUMMARY
(Page 1 of 1)

Sample Location Identifiation	Unique Sample ID	Sample Identification	Date Collected	Removed or In Place	Sample Method	Depth (feet bgs)	Sample Type	Validated Yes/No		Rationale	Consultant	Reference Document
								VOC	Validated			
No RFI soil vapor samples collected for this site.												

Total Primary Samples:	0	**Validated:**	0
Total QC (Duplicate) Samples:	0	**Not Validated:**	0
Number of Building 4029 RFI Site Soil Vapor Samples:	**0**		

TABLE A.3-1C
B4029 RFI SITE SOIL MATRIX SAMPLING AND ANALYTICAL SUMMARY
(Page 1 of 1)

Sample Location Identification	Unique Sample ID	Sample Identification *	Date Collected	Removed or In Place (f)	Sample Method (a)	Depth (feet bgs)	Sample Type	Sample Analyses (Validated Yes/No)							Validated (b)	Rationale (c)	Consultant (d)	Reference Document (e)
								Herbicide	Inorganics	Metals	Pesticide	SVOCs	TPH	VOCs				
OCTS01	RS870	OCTS01S01	05/07/99	In Place	T	4	Primary Sample		Y				Y		Y	WP	OGDEN Environmental and Energy Services	This Report
SFBS0001	SFBS0001S01	SFBS0001S01	05/05/08	In Place	HA	1.2	Primary Sample		Y	Y		Y	Y	Y	Y	DGA(g)	MWH	This Report
SFBS0001	SFBS0001S01SP	SFBS0001S01SP	05/05/08	In Place	HA	1.2	Split Sample		Y	Y		Y	Y		Y	DGA(g)	MWH	This Report
SFBS0003	SFBS0003S01	SFBS0003S01	05/05/08	In Place	HA	0.5	Primary Sample		Y	Y		Y	Y	Y	Y	DGA(g)	MWH	This Report
SFBS0004	SFBS0004S01	SFBS0004S01	05/05/08	In Place	HA	1.5	Primary Sample		Y	Y			Y		Y	DGA(g)	MWH	This Report
SFBS0005	SFBS0005D01	SFBS0005D01	05/05/08	In Place	GP	10.5	Field Duplicate		Y	Y			Y		Y	DGA(g)	MWH	This Report
SFBS0005	SFBS0005S01	SFBS0005S01	05/05/08	In Place	GP	10.5	Primary Sample		Y	Y			Y	Y	Y	DGA(g)	MWH	This Report
SFBS0006	SFBS0006S01	SFBS0006S01	05/05/08	In Place	GP	1.5	Primary Sample		Y	Y			Y		Y	DGA(g)	MWH	This Report
SFBS0007	SFBS0007S01	SFBS0007S01	05/05/08	In Place	GP	1.5	Primary Sample		Y	Y			Y		Y	DGA(g)	MWH	This Report
SFBS0008	SFBS0008S01	SFBS0008S01	04/29/08	In Place	GP	1.5	Primary Sample		Y	Y		Y	Y	Y	Y	DGA(g)	MWH	This Report
SFBS0008	SFBS0008S02	SFBS0008S02	04/29/08	In Place	GP	3.5	Primary Sample		Y	Y			Y		Y	DGA(g)	MWH	This Report
SFBS0009	SFBS0009S01	SFBS0009S01	04/29/08	In Place	GP	1.5	Primary Sample	Y	Y	Y	Y	Y	Y		Y	DGA(g)	MWH	This Report
SFBS0009	SFBS0009S02	SFBS0009S02	04/29/08	In Place	GP	4.5	Primary Sample		Y	Y			Y		Y	DGA(g)	MWH	This Report
SFBS0010	SFBS0010S01	SFBS0010S01	04/29/08	In Place	GP	1.5	Primary Sample		Y	Y		Y	Y	Y	Y	DGA(g)	MWH	This Report
SFBS0011	SFBS0011S01	SFBS0011S01	04/29/08	In Place	GP	1.5	Primary Sample		Y	Y			Y		Y	DGA(g)	MWH	This Report
SFBS0011	SFBS0011S02	SFBS0011S02	04/29/08	In Place	GP	4.5	Primary Sample		Y	Y			Y		Y	DGA(g)	MWH	This Report
SFBS0012	SFBS0012S01	SFBS0012S01	04/29/08	In Place	GP	1.5	Primary Sample		Y	Y			Y		Y	DGA(g)	MWH	This Report
SFBS0012	SFBS0012S02	SFBS0012S02	04/29/08	In Place	GP	5.5	Primary Sample		Y	Y			Y		Y	DGA(g)	MWH	This Report
SFBS0012	SFBS0012S03	SFBS0012S03	04/29/08	In Place	GP	10.5	Primary Sample		Y	Y			Y		Y	DGA(g)	MWH	This Report
SFBS0013	SFBS0013S01	SFBS0013S01	04/29/08	In Place	GP	1.2	Primary Sample		Y	Y			Y		Y	DGA(g)	MWH	This Report
SFBS0014	SFBS0014S01	SFBS0014S01	04/29/08	In Place	GP	1.5	Primary Sample		Y	Y			Y		Y	DGA(g)	MWH	This Report
SFBS0014	SFBS0014S02	SFBS0014S02	04/29/08	In Place	GP	4.5	Primary Sample		Y	Y			Y		Y	DGA(g)	MWH	This Report
SFBS0015	SFBS0015S01	SFBS0015S01	04/29/08	In Place	GP	1.5	Primary Sample		Y	Y			Y		Y	DGA(g)	MWH	This Report
SFBS0021	SFBS0021S001	SFBS0021S001	11/18/08	In Place	GP	1	Primary Sample		Y	Y					Y	DGA	MWH	This Report
SFBS0021	SFBS0021S001SP	SFBS0021S001SP	11/18/08	In Place	GP	1	Split Sample		Y	Y					Y	DGA	MWH	This Report
SFBS0022	SFBS0022D001	SFBS0022D001	11/18/08	In Place	GP	1	Field Duplicate		Y	Y					Y	DGA	MWH	This Report
SFBS0022	SFBS0022S001	SFBS0022S001	11/18/08	In Place	GP	1	Primary Sample		Y	Y					Y	DGA	MWH	This Report
SFBS0022	SFBS0022S002	SFBS0022S002	11/18/08	In Place	GP	5	Primary Sample		Y	Y					Y	DGA	MWH	This Report
		Total Primary Samples:	24				**Validated:**	1	28	27	1	6	23	5	**28**			
		Total QC (Duplicate, Split) Samples:	4				**Not Validated:**	0	0	0	0	0	0	0	**0**			
		Total Number of Building 4029 RFI Site Soil Samples:	**28**															

* Soil sampling and analytical summary includes only samples collected prior to May 8, 2009. For information regarding additional samples collected on May 8, 2009, see the 'Additional Data' folder of Attachment A-3 of this report. These Group 7 data gap sample results are considered for site action recommendations presented in the Group 7 RFI Report, but could not be included in the quantitative site risk assessments.

Notes:

Sample Location Identification - Boring or trench number

Unique Sample ID - Laboratory reporting code

Sample Identification - RFI site and sample identifier code

(a) **Sample Method:**

GP = Geoprobe - using direct push core barrel **T =** Trench sample

HA = Hand Auger sample

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

(c) **Rationale (see below):**

DGA - Indicates samples collected in 2008 as a part of the Data Gaps Analysis to address delineation with stepout samples, elevated detection limit issues, and specific DTSC resquests

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

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

(e) **Reference Document:** Document containing published data; "This report" includes the Building 4029 RFI site appendix and the Group 7 RFI Report. Refer to Section A.6 (References) for complete citatio

(f) **Removed or in-place sample status:** Status as of date of this report.

(g) Indicates a sample collected at a location identified in the DTSC-approved HWMF Closure Plan (MWH, 2003)

Laboratory Analytical Methods Represented (EPA Method No.)

Herbicide - 8151A
Inorganics - % Moist, 300.0, D2216M, 9056, 160.3 MOD, 2540G, 9045C
Metals - 6010B, 6020, 7196A, 7471A
Pesticide - 8081A
SVOCs - 8270C, 8270C SIM
TPH - 8015B, 8015M
VOCs - 8260B

Inorganics - % Moisture, pH and Fluoride
SVOC - Semivolatile organic compound
TPH - Total petroleum hydrocarbons
VOC - Volatile organic compound

Acronyms:

bgs - below ground surface
DTSC - Department of Toxic Substances Control
HWMF - Hazardous Waste Management Facility
RFI - Resource Conservation and Recovery Act Facility Investigation
QA - Quality assurance
QC - Quality control

TABLE A.3-1D
B4029 RFI SITE SURFACE WATER SAMPLING AND ANALYTICAL SUMMARY

Sample Location Identifiation	Unique Sample ID	Sample Identification	Date Collected	Removed or In Place	Sample Method	Depth (feet bgs)	Sample Type	Sample Analyses (Validated Yes/No)			Validated	Rationale	Consultant	Reference Document
								SVOCs	TPH	VOCs				
No RFI surface water samples collected for this site.														
		Total Primary Samples:	0				**Validated:**	0	0	0	**0**			
		Total QC (Duplicate, Split) Samples:	0				**Not Validated:**	0	0	0	**0**			
		Number of Building 4029 RFI Site Surface Water Samples:	**0**											

TABLE A.3-2A
DESCRIPTION OF CHEMICAL USE AREAS AT THE B4029 RFI SITE AND SOIL SAMPLING RESULTS SUMMARY
(Page 1 of 5)

Map Key[1]	Chemical Use Area Name Status, How Used and Physical Characteristics (see text for Site History)	Potential Chemicals Used / Stored[2]	Sampling Scope and Rationale[2] [See Figure A.2-2 for sampling locations]	Sampling Results[3] Chemical concentrations detected greater than background and/or risk screening levels? [4]	Potential concentration gradients sufficiently characterized for risk assessment?[5]	Is delineation sufficient to estimate soil volume in CMS?[6,7] (see Figure A.5-1 for CMS areas)
1	**Building 4029 and Concrete Pads** Building 4029 consists of an 800 square foot corrugated metal building and three adjacent concrete pads. The building is mounted on a slightly above-grade concrete foundation (approximately 5 inches thick) to prevent storm water intrusion during rain events. Several concrete stairs at the southwest corner of the building lead up to an entry door. A former loading platform is located on a concrete pad at the northwest corner of the building; an 8 foot wide bay door opens onto the platform from the building interior. A concrete pad at the northeast corner of the building, served as a staging area for external components of the radioactive exhaust system. From 1959 to 1974, Building 4029 was used to calibrate radiation detection equipment and store the radioactive source materials used in the calibration process. The radioactive materials (radium-226, cesium-137, cobalt-60, polonium beryllium [PoBe], and plutonium beryllium [PuBe]) were stored in three separate below grade source wells. The radium-226 well was located in the center of the building, the cobalt-60 well was located in the southeast corner of the building, and the PoBe and PuBe storage area (known as the "Pit") was located in the northeast corner of the building. All radioactive source material was removed in 1974 and the source wells were removed in 1988. Soil removal during the source well removal was not documented. From 1978 to 1997, Building 4029 was used as the storage area for the Hazardous Waste Management Facility which comprised of Hazardous Waste Treatment Facility (Building 4133) and the Hazardous Waste Storage Facility (Building 4029). Building 4029 was used to store reactive metal waste while it was waiting to be treated at Building 4133. Materials stored at Building 4029 were mostly forms of sodium and potassium; however, forms of lithium and	**VOCs** VOC use and/or storage not documented at the B4029 RFI Site.	Soil matrix samples were collected at four targeted Building 4029 locations: • The former staging area at the northeast concrete pad (SFBS0001 at 1.2 feet bgs) • The northwest corner near the loading platform (SFBS0008 at 1.5 feet bgs) • The excavated radium-226 source well (SFBS0005 at 10.5 feet bgs) • The lowpoint at the stormwater drainage area south of Building 4029 (SFBS0003 at 0.5 feet bgs) Note: SFBS0002 was planned for the northeast corner of Buiilding 4029, targeting the "pit", one of the removed radioactive storage areas. Due to shallow bedrock and refusal, a sample was not collected.	VOC results area shown on Figure A.3-1. VOCs were detected at all four Building 4029 locations, including methylene chloride (one location), toluene (one location), and styrene (three locations). The maximum detected concentration was 4.38 µg/kg methylene chloride at SFBS0003, slightly above the ResRBSL of 4 µg/kg and well below the EcoRBSL of 25,000 µg/kg. All other detected VOCs at all remaining locations were below RBSLs. Based on targeted and representative sampling results, indicating VOCs present at concentrations below or just slightly above RBSLs, no further characterization is required.	**Yes** VOCs were detected at low concentrations at targeted locations.	**Yes** Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.
		SVOCs Petroleum-based oils and fuels potentially associated with loading and unloading activities (e.g. vehicles).	Soil matrix samples were collected at four targeted Building 4029 locations: • The former staging area at the northeast concrete pad (SFBS0001 at 1.2 feet bgs) • The northwest corner near the loading platform (SFBS0008 at 1.5 feet bgs) • One location at the loading platform outside the bay door (SFBS0009 at 1.5 feet bgs) • The lowpoint at the stormwater drainage area south of Building 4029 (SFBS0003 at 0.5 feet bgs) Note: SFBS0002 was planned for the northeast corner of Buiilding 4029, targeting the "pit", one of the removed radioactive storage areas. Due to shallow bedrock and refusal, a sample was not collected.	SVOC results area shown on Figure A.3-2. Di-n-butyl phthalate was detected at 1 µg/kg at the northeast staging area (SFBS0001), well below ResRBSL (5,700,000 µg/kg) and EcoRBSL (488 µg/kg). Phthalates are common chemicals in plastics and laboratory contaminants, and such a low concentration does not suggest chemical contamination at the site. No other SVOCs were detected, and SVOCs were not detected at the other three sample locations. Based on lack of detected SVOCs that would suggest chemical impacts (e.g. PAHs) at targeted locations, no further characterization is required.	**Yes** SVOCs that would suggest chemical impacts not detected at targeted locations.	**Yes** Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.
		TPH Petroleum-based oils and fuels potentially associated with loading and unloading activities (e.g. vehicles).	Soil matrix samples were collected at eight targeted locations: • The former staging area at the northeast concrete pad (SFBS0001 at 1.2 feet bgs) • The northwest corner near the loading platform (SFBS0008 at 1.5 feet bgs) • One location at the loading platform outside the bay door (SFBS0009 at 1.5 feet bgs) • The excavated radium-226 source well (SFBS0005 at 10.5 feet bgs) • Two locations at concrete cracks within	TPH results area shown on Figure A.3-3. Lubricant oil range organics (C21-C30) were detected at the loading platform (1.24 mg/kg at SFBS0009, 4.5 feet bgs), well below the ResRBSL (1,400 mg/kg) for kerosene/diesel/lubricant oil range organics (C12 - C30). No other TPH ranges were detected; TPH was not detected at any of the other seven targeted sampling locations. Based on targeted sampling results, indicating very low	**Yes** TPH detected at very low concentration at one of seven targeted sampling locations.	**Yes** Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.

TABLE A.3-2A
DESCRIPTION OF CHEMICAL USE AREAS AT THE B4029 RFI SITE AND SOIL SAMPLING RESULTS SUMMARY
(Page 2 of 5)

Map Key[1]	**Chemical Use Area Name** Status, How Used and Physical Characteristics (see text for Site History)	**Potential Chemicals Used / Stored**[2]	**Sampling Scope and Rationale**[2] [See Figure A.2-2 for sampling locations]	**Sampling Results**[3] Chemical concentrations detected greater than background and/or risk screening levels? [4]	**Potential concentration gradients sufficiently characterized for risk assessment?**[5]	**Is delineation sufficient to estimate soil volume in CMS?**[6,7] (see Figure A.5-1 for CMS areas)
	zirconium were also stored at the building. The waste materials were stored in drums and containers on pallets along the north and south walls of the building. Surface water flows via sheet flow to a lowpoint to the south of the southeast corner of the building where it is conveyed, via a PVC drainage pipe, approximately 6 feet to the southeast to a south-facing slope offsite. Once offsite the surface water continues in natural drainages to the south-southwest, to the primary drainage south of Silvernale Reservoir, and eventually discharges to the R-2 Ponds. Water existing in the R-2 Ponds is monitored at NPDES surface water monitoring location, Outfall 018. Soils in the Building 4029 area consist mainly silty sand with occasionally occurring silty sandstone. Soil depths around Building 4029 range from 0 (exposed bedrock) to 5 feet thick; fill gravel and sand are present in the excavated former source wells ranging up to 9 feet thick.		Building 4029 (SFBS0006 and SFBS0007 at 1.5 feet bgs) • Two locations in the stormwater drainage area southeast of Building 4029 (SFBS0003 [0.5 feet bgs] and SFBS0004 [1.5 feet bgs]) Note: SFBS0002 was planned for the northeast corner of Buiilding 4029, targeting the "pit", one of the removed radioactive storage areas. Due to shallow bedrock and refusal, a sample was not collected.	detected TPH at one of seven locations, no further characterization is required.		
		Metals/Inorganics Building 4029 previously used for reactive metals waste storage, primarily sodium and potassium, but also including lithium and zirconium.	Soil matrix samples were collected at eight targeted locations: • The former staging area at the northeast concrete pad (SFBS0001 at 1.2 feet bgs) • The northwest corner near the loading platform (SFBS0008 at 1.5 feet bgs) • One location at the loading platform outside the bay door (SFBS0009 at 1.5 feet bgs) • The excavated radium-226 source well (SFBS0005 at 10.5 feet bgs) • Two locations at concrete cracks within Building 4029 (SFBS0006 and SFBS0007 at 1.5 feet bgs) • Two locations in the stormwater drainage area southeast of Building 4029 (SFBS0003 [0.5 feet bgs] and SFBS0004 [1.5 feet bgs]) Note: SFBS0002 was planned for the northeast corner of Buiilding 4029, targeting the "pit", one of the removed radioactive storage areas. Due to shallow bedrock and refusal, a sample was not collected.	Metals/inorganics results area shown on Figure A.3-6. Metals were detected above background at six of eight locations around Building 4029. Sodium was above background in all six samples, but the remaining metals (barium, lithium, nickel, thallium, and zinc) were detected above background in three samples, primarily within the eastern interior of the building: • SFBS0006, located beneath a crack in the building's concrete, generally contained the highest metals concentrations, including barium (185 mg/kg; background 140 mg/kg), lithium (60.8 mg/kg; background 37 mg/kg), nickel (37.9 mg/kg; background 29 mg/kg); sodium (220 mg/kg; background 110 mg/kg), thallium (0.51 mg/kg; background 0.46 mg/kg), and zinc (129 mg/kg; background 110 mg/kg) • SFBS0005, in the former radium-226 source well, contained sodium (245 mg/kg) and zinc (133 mg/kg) • SFBS0003, at the low point in the stormwater drainage area, contained zinc at 328 mg/kg; all metals detected in the down-drainage sample (SFBS0004) were within background range All metals in sample SFBS0001, at the former staging area pad, were within background ranges. No metals exceeded respective ResRBSLs. EcoRBSLs for barium, lithium, nickel, and zinc are below maximum background concentrations. pH levels ranged from 6.33 to 8.7, within normal soil ranges. Based on elevated metals in observed mostly in one of four targeted samples within the building footprint (one of eight total samples) and defined drainage migration, sample distribution adequately characterizes Building 4029 area. No further characterization is required.	**Yes** Elevated metals detected primarily in one of four targeted building footprint samples. Targeted samples adequately characterize area.	**Yes** Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.

TABLE A.3-2A
DESCRIPTION OF CHEMICAL USE AREAS AT THE B4029 RFI SITE AND SOIL SAMPLING RESULTS SUMMARY
(Page 3 of 5)

Map Key[1]	**Chemical Use Area Name** Status, How Used and Physical Characteristics (see text for Site History)	**Potential Chemicals Used / Stored**[2]	**Sampling Scope and Rationale**[2] [See Figure A.2-2 for sampling locations]	**Sampling Results**[3] Chemical concentrations detected greater than background and/or risk screening levels? [4]	**Potential concentration gradients sufficiently characterized for risk assessment?**[5]	**Is delineation sufficient to estimate soil volume in CMS?**[6,7] (see Figure A.5-1 for CMS areas)
		Herbicides/Pesticides Herbicide/pesticide use and/or storage not documented at the B4029 RFI Site.	One representative soil sample was collected (SFBS0009) at the western concrete pad outside the bay door of Building 4029.	No herbicides/pesticides were detected at the representative sample location. No further characterization is required.	**Yes** Herbicides/pesticides not detected at the representative sampling location.	**Yes** Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.
2	**Building 4029 Access Road** The Building 4029 Access Road is an asphalt driveway connecting G Street to Building 4029 extending from the west end of Building 4029 to the driveway gate approximately 124 feet to the west. The Access Road was used as a loading/ unloading area and never designated as a storage area; however, records indicate that the area may have been used to store miscellaneous equipment at various times, including sodium cold traps. Surface water on the access road collects in a swale along the north side of the road and flows west until the access road turns north, approximately 150 feet west of Building 4029, where it flows underneath the road (via a sub-road drainage) and continues south-southwest offsite. Outside the B4029 RFI Site, surface water flows south-southwest in natural drainages to the primary drainage south of Silvernale Reservoir, and eventually discharges to the R-2 Ponds. Water existing in the R-2 Ponds is monitored at NPDES surface water monitoring location, Outfall 018. Soils in the Building 4029 Access Road area are mainly fill soils (from an unknown location) consisting of silty sand with occasionally occurring silty sandstone. Fill soil depths at this area range from 0 (exposed bedrock) to 6 feet bgs, alluvial soils reachs depths of up to 10.5 feet bgs.	**VOCs** VOC use and/or storage not documented at the B4029 RFI Site.	One soil sample targeted the Building 4029 Access Road drainage swale (SFBS0010 at 1.5 feet bgs)	VOC results area shown on Figure A.3-1. Methylene chloride was detected at the targeted sampling location at 2.3 µg/kg, below both ResRBSL (4 µg/kg) and EcoRBSL (25,000 µg/kg). No other VOCs were detected. Based on low VOC concentration at the targeted sample location, no further characterization is required.	**Yes** One VOC detected at low concentration at targeted sample location.	**Yes** Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.
		SVOCs Potentially associated with oils used during loading and unloading activities.	Collected soil samples at one targeted and one representative location around the Building 4029 Access Road: • One location targeting the Building 4029 Access Road drainage swale (SFBS0010 at 1.5 feet bgs) • One representative location at the center of the Building 4029 Access Road (SFBS0011 at 4 feet bgs); location corresponds to maximum lubricant oil range organics concentration.	SVOC results area shown on Figure A.3-2. Di-n-butyl phthalatewas detected at 5.35 µg/kg; no other phthalates or PAHs (including benzo(a)pyrene) were detected at either location. Based on lack of detected SVOCs that would suggest chemical impacts (e.g. PAHs) at targeted and representative locations, no further characterization is required.	**Yes** SVOCs that would suggest chemical impacts not detected at targeted and representative sample locations.	**Yes** Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.
		TPH Petroleum-based oils and fuels potentially associated with loading and unloading activities.	Collected soil samples at two representative and six targeted locations around the Building 4029 Access Road : • Two locations targeting the Building 4029 Access Road drainage swale (SFBS0010 and SFBS0013) at depths of 2.5 and 1.25 feet bgs, respectively • Six representative locations along the Building 4029 Access Road (SFBS0011, SFBS0012, SFBS0014, SFBS0015, SFBS0021, and SFBS0022) at depths ranging up to 10.5 feet bgs Additionally, one sample was collected down-drainage from the Access Road immediately upslope from the sub-road drainage (SFBS0023 at 1.6 feet bgs).	TPH results area shown on Figure A.3-3. Lubricant oil range organics (C21 – C30) were detected in 10 of 11 samples, ranging from less than 5 mg/kg to 493 mg/kg (max at SFBS0011, 4.5 feet bgs). Detected concentrations well below the ResRBSL (1,400 mg/kg) for kerosene/diesel/lubricant oil range organics (C12 - C30). . No other TPH ranges were detected at the targeted and representative sampline locations. Note: SVOCs, including PAHs, were not detected in the sample containing the maximum lubricant oil range concentration. Numerous targeted and representative samples adequately characterize the area for TPH. TPH concentrations detected well below RBSLs. No further characterization is required.	**Yes** Lubricant oil range organics detected at relatively low concentrations. Numerous samples adequately characterize TPH and PAHs (above).	**Yes** Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.

TABLE A.3-2A
DESCRIPTION OF CHEMICAL USE AREAS AT THE B4029 RFI SITE AND SOIL SAMPLING RESULTS SUMMARY
(Page 4 of 5)

Map Key[1]	**Chemical Use Area Name** Status, How Used and Physical Characteristics (see text for Site History)	**Potential Chemicals Used / Stored**[2]	**Sampling Scope and Rationale**[2] [See Figure A.2-2 for sampling locations]	**Sampling Results**[3] Chemical concentrations detected greater than background and/or risk screening levels? [4]	**Potential concentration gradients sufficiently characterized for risk assessment?**[5]	**Is delineation sufficient to estimate soil volume in CMS?**[6,7] (see Figure A.5-1 for CMS areas)
		PCB PCB use/storage not documented at the B4029 RFI Site.	One soil sample was collected to target the maximum concentration of lubricant oil range organics at the center of the Building 4029 access road (SFBS0011), at a depth of 4 feet bgs.	PCBs were not detected; no further characterization is required.	**Yes** PCBs not detected at the targeted sampling location.	**Yes** Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.
		Metals/Inorganics Access road used as a loading/unloading area for reactive metals. The road may have been used as a storage area for equipment associated with Building 4029.	Collected soil samples at two representative and six targeted locations around the Building 4029 Access Road : • Two locations targeting the Building 4029 Access Road drainage swale (SFBS0010 and SFBS0013) at depths of 2.5 and 1.25 feet bgs, respectively • Six representative locations along the Building 4029 Access Road (SFBS0011, SFBS0012, SFBS0014, SFBS0015, SFBS0021, and SFBS0022) at depths ranging up to 10.5 feet bgs	Metals/inorganics results area shown on Figure A.3-6. Sodium was detected above background in six of eight samples around the Building 4029 Access Road, ranging up to 144 mg/kg (background 110 mg/kg) on the south side of the Access Road (SFBS0012, 10.5 feet bgs). Barium was detected above background in one sample at 165 mg/kg (background 140 mg/kg) west of the driveway gate (SFBS0021). The EcoRBSL for barium is below the background range. pH ranged from 5.79 to 7.51, within normal soil ranges. Based on representative sampling results, indicating metals concentrations (with the exception of sodium) within or near background ranges. Numerous targeted samples adequately characterize area. No further characterization is required.	**Yes** Numerous targeted and representative samples adequately characterize metals concentrations. Area recommended for further evaluation to provide additional characterization data and address uncertainty regarding PCBs potentially associated with lubricant oil range organics.	**Yes** Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.
3	**Former Old Conservation Yard (OCY) Tank Pipeline**[8] The former OCY Tank Pipeline was a carbon steel pipe used to carry fuel from the OCY to Fuel Tank 4735 (RFI Group 5). Fuel Tank 4735 stored fuel for the Sodium Component Test Installation from 1977 to 1990, and was removed (along with the piping) in 1999. The OCY Tank Pipeline ran through the Group 7 reporting area north of Building 4029, along the southern edge of G Street. Soil depth where the OCY pipeline enters the Group 7 Boundary was recorded at 4 feet bgs; soils consisted of sandy silt and silt with sand. Surface water around the former OCY Tank	**TPH** Petroleum-based fuels were transported through the pipeline.	One soil sample was collected at a targeted location where the former OCY pipeline entered the Group 7 boundary from the eastern side (OCTS01) at 4 feet bgs.	TPH results area shown on Figure A.3-3. TPH was not detected at the targeted sample location. Based on TPH results at the targeted location, no further characterization is required.	**Yes** TPH not detected at the targeted sampling location.	**Yes** Area is not recommended for further evaluation in CMS based on sampling and risk assessment results.

TABLE A.3-2A
DESCRIPTION OF CHEMICAL USE AREAS AT THE B4029 RFI SITE AND SOIL SAMPLING RESULTS SUMMARY
(Page 5 of 5)

Map Key[1]	**Chemical Use Area Name** Status, How Used and Physical Characteristics (see text for Site History)	**Potential Chemicals Used / Stored**[2]	**Sampling Scope and Rationale**[2] [See Figure A.2-2 for sampling locations]	**Sampling Results**[3] Chemical concentrations detected greater than background and/or risk screening levels?[4]	**Potential concentration gradients sufficiently characterized for risk assessment?**[5]	**Is delineation sufficient to estimate soil volume in CMS?**[6,7] (see Figure A.5-1 for CMS areas)
	Pipeline flows south-southwest in natural drainages to the primary drainage south of Silvernale Reservoir, and eventually discharges to the R-2 Ponds.					

Notes:

1. Map Key refers to numbered chemical use area as shown on Figure A.2-1.
2. Where historical records and physical characteristics do not suggest the presence of a chemical group, that chemical group was not analyzed in samples from the respective chemical use area and is not reflected in this table.
3. Complete sample analytical results are presented in Attachment A-3.
4. The use of the SRAM-based screening levels for comparison purposes does not serve as a risk assessment. These screening levels are not used to determine if a chemical use area will be recommended for further consideration in the CMS, but only as a tool to evaluate the characterization data. The SRAM-based screening levels represent conservative concentrations that pose a low level of risk.
5. Concentration gradients must be defined such that the risk assessment reflects the approximate maximum analyte concentration OR a concentration sufficiently high to result in risk requiring a recommendation for evaluation during CMS.
6. Chemicals listed as a basis for CMS recommendations include both chemical drivers (above 1 x 10-6 risk and HI of 1.0) and significant chemical contributors to overall risk.
7. Volumes for CMS evaluation must be estimable within a factor of ten for comparison of remedial alternatives.
8. Sample OCTS01 was collected from a trench targeting the former fuel pipeline from OCY to Fuel Tank 4735 in Area IV; a full investigation of this unit, including this sample, will be discussed in the Group 5 RFI Report.

ACRONYMS

B4029 - Building 4029
bgs - below ground surface
CMS - Corrective Measures Study
EcoRBSL - ecological risk-based screening level
HI - Hazard Index
mg/kg - milligrams per kilogram
OCY - Old Conservation Yard
PoBe - polonium beryllium
PuBe - plutonium beryllium
RBSLs - risk based screening levels
ResRBSL - residential risk-based screening level
RFI - Resource Conservation and Recovery Act (RCRA) Facility Investigation
SRAM - Standardized Risk Assessment Methodology
SVOC - semivolatile organic compound
TPH - total petroleum hydrocarbons
µg/kg - micrograms per kilogram
VOC - volatile organic compound

TABLE A.3-2B
B4029 RFI SITE SUMMARY AND EVALUATION OF GROUNDWATER SAMPLING RESULTS
(PAGE 1 OF 3)

Analytical Group	Site Soil Impacts? (Summary of Relevant Impacts)[1]	Monitored in Groundwater? (Number of Samples/Date Range)[2]	Constituents Detected in Groundwater? (Above GWCC or Regulatory Criteria?)[3]	RFI Site Related?	Groundwater Characterized Sufficiently for Risk Assessment?
VOC	YES VOC use was not documented at the site; however, methylene chloride, styrene, and toluene were detected at very low concentrations in soil around the Building 4029 area. Methylene chloride was detected southeast of Building 4029 (SFBS0003) and at the northern edge of the access road to the west of Building 4029 (SFBS0010) up to 4.38 µg/kg west of the building at a depth of 0.5 feet bgs. Styrene was detected at low concentrations at several locations in and around Building 4029 (SFBS0001, SFBS0003, and SFBS0005) up to 0.325 µg/kg in the center of the building (SFBS0005) at a depth of 10.5 feet bgs. Toluene was detected inside the west end of Building 4029 (SFBS0008) at 0.476 µg/kg at a depth of 1.5 feet bgs.	YES A total of 87 groundwater samples have been collected and analyzed for VOCs at the four groundwater monitoring locations in the vicinity of the B4029 RFI Site between 1989 and 2008.	YES VOCs have been infrequently detected below MCLs in vicinity monitoring locations, with many samples ND for VOCs. VOCs detected in only one sampling event include: TCE, chloromethane, carbon disulfide, ethylbenzene, toluene, and methylene chloride. Acetone was detected in one sample each in PZ-112 and RD-92.	NO Based on site chemical use and very low soil VOCs, sporadic VOCs detected in groundwater in the vicinity of the B4029 RFI Site are not considered site-related.	YES
SVOCs	YES Potential SVOC sources include oils associated with lubricant oils associated with vehicle use. Lubricant oil range organics were detected in site soils (see below). Low concentrations of phthalates, common laboratory contaminants and also found in plastics, were detected at the site. No PAHs were detected.	YES A total of four groundwater samples have been collected and analyzed for SVOCs at one B4029 RFI Site vicinity groundwater monitoring location between 1989 and 2005.	YES Di-n-butyl phthalate and bis(2-ethylhexyl) phthalate were detected with concentrations of 4.8 µg/L and 20 µg/L, respectively, in a single sample collected at RD-16 in 1996. These compounds were not detected in two subsequent samples collected from this location and are considered likely laboratory contaminants.	NO Based on low phthalate soil concentrations (no PAHs), site use, low SVOC solubility, and the likely laboratory contaminant source in groundwater, groundwater SVOCs are not considered site related.	YES
TPH	YES Site TPH use was not documented; however, detected TPH may be partly attributed to regular vehicle use for loading/unloading activities and imported fill source at the Building 4029 Access Road. Lubricant oil range organics (C21-C30) were detected up to 493 mg/kg at seven locations along the Building 4029 Access Road at depths ranging from 1.5 to 10.5 feet bgs. The maximum concentration ranging was detected at 4.5 feet bgs. No other TPH ranges were detected at the B4029 RFI site.	NO Groundwater samples have not been analyzed for TPH near the B4029 RFI Site.	N/A	NO Lubricant oil range organics in Building 4029 Access Road soil has very low mobility are unlikely to have impacted groundwater.	YES .

TABLE A.3-2B
B4029 RFI SITE SUMMARY AND EVALUATION OF GROUNDWATER SAMPLING RESULTS
(PAGE 2 OF 3)

Analytical Group	Site Soil Impacts? (Summary of Relevant Impacts)[1]	Monitored in Groundwater? (Number of Samples/Date Range)[2]	Constituents Detected in Groundwater? (Above GWCC or Regulatory Criteria?)[3]	RFI Site Related?	Groundwater Characterized Sufficiently for Risk Assessment?
PCBs	NO PCBs were not detected in soil samples at the B4029 RFI Site.	NO Groundwater samples have not been analyzed for PCBs at the B4029 RFI Site.	N/A	NO	N/A
Dioxins	N/A Dioxins are not suspected site chemicals and were not analyzed at the B4029 RFI site.	NO Groundwater samples have not been analyzed for dioxins at the B4029 RFI Site.	N/A	N/A	N/A
Metals	YES Reactive metals, such as sodium, potassium, lithium, and zirconium, and contaminated equipment, were stored at the B4029 RFI site pending transport to Building 4133 for treatment. • Barium was detected above background in 2 of 22 samples, up to 185 mg/kg at 1.5 feet bgs inside of Building 4029. • Lithium was detected above background in 1 of 22 samples, at 60.8 mg/kg at 1.5 feet bgs) inside of Building 4029l. • Nickel was detected above background in 1 of 20 samples, at 37.9 mg/kg at 1.5 feet bgs inside of Building 4029. • Sodium was detected above background in 12 of 23 samples, up to 245 mg/kg. • Thallium was detected slightly above background in 1 of 20 samples, at 0.51 mg/kg. • Zinc was detected above background in 3 of 22 samples, up to 328 mg/kg at 0.5 feet bgs at the low point just southeast of Building 4029. The other two were slightly above background.	YES 7 groundwater samples were collected and analyzed for metals at two B4029 RFI Site vicinity groundwater monitoring locations between 1989 and 2008.	YES Manganese, molybdenum, selenium, and vanadium have been detected above their respective GWCCs at RD-92.	NO None of the metals detected above GWCCs were above background in soil; likewise none of the metals detected above background in soil were above GWCCs in groundwater. Metals were sporadically detected above GWCCs in groundwater in the vicinity of the B4029 RFI Site, and all were less than 1.3x the respective GWCC. For each metal detected above the GWCC in groundwater, at least three other analytical results indicate that concentrations are below the GWCC.	YES
Inorganic Compounds	NO Fluoride was not detected in any of the soil sampling conducted around the B4029 RFI site.	YES 7 groundwater samples were collected and analyzed for inorganic compounds at 2 B4029 RFI Site vicinity groundwater monitoring locations between 1989 and 2006.	YES Inorganic compounds were detected in groundwater near the B4029 RFI Site, but none were detected above established MCLs.	NO	YES

TABLE A.3-2B
B4029 RFI SITE SUMMARY AND EVALUATION OF GROUNDWATER SAMPLING RESULTS
(PAGE 3 OF 3)

Analytical Group	Site Soil Impacts? (Summary of Relevant Impacts)[1]	Monitored in Groundwater? (Number of Samples/Date Range)[2]	Constituents Detected in Groundwater? (Above GWCC or Regulatory Criteria?)[3]	RFI Site Related?	Groundwater Characterized Sufficiently for Risk Assessment?
Perchlorate	N/A Perchlorate was not sampled for at the B4029 RFI site.	YES 6 groundwater samples were collected and analyzed for perchlorate at 2 B4029 RFI Site groundwater monitoring locations between 1997 and 2004.	NO	NO	YES
NDMA and formaldehyde (indicators of hydrazine)	NO NDMA was not detected in the sampling, and formaldehyde was not a suspected site chemical at the B4029 RFI site.	YES 5 groundwater samples were collected and analyzed for NDMA at RD-16 between 1997 and 2004. 3 groundwater samples were collected and analyzed for formaldehyde at RD-16.	NO	NO	YES
1,4-Dioxane	N/A 1,4-Dioxane was not sampled for at the B4029 RFI site, and additionally 1,1,1-trichloroethane was not detected in any of the VOC sampling.	YES 15 groundwater samples were collected and analyzed for 1,4-dioxane at RD-16 between 1995 and 2005.	NO	NO	YES

Notes:
[1] See Table A.3-2A for a complete summary of soil impacts.
[2] All B4029 RFI Site groundwater monitoring locations are shown on Figure D-4 in Appendix D.
[3] See Tables D-8 through D-25 for Groundwater Results.

Acronyms:
bgs - below ground surface
CFGW - Chatsworth Formation groundwater
GWCC - Groundwater Comparison Concentrations
mg/kg - milligrams per kilogram
ND - non-detect
NSGW - near surface groundwater
PCB - polychlorinated biphenyl
RFI - Resource Conservation and Recovery Act Facility Investigation
SVOC - semivolatile organic compound
TPH - total petroleum hydrocarbons
VOC - volatile organic compound
µg/kg - micrograms per kilogram

TABLE A.3-3A
B4029 RFI SITE ANALYTICAL DATA SCREENING SUMMARY AND DATA QUALITY (SOIL)
(Page 1 of 3)

Analyte Group	Constituent *	Units	Screening Levels (1)			Total Number Samples Analyzed	Detect Data Summary						Non-Detect Data Summary						Data Issue (5)	Issue Resolution (6)
			Residential (ResRBSL)	Ecological (EcoRBSL)	Background (2)		Total Samples w/ Detections	Minimum Detected Concentration	Maximum Detected Concentration	Number of Detected Concentrations > Res RBSL	Number of Detected Concentrations > Eco RBSL	Number of Detected Concentrations > Background	Total Samples ND	Minimum Detection Limit	Maximum Detection Limit	Number DLs > ResRBSL	NumberDL > EcoRBSL	Number DL > Background		
Herbicide (µg/kg)																				
	2,4,5-T	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	5.37	5.37	NA (4)	NA (4)	NA (3)	--	--
	2,4,5-Trichlorophenoxypropionic acid	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	5.37	5.37	NA (4)	NA (4)	NA (3)	--	--
	2,4-Dichlorophenoxyacetic Acid (2,4-D)	µg/kg	686090	NA (4)	NA (3)	1	0	0	0	0	NA (4)	NA (3)	1	5.37	5.37	0	NA (4)	NA (3)	--	--
Inorganics																				
	% Solids	%	NA (4)	NA (4)	NA (3)	1	1	90	90	NA (4)	NA (4)	NA (3)	0	0	0	NA (4)	NA (4)	NA (3)	--	--
	Fluoride	mg/kg	NA (4)	NA (4)	NA (3)	5	5	0.391	3.2	NA (4)	NA (4)	NA (3)	0	0	0	NA (4)	NA (4)	NA (3)	--	--
	Moisture	%	NA (4)	NA (4)	NA (3)	27	27	1.89	13.5	NA (4)	NA (4)	NA (3)	0	0	0	NA (4)	NA (4)	NA (3)	--	--
	pH	pH Units	NA (4)	NA (4)	NA (3)	27	27	5.79	8.7	NA (4)	NA (4)	NA (3)	0	0	0	NA (4)	NA (4)	NA (3)	--	--
METALS (mg/kg)																				
	Aluminum	mg/kg	75000	12	20000	22	22	5740	19200	0	22	0	0	0	0	0	0	0	--	--
	Antimony	mg/kg	30	0.095	8.7	22	1	0.47	0.47	0	1	0	21	0.301	1.72	0	21	0	Elevated DLs	a
	Arsenic	mg/kg	0.095	1.9	15	22	22	2.7	7.4	22	22	0	0	0	0	0	0	0	--	--
	Barium	mg/kg	15000	15	140	26	26	54.3	185	0	26	2	0	0	0	0	0	0	--	--
	Beryllium	mg/kg	150	5.1	1.1	22	22	0.41	1.1	0	0	0	0	0	0	0	0	0	--	--
	Boron	mg/kg	15000	6.8	9.7	22	10	0.99	1.9	0	0	0	12	1	1.14	0	0	0	--	--
	Cadmium	mg/kg	78	0.021	1	22	22	0.097	0.39	0	22	0	0	0	0	0	0	0	--	--
	Chromium	mg/kg	114000	930	37	22	22	14	34.6	0	0	0	0	0	0	0	0	0	--	--
	Cobalt	mg/kg	23	8.9	21	22	22	5	12	0	4	0	0	0	0	0	0	0	--	--
	Copper	mg/kg	3000	1.1	29	22	22	7.4	26.3	0	22	0	0	0	0	0	0	0	--	--
	Hexavalent Chromium	mg/kg	110	0.20	NA (3)	1	0	0	0	0	0	NA (3)	1	0.0207	0.0207	0	0	NA (3)	--	--
	Lead	mg/kg	150	0.063	34	22	22	3.5	11.3	0	22	0	0	0	0	0	0	0	--	--
	Lithium	mg/kg	152.2	10	37	26	26	15	60.8	0	26	1	0	0	0	0	0	0	--	--
	Mercury	mg/kg	23	0.10	0.09	22	19	0.0034	0.049	0	0	0	3	0.0061	0.0101	0	0	0	--	--
	Molybdenum	mg/kg	380	0.11	5.3	22	22	0.24	2.3	0	22	0	0	0	0	0	0	0	--	--
	Nickel	mg/kg	1500	0.10	29	22	22	9.5	37.9	0	22	1	0	0	0	0	0	0	--	--
	Potassium	mg/kg	NA (4)	NA (4)	6400	22	22	1790	4310	NA (4)	NA (4)	0	0	0	0	NA (4)	NA (4)	0	--	--
	Selenium	mg/kg	380	0.17	0.66	22	1	0.43	0.43	0	1	0	21	0.493	0.573	0	21	0	Elevated DLs	a
	Silver	mg/kg	380	0.54	0.79	22	15	0.022	0.1	0	0	0	7	0.041	0.0436	0	0	0	--	--
	Sodium	mg/kg	NA (4)	NA (4)	110	27	27	58.1	245	NA (4)	NA (4)	15	0	0	0	NA (4)	NA (4)	0	--	--
	Thallium	mg/kg	4.9	2.9	0.46	22	22	0.2	0.51	0	0	1	0	0	0	0	0	0	--	--
	Vanadium	mg/kg	369	1.5	62	22	22	25.1	52.4	0	22	0	0	0	0	0	0	0	--	--
	Zinc	mg/kg	23000	21	110	26	26	42.3	328	0	26	3	0	0	0	0	0	0	--	--
	Zirconium	mg/kg	NA (4)	7.4	8.6	22	22	1.1	2.5	NA (4)	0	0	0	0	0	NA (4)	0	0	--	--
Pesticide (µg/kg)																				
	4,4'-DDD	µg/kg	3573	12	NA (3)	1	0	0	0	0	0	NA (3)	1	1.43	1.43	0	0	NA (3)	--	--
	4,4'-DDE	µg/kg	2522	12	NA (3)	1	0	0	0	0	0	NA (3)	1	1.43	1.43	0	0	NA (3)	--	--
	4,4'-DDT	µg/kg	2522	12	NA (3)	1	0	0	0	0	0	NA (3)	1	1.43	1.43	0	0	NA (3)	--	--
	a-Chlordane	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	0.717	0.717	NA (4)	NA (4)	NA (3)	--	--
	Aldrin	µg/kg	50	427	NA (3)	1	0	0	0	0	0	NA (3)	1	0.717	0.717	0	0	NA (3)	--	--
	alpha-BHC	µg/kg	318	214	NA (3)	1	0	0	0	0	0	NA (3)	1	0.717	0.717	0	0	NA (3)	--	--
	beta-BHC	µg/kg	572	214	NA (3)	1	0	0	0	0	0	NA (3)	1	0.717	0.717	0	0	NA (3)	--	--
	delta-BHC	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	0.717	0.717	NA (4)	NA (4)	NA (3)	--	--
	Dieldrin	µg/kg	54	85	NA (3)	1	0	0	0	0	0	NA (3)	1	1.43	1.43	0	0	NA (3)	--	--
	Endosulfan I	µg/kg	411654	641	NA (3)	1	0	0	0	0	0	NA (3)	1	0.717	0.717	0	0	NA (3)	--	--
	Endosulfan II	µg/kg	411654	641	NA (3)	1	0	0	0	0	0	NA (3)	1	1.43	1.43	0	0	NA (3)	--	--
	Endosulfan sulfate	µg/kg	411654	641	NA (3)	1	0	0	0	0	0	NA (3)	1	1.43	1.43	0	0	NA (3)	--	--
	Endrin	µg/kg	20583	44	NA (3)	1	0	0	0	0	0	NA (3)	1	1.43	1.43	0	0	NA (3)	--	--
	Endrin aldehyde	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	1.43	1.43	NA (4)	NA (4)	NA (3)	--	--
	Endrin ketone	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	1.43	1.43	NA (4)	NA (4)	NA (3)	--	--
	gamma-BHC	µg/kg	780	214	NA (3)	1	0	0	0	0	0	NA (3)	1	0.717	0.717	0	0	NA (3)	--	--
	gamma-Chlordane	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	0.717	0.717	NA (4)	NA (4)	NA (3)	--	--
	Heptachlor	µg/kg	209	555	NA (3)	1	0	0	0	0	0	NA (3)	1	0.717	0.717	0	0	NA (3)	--	--
	Heptachlor epoxide	µg/kg	156	5.3	NA (3)	1	0	0	0	0	0	NA (3)	1	0.717	0.717	0	0	NA (3)	--	--
	p,p'-Methoxychlor	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	7.17	7.17	NA (4)	NA (4)	NA (3)	--	--
	Toxaphene	µg/kg	715	34168	NA (3)	1	0	0	0	0	0	NA (3)	1	35.8	35.8	0	0	NA (3)	--	--
SVOC (µg/kg)																				
	1,2,4-Trichlorobenzene	µg/kg	142	20000	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	1	0	NA (3)	Elevated DLs	b
	1,2-Dichlorobenzene	µg/kg	1800	370000	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	1,2-Diphenylhydrazine	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	1,3-Dichlorobenzene	µg/kg	1700	160165	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	1,4-Dichlorobenzene	µg/kg	5.6	20000	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	1	0	NA (3)	Elevated DLs	c
	1-Methyl naphthalene	µg/kg	NA (4)	NA (4)	NA (3)	6	0	0	0	NA (4)	NA (4)	NA (3)	6	17.3	35.7	NA (4)	NA (4)	NA (3)	--	--
	2,4,5-Trichlorophenol	µg/kg	5700000	9000	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	2,4,6-Trichlorophenol	µg/kg	10000	10000	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	2,4-Dichlorophenol	µg/kg	170000	1281	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	2,4-Dimethylphenol	µg/kg	1100000	110000	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	2,4-Dinitrophenol	µg/kg	110000	590	NA (3)	1	0	0	0	0	0	NA (3)	1	715	715	0	1	NA (3)	Elevated DLs	b
	2,4-Dinitrotoluene	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	2,6-Dinitrotoluene	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	2-Chloronaphthalene	µg/kg	4600000	530000	NA (3)	1	0	0	0	0	0	NA (3)	1	35.7	35.7	0	0	NA (3)	--	--
	2-Chlorophenol	µg/kg	290000	21355	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	2-Methylnaphthalene	µg/kg	230000	210000	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	35.7	0	0	NA (3)	--	--
	2-Nitroaniline	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--

TABLE A.3-3A
B4029 RFI SITE ANALYTICAL DATA SCREENING SUMMARY AND DATA QUALITY (SOIL)
(Page 2 of 3)

Analyte Group	Constituent *	Units	Screening Levels (1)			Total Number Samples Analyzed	Detect Data Summary						Non-Detect Data Summary						Data Issue (5)	Issue Resolution (6)
			Residential (ResRBSL)	Ecological (EcoRBSL)	Background (2)		Total Samples w/ Detections	Minimum Detected Concentration	Maximum Detected Concentration	Number of Detected Concentrations > Res RBSL	Number of Detected Concentrations > Eco RBSL	Number of Detected Concentrations > Background	Total Samples ND	Minimum Detection Limit	Maximum Detection Limit	Number DLs > ResRBSL	NumberDL > EcoRBSL	Number DL > Background		
	2-Nitrophenol	µg/kg	NA (4)	11532	NA (3)	1	0	0	0	NA (4)	0	NA (3)	1	357	357	NA (4)	0	NA (3)	--	--
	3,3'-Dichlorobenzidine	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	3-Nitroaniline	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	4,6-Dinitro-o-cresol	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	4-Bromophenyl phenyl ether	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	4-Chlorophenylphenyl ether	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	4-Nitrophenol	µg/kg	NA (4)	7000	NA (3)	1	0	0	0	NA (4)	0	NA (3)	1	357	357	NA (4)	0	NA (3)	--	--
	Acenaphthene	µg/kg	3400000	2456	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	35.7	0	0	NA (3)	--	--
	Acenaphthylene	µg/kg	3400000	270384	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	35.7	0	0	NA (3)	--	--
	Aniline	µg/kg	130000	10678	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	Anthracene	µg/kg	17000000	2384	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	35.7	0	0	NA (3)	--	--
	Benzidine	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	Benzo(a)anthracene	µg/kg	600	1418	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	35.7	0	0	NA (3)	--	--
	Benzo(a)pyrene	µg/kg	60	5595	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	35.7	0	0	NA (3)	--	--
	Benzo(b)fluoranthene	µg/kg	600	4360	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	35.7	0	0	NA (3)	--	--
	Benzo(ghi)perylene	µg/kg	NA (4)	NA (4)	NA (3)	6	0	0	0	NA (4)	NA (4)	NA (3)	6	17.3	35.7	0	0	NA (3)	--	--
	Benzo(k)fluoranthene	µg/kg	600	5763	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	35.7	0	0	NA (3)	--	--
	Benzoic acid	µg/kg	230000000	4438	NA (3)	1	0	0	0	0	0	NA (3)	1	715	715	0	0	NA (3)	--	--
	Benzyl alcohol	µg/kg	17000000	4438	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	bis(2-Chloroethoxy)methane	µg/kg	NA (4)	150000	NA (3)	1	0	0	0	NA (4)	0	NA (3)	1	357	357	NA (4)	0	NA (3)	--	--
	bis(2-Chloroethyl) ether	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	bis(2-Chloroisopropyl) ether	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	bis(2-Ethylhexyl) phthalate	µg/kg	NA (4)	NA (4)	NA (3)	6	0	0	0	NA (4)	NA (4)	NA (3)	6	17.3	179	NA (4)	NA (4)	NA (3)	--	--
	Butyl benzyl phthalate	µg/kg	377249	339549	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	357	0	0	NA (3)	--	--
	Chrysene	µg/kg	6000	2359	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	35.7	0	0	NA (3)	--	--
	Dibenzo(a,h)anthracene	µg/kg	NA (4)	NA (4)	NA (3)	6	0	0	0	NA (4)	NA (4)	NA (3)	6	17.3	35.7	NA (4)	NA (4)	NA (3)	--	--
	Dibenzofuran	µg/kg	110000	62000	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	Diethyl phthalate	µg/kg	NA (4)	NA (4)	NA (3)	6	0	0	0	NA (4)	NA (4)	NA (3)	6	17.3	357	NA (4)	NA (4)	NA (3)	--	--
	Dimethyl phthalate	µg/kg	570000000	4438	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	357	0	0	NA (3)	--	--
	Di-n-butyl phthalate	µg/kg	NA (4)	NA (4)	NA (3)	6	2	1	5.35	NA (4)	NA (4)	NA (3)	4	17.8	357	NA (4)	NA (4)	NA (3)	--	--
	Di-n-octyl phthalate	µg/kg	2300000	13000	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	357	0	0	NA (3)	--	--
	Diphenylamine	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	Fluoranthene	µg/kg	2300000	38000	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	35.7	0	0	NA (3)	--	--
	Fluorene	µg/kg	2300000	1646	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	35.7	0	0	NA (3)	--	--
	Hexachlorobenzene	µg/kg	400	342	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	1	NA (3)	Elevated DLs	b
	Hexachlorobutadiene	µg/kg	9200	854	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	Hexachlorocyclopentadiene	µg/kg	340000	12813	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	Hexachloroethane	µg/kg	18000	2136	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	Indeno(1,2,3-cd)pyrene	µg/kg	600	5821	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	35.7	0	0	NA (3)	--	--
	Isophorone	µg/kg	750000	320329	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	Naphthalene	µg/kg	1146591	210000	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	357	0	0	NA (3)	--	--
	Nitrobenzene	µg/kg	29000	1965	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	n-Nitrosodimethylamine	µg/kg	45	20000	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	357	1	0	NA (3)	Elevated DLs	b
	n-Nitrosodi-n-propylamine	µg/kg	100	27762	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	1	0	NA (3)	Elevated DLs	b
	o-Cresol	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	p-Chloroaniline	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	p-Chloro-m-cresol	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	p-Cresol	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	Pentachlorophenol	µg/kg	8800	6000	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	Phenanthrene	µg/kg	17000000	1314	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	35.7	0	0	NA (3)	--	--
	Phenol	µg/kg	18000000	5015	NA (3)	1	0	0	0	0	0	NA (3)	1	357	357	0	0	NA (3)	--	--
	p-Nitroaniline	µg/kg	NA (4)	NA (4)	NA (3)	1	0	0	0	NA (4)	NA (4)	NA (3)	1	357	357	NA (4)	NA (4)	NA (3)	--	--
	Pyrene	µg/kg	1700000	18000	NA (3)	6	0	0	0	0	0	NA (3)	6	17.3	35.7	0	0	NA (3)	--	--
TPH (mg/kg)																				
	Diesel Range Organics (C14-C20)	mg/kg	1400	NA (4)	NA (3)	1	0	0	0	0	NA (4)	NA (3)	1	11	11	0	NA (4)	NA (3)	--	--
	Diesel Range Organics (C15-C20)	mg/kg	1400	NA (4)	NA (3)	22	0	0	0	0	NA (4)	NA (3)	22	3.39	180	0	NA (4)	NA (3)	--	--
	Gasoline Range Organics (C8-C11)	mg/kg	1.1	NA (4)	NA (3)	23	0	0	0	0	NA (4)	NA (3)	23	3.39	180	23	NA (4)	NA (3)	Elevated DLs	d, e
	Kerosene Range Organics (C11-C14)	mg/kg	1400	NA (4)	NA (3)	1	0	0	0	0	NA (4)	NA (3)	1	11	11	0	NA (4)	NA (3)	--	--
	Kerosene Range Organics (C12-C14)	mg/kg	1400	NA (4)	NA (3)	22	0	0	0	0	NA (4)	NA (3)	22	3.39	180	0	NA (4)	NA (3)	--	--
	Lubricant Oil Range Organics (C20-C30)	mg/kg	1400	NA (4)	NA (3)	23	11	1.24	493	0	NA (4)	NA (3)	12	3.46	11	0	NA (4)	NA (3)	--	--
VOC (µg/kg)																				
	1,1,1,2-Tetrachloroethane	µg/kg	2.0	76281	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	1,1,1-Trichloroethane	µg/kg	1114	4300000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	1,1,2,2-Tetrachloroethane	µg/kg	1.4	5979	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/kg	16000	582999	NA (3)	5	0	0	0	0	0	NA (3)	5	4.92	5.9	0	0	NA (3)	--	--
	1,1,2-Trichloroethane	µg/kg	1.2	8329	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	1,1-Dichloroethane	µg/kg	1.6	210000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	1,1-Dichloroethene	µg/kg	8.0	10678	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	1,1-Dichloropropene	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	1,2,3-Trichlorobenzene	µg/kg	142	20000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	1,2,3-Trichloropropane	µg/kg	66	12194	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	1,2,4-Trichlorobenzene	µg/kg	142	20000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	1,2,4-Trimethylbenzene	µg/kg	41	64066	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	1,2-Dibromo-3-chloropropane	µg/kg	29	21782	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--

TABLE A.3-3A
B4029 RFI SITE ANALYTICAL DATA SCREENING SUMMARY AND DATA QUALITY (SOIL)
(Page 3 of 3)

Analyte Group	Constituent *	Units	Screening Levels (1)			Total Number Samples Analyzed	Detect Data Summary						Non-Detect Data Summary						Data Issue (5)	Issue Resolution (6)
			Residential (ResRBSL)	Ecological (EcoRBSL)	Background (2)		Total Samples w/ Detections	Minimum Detected Concentration	Maximum Detected Concentration	Number of Detected Concentrations > Res RBSL	Number of Detected Concentrations > Eco RBSL	Number of Detected Concentrations > Background	Total Samples ND	Minimum Detection Limit	Maximum Detection Limit	Number DLs > ResRBSL	NumberDL > EcoRBSL	Number DL > Background		
	1,2-Dibromoethane	µg/kg	0.24	25000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	1,2-Dichlorobenzene	µg/kg	1800	370000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	1,2-Dichloroethane	µg/kg	0.50	76337	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	5	0	NA (3)	Elevated DLs	b
	1,2-Dichloropropane	µg/kg	0.57	25000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	5	0	NA (3)	Elevated DLs	b
	1,3,5-Trimethylbenzene	µg/kg	36	64066	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	1,3-Dichlorobenzene	µg/kg	1700	160165	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	1,3-Dichloropropane	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	1,4-Dichlorobenzene	µg/kg	5.6	20000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	2-Chloroethylvinyl ether	µg/kg	0.010	726	NA (3)	5	0	0	0	0	0	NA (3)	5	4.92	5.9	5	0	NA (3)	Elevated DLs	d
	2-Hexanone	µg/kg	NA (4)	1220000	NA (3)	5	0	0	0	NA (4)	0	NA (3)	5	4.92	5.9	NA (4)	0	NA (3)	--	--
	Acetone	µg/kg	482144	42711	NA (3)	5	0	0	0	0	0	NA (3)	5	4.92	5.9	0	0	NA (3)	--	--
	Benzene	µg/kg	0.13	110000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	5	0	NA (3)	Elevated DLs	d
	Bromobenzene	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	Bromochloromethane	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	Bromodichloromethane	µg/kg	0.31	15290	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	5	0	NA (3)	Elevated DLs	b
	Bromoform	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	Bromomethane	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	Carbon Tetrachloride	µg/kg	0.04	1516	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	5	0	NA (3)	Elevated DLs	d
	Chlorobenzene	µg/kg	80	40000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	Chloroethane	µg/kg	NA (4)	190000	NA (3)	5	0	0	0	NA (4)	0	NA (3)	5	0.985	1.18	NA (4)	0	NA (3)	--	--
	Chloroform	µg/kg	0.77	11019	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	5	0	NA (3)	Elevated DLs	b
	Chloromethane	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	cis-1,2-Dichloroethene	µg/kg	14	68337	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	cis-1,3-Dichloropropene	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	Cumene	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	Dibromochloromethane	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	Dibromomethane	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	Dichlorodifluoromethane	µg/kg	15	64066	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	Ethylbenzene	µg/kg	4.6	210000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	Hexachlorobutadiene	µg/kg	9200	854	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	Methyl ethyl ketone	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	4.92	5.9	NA (4)	NA (4)	NA (3)	--	--
	Methyl isobutyl ketone (MIBK)	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	4.92	5.9	NA (4)	NA (4)	NA (3)	--	--
	Methyl tert-butyl ether	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	Methylene chloride	µg/kg	4.0	24986	NA (3)	5	2	2.3	4.38	1	0	NA (3)	3	5.33	5.9	3	0	NA (3)	Elevated DLs	b
	m-Xylene & p-Xylene	µg/kg	150	64066	NA (3)	5	0	0	0	0	0	NA (3)	5	1.97	2.36	0	0	NA (3)	--	--
	Naphthalene	µg/kg	1146591	210000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	n-Butylbenzene	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	n-Propylbenzene	µg/kg	203	210000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	o-Chlorotoluene	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	o-Xylene	µg/kg	190	64066	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	p-Chlorotoluene	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	p-Cymene	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	sec-Butylbenzene	µg/kg	29755	210000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	sec-Dichloropropane	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	Styrene	µg/kg	7200	427106	NA (3)	5	3	0.254	0.325	0	0	NA (3)	2	1.04	1.07	0	0	NA (3)	--	--
	tert-Butylbenzene	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	Tetrachloroethene	µg/kg	0.43	5979	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	5	0	NA (3)	Elevated DLs	b
	Toluene	µg/kg	234	3417	NA (3)	5	1	0.476	0.476	0	0	NA (3)	4	0.985	1.18	0	0	NA (3)	--	--
	trans-1,2-Dichloroethene	µg/kg	14	970000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	trans-1,3-Dichloropropene	µg/kg	NA (4)	NA (4)	NA (3)	5	0	0	0	NA (4)	NA (4)	NA (3)	5	0.985	1.18	NA (4)	NA (4)	NA (3)	--	--
	Trichloroethene	µg/kg	2.2	2990	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0		NA (3)	--	--
	Trichlorofluoromethane	µg/kg	110	300000	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	0	0	NA (3)	--	--
	Vinyl chloride	µg/kg	0.010	726	NA (3)	5	0	0	0	0	0	NA (3)	5	0.985	1.18	5	0	NA (3)	Elevated DLs	d

* Analytical data screening summary includes only results collected prior to May 8, 2009. For information regarding additional samples collected on May 8, 2009, see the 'Additional Data' folder of Attachment C-3 of this report. These Group 7 data gap sample results are considered for site action recommendations presented in the Group 7 RFI Report, but were not included in the quantitative site risk assessments.

Notes:

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

Data Issue Resolution Notes:

-- Indicates that the constituent does not have elevated detection limits.
(a) The MDL is less than background, so if the compound was present at concentrations greater than the MDL, but less than the RL, it would have been reported.
(b) The MDL is less than the RBSL, so if the compound was present at concentrations greater than the MDL, but less than the RL, it would have been reported.
(c) The source of the elevated DL is unknown
(d) DL concentrations achieved were within practicable laboratory reporting limits at the time the sample was collected. The adequacy assessment of sample results for characterization decisions was made based on surrounding sampling results, potential for laboratory interference, data trends, and reporting limits with respect to screening levels.
(e) Sample diluted due to high concentrations of other constituents

Acronyms

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

TABLE A.3-3B
B4029 RFI SITE ANALYTICAL DATA SCREENING SUMMARY AND DATA QUALITY (SOIL VAPOR)
(Page 1 of 1)

Analyte Group	Constituent	Units	Screening Levels		Total Number Samples Analyzed	Detect Data Summary					Non-Detect Data Summary					Data Issue	Issue Resolution
			Residential (ResRBSL)	Ecological (EcoRBSL)		Total Samples w/ Detections	Minimum Detected Concentration	Maximum Detected Concentration	Number of Detected Concentrations > Res RBSL	Number of Detected Concentrations > Eco RBSL	Total Samples ND	Minimum Detection Limit	Maximum Detection Limit	Number DLs > ResRBSL	Number DLs > EcoRBSL		
No RFI soil vapor samples collected for this site.																	

TABLE A.3-3C
B4029 RFI SITE ANALYTICAL DATA SCREENING SUMMARY AND DATA QUALITY (SURFACE WATER)
(Page 1 of 1)

Analyte Group	Constituent	Units	Screening Levels		Total Number Samples Analyzed	Detect Data Summary					Non-Detect Data Summary					Data Issue	Issue Resolution
			Residential (ResRBSL)	Ecological (EcoRBSL)		Total Samples w/ Detections	Minimum Detected Concentration	Maximum Detected Concentration	Number of Detected Concentrations > Res RBSL	Number of Detected Concentrations > Eco RBSL	Total Samples ND	Minimum Detection Limit	Maximum Detection Limit	Number DLs > ResRBSL	Number DLs > EcoRBSL		
No RFI surface water samples collected for this site.																	

Table A.4-1

Chemicals of Potential Concern for Human Health
B4029 RFI Site

Chemical	Soil (0 to 2 feet bgs)	Soil (0 to 10 feet bgs)	Building 4029 Area RFI Site Groundwater (Indirect Pathway)	Group 7 Groundwater (Direct Pathway)	Soil Vapor
Inorganic Compounds					
Barium	X				
Beryllium				X	
Chromium		X			
Thallium		X			
Zinc	X	X			
VOCs					
1,1,2-Trichloro-1,2,2-trifluoroethane				X	
1,1-Dichloroethane				X	
1,1-Dichloroethene				X	
Acetone			X		
Chloroform				X	
cis-1,2-Dichloroethene				X	
Methylene chloride	X	X			X
Styrene	X	X			X
Tetrachloroethene				X	
Toluene	X	X	X		X
Trichloroethene				X	
SVOCs					
Acenaphthene	X	X			
Acenaphthylene	X	X			
Anthracene	X	X			
Benzo(a)anthracene	X	X			
Benzo(a)pyrene	X	X			
Benzo(b)fluoranthene	X	X			
Benzo(e)pyrene	X	X			
Benzo(g,h,i)perylene	X	X			
Benzo(k)fluoranthene	X	X			
Chrysene	X	X			
Dibenz(a,h)anthracene	X	X			
Di-n-butylphthalate	X	X			
Fluoranthene	X	X			
Fluorene	X	X			
Indeno(1,2,3-cd)pyrene	X	X			
Perylene	X	X			
Phenanthrene	X	X			
Pyrene	X	X			
Total Petroleum Hydrocarbons					
C20-C30(Lubricant Oil Range)	X	X			

Notes:
bgs - below ground surface
SVOC - semi-volatile organic compound
VOC - volatile organic compound
X - selected as a chemical of potential concern

Table A.4-2

Human Health Risk Estimate Summary[1]
B4029 RFI Site

Receptor	Soil Media[2]				Groundwater[3]				Total for Site Media			
	HI Range	CD[4]	Risk Range	CD	HI Range	CD	Risk Range	CD	HI Range	CD	Risk Range	CD
Future Adult Recreator	<0.001 - <0.001	-	2E-10 - 6E-08	-	<0.001 - <0.001	-	- - -	-	<0.001 - <0.001	-	2E-10 - 6E-08	-
Future Child Recreator	<0.001 - 0.004	-	2E-09 - 5E-08	-	<0.001 - <0.001	-	- - -	-	<0.001 - 0.004	-	2E-09 - 5E-08	-
Future Adult Resident	0.003 - 0.01	-	4E-09 - 9E-08	-	<0.001 - <0.001	-	- - -	-	0.003 - 0.008	-	4E-09 - 9E-08	-
Future Child Resident	0.03 - 0.07	-	3E-08 - 2E-07	-	<0.001 - <0.001	-	- - -	-	0.03 - 0.07	-	3E-08 - 2E-07	-

Notes:

1. Risk estimates shown are a sum of all exposure pathways per media; the range reported is for the central tendency and reasonable maximum exposures, respectively.
2. Soil media risk estimates are a sum of all direct and indirect exposure, so site soil and soil vapor.
3. Groundwater media risk estimates are for indirect exposure only and assume no domestic use of groundwater.
4. Chemical risk drivers are those COPCs detected onsite with an HI > 1, risk > $1x10^{-6}$, or blood lead concentration > 10 µg/dl. Only major risk contributors listed if cumulative HI >> 1 or cancer risk >> $1x10^{-6}$.

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

Table A.4-3

Human Health Risk Assessment Uncertainty Analysis
B4029 RFI Site

Uncertainty	Magnitude of Impact	Direction of Impact
COPC Selection		
Zinc was demonstrated to be consistent with background concentrations by the Wilcoxon Rank Sum test but was included as a COPC because the maximum detected concentration was greater than 2-times the maximum detected background concentration.	Medium	Conservative
Chromium concentrations were shown to be above background concentrations based on the Wilcoxon Rank Sum test. However, the maximum detected concentration at the Building 4029 Area RFI Site was less than the maximum background concentration. Chromium was conservatively retained as a COPC.	Low	Conservative
Potential impacts of the Topanga fire on the selection of COPCs and risks have been evaluated. The evaluation concluded that the presence of zinc at SFBS0003, the location of the maximum B4029 RFI Site concentration, may be indicative of impacts of fire ash on soil metal concentrations at the B4029 RFI Site.	Low	Uncertain
As described in Section 1.0 of the Group 7 RFI Report, some additional soil samples were collected at the B4029 RFI Site after the site risk assessment was completed. Data for these additional samples could not be assessed quantitatively, which results in some uncertainty. The additional samples were analyzed for SVOCs, PCBs, and TPH. No SVOCs or PCBs were detected in these samples, and the concentrations of detected TPH compounds were within the range of concentrations previously detected and evaluated in the risk assessment. Consequently, including the additional data in the quantitative evaluation would not change the overall conclusions of the risk assessment for this site.	Low	Not Conservative
The selection of toluene as a COPC for indirect exposure to groundwater (i.e., vapor modeling to ambient and indoor air) is a conservative measure since it was only detected in one of three samples and the detection was just after well installation, and toluene is also considered a common laboratory contaminant.	Low	Conservative
EPC Calculations		
Where available, site-specific chemical data were used in the risk assessment. Where data were not available, risks associated with polynuclear aromatic hydrocarbons (PAHs) are estimated based, in part, on extrapolation factors using site TPH data as described in the SRAM (MWH, 2005). The estimation of PAH concentrations from TPH concentrations is considered conservative since the extrapolation factors used to estimate PAH concentrations are based on the maximum ratio of the TPH concentration to the individual petroleum constituent concentration in the dataset.	Medium	Conservative
Where VOCs are detected in one medium, and analyzed for in another medium to which the VOC could migrate but were not detected, media-to-media extrapolations were conducted (e.g., soil-to-soil vapor). This procedure is expected to overestimate potential exposures.	Low	Conservative
The maximum detected concentration of each COPC detected in groundwater was utilized as the EPC. This is likely to result in an overestimation of potential exposures.	High	Conservative

Table A.4-3

Human Health Risk Assessment Uncertainty Analysis
B4029 RFI Site

Uncertainty	Magnitude of Impact	Direction of Impact
The 95% UCL concentration of some chemicals is greater than the maximum concentration, therefore the maximum was used as the RME EPC. This is considered to be a likely overestimation of the representative exposure point concentration because samples were collected in areas with the highest likelihood to detect the highest concentrations at the site, and a receptor using the site is not always exposed to the location of highest concentrations.	Low	Conservative
The mean concentration for some chemicals exceeded the selected RME concentrations; therefore, the RME concentration was also used as the CTE concentration under some circumstances.	Low	Conservative
Vapor migration into indoor air has been estimated using a model which is being validated for the site. Preliminary findings show that the model conservatively over-predicts air concentrations when compared to flux chamber measurements.	Low	Conservative
Exposure Pathways		
Risks associated with drinking of groundwater are not realistic because the groundwater beneath the SSFL is not currently used as a drinking water source and the presence of the contamination will likely require a restriction on its future use as well.	High	Conservative
Future land use of the site is currently undecided but may be recreational, which has lower risks than residential.	Medium	Uncertain
Cancer Slope Factor		
To develop cancer slope factors and reference doses, dose-response data are extrapolate from laboratory animals to humans.	High	Conservative
Assumes that all carcinogens do not have a threshold below which a carcinogenic response does not occur, and therefore, any dose, no matter how small, results in some potential risk.	Medium	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.	Medium	Conservative
Reference Dose		
High degree of uncertainty in extrapolation of dose-response data from laboratory animals to humans.	High	Conservative
Risk Calculations		
Although benzo(g,h,i)perylene was selected as COPCs for soil from 0 to 10 feet bgs and from 0 to 2 feet bgs, risks could not be evaluated since toxicity values are not available. This is not expected to affect the overall results of the risk assessment since other PAHs are evaluated in the risk assessment for soil.	Low	Not Conservative

Notes:
Low - This uncertainty is considered to have minimal impact on the total risk estimate.
Medium - This uncertainty is considered to have moderate impact on the total risk estimate.
High - This uncertainty is considered to have significant impact on the total risk estimate.

bgs - below ground surface
COPC - chemical of potential concern

Table A.4-3

Human Health Risk Assessment Uncertainty Analysis
B4029 RFI Site

Uncertainty	Magnitude of Impact	Direction of Impact

EPC - exposure point concentration
HRA - human health risk assessment
PAH - polycyclic aromatic hydrocarbons
TPH - total petroleum hydrocarbons

Table A.4-4

Chemicals of Potential Ecological Concern
B4029 RFI Site

Chemical	Soil (0 to 2 feet bgs)	Soil (0 to 4 feet bgs)	Soil (0 to 6 feet bgs)	Soil Vapor (0 to 6 feet bgs)
Inorganic Compounds				
Barium	X	X	X	
Chromium		X	X	
Zinc	X	X	X	
VOCs				
Methylene chloride	X	X	X	X
Styrene	X	X	X	X
Toluene	X	X	X	X
SVOCs				
Acenaphthene	X	X	X	
Acenaphthylene	X	X	X	
Anthracene	X	X	X	
Benzo(a)anthracene	X	X	X	
Benzo(a)pyrene	X	X	X	
Benzo(b)fluoranthene	X	X	X	
Benzo(e)pyrene	X	X	X	
Benzo(g,h,i)perylene	X	X	X	
Benzo(k)fluoranthene	X	X	X	
Chrysene	X	X	X	
Dibenz(a,h)anthracene	X	X	X	
Di-n-butylphthalate	X	X	X	
Fluoranthene	X	X	X	
Fluorene	X	X	X	
Indeno(1,2,3-cd)pyrene	X	X	X	
Perylene	X	X	X	
Phenanthrene	X	X	X	
Pyrene	X	X	X	
Total Petroleum Hydrocarbons				
C20-C30(Lubricant Oil Range)	X	X	X	

Notes:
bgs - below ground surface
SVOC - semi-volatile organic compound
VOC - volatile organic compound
X - selected as a chemical of potential ecological concern

Table A.4-5

Ecological Hazard Estimate Summary
B4029 RFI Site

Receptor	Chemical Risk Driver[1]
Deer Mouse	Barium (8), Zinc (7)
without inhalation pathway	Barium (8), Zinc (7)
Hermit Thrush	Barium (3), Zinc (6)
Red-Tailed Hawk	Zinc (3)
Using Large Home Range Factor[2]	None
Bobcat	Zinc (2)
Using Large Home Range Factor[2]	None
Mule Deer	None
Using Large Home Range Factor[2]	None

Notes:

1. Chemical risk drivers are those CPECs detected onsite with an HQ > 1, the RME HQ is provided after the chemical name. "None" indicates that no chemical's HQs > 1.
2. The HIs for hawk, mule deer, and bobcat assume that their home ranges are equal to the RFI site acreage. This is an extremely conservative assumption; RFI site acreage is typically only a small fraction of a large animal's home range. The estimated HIs decrease to the values indicated above if an adjustment is made to reflect a more realistic home range for these receptors.

CPEC = Chemical of potential ecological concern
HI = Hazard index
HQ = Hazard Quotient
RME - reasonable maximum exposure

Table A.4-6

Ecological Risk Assessment Uncertainty Analysis
B4029 RFI Site

Uncertainty	Magnitude of Impact	Direction of Impact
CPEC Selection		
Zinc was demonstrated to be consistent with background concentrations by the Wilcoxon Rank Sum test but was included as a COPC because the maximum detected concentration was greater than 2-times the maximum detected background	High	Conservative
Potential impacts of the Topanga fire on the selection of COPCs and risks have been evaluated. The evaluation concluded that the presence of zinc at SFBS0003, the location of the maximum B4029 RFI Site concentration, may be indicative of impacts of fire ash on soil metal concentrations at the B4029 RFI Site.	Low	Uncertain
As described in Section 1.0 of the Group 7 RFI Report, some additional soil samples were collected at the B4029 RFI Site after the site risk assessment was completed. Data for these additional samples could not be assessed quantitatively, which results in some uncertainty. The additional samples were analyzed for SVOCs, PCBs, and TPH. No SVOCs or PCBs were detected in these samples, and the concentrations of detected TPH compounds were within the range of concentrations previously detected and evaluated in the risk assessment. Consequently, including the additional data in the quantitative evaluation would not change the overall conclusions of the risk assessment for this site.	Low	Not Conservative
EPC Calculations		
Where available, site-specific data were used in the risk assessment. Where data were not available, risks associated with PAHs are estimated based, in part, on extrapolation factors using site TPH data as described in the SRAM (MWH, 2005). The estimation of PAH concentrations from TPH concentrations is considered conservative since the extrapolation factors used to estimate PAH concentrations are based on the maximum ratio of TPH concentration to petroleum constituent concentration in the dataset.	Low	Conservative
Where VOCs are detected in one media, and analyzed for in another media to which the VOC could migrate but were not detected, media-to-media extrapolations were conducted (e.g., soil-to-soil vapor). This procedure is expected to overestimate potential exposures.	Medium	Conservative
Soil and soil vapor CTE EPCs were calculated using 1/2 the SQL for CPECs in soil and soil vapor samples when there were too few samples to calculate a mean in ProUCL.	Medium	Uncertain
The mean concentration for some chemicals exceeded the selected RME concentrations; therefore, the RME concentration was also used as the CTE concentration under some circumstances.	Low	Conservative
Estimation of soil vapor concentrations overstates actual burrow concentrations due to the following: 1. Model is conservative 2. Model does not account for attenuation between 57 feet bgs depth to groundwater and 0 to 6 feet bgs interval for burrows 3. Air flow in burrows is not accounted for	Low	Conservative

Table A.4-6

Ecological Risk Assessment Uncertainty Analysis
B4029 RFI Site

Uncertainty	Magnitude of Impact	Direction of Impact
Wildlife Exposure Factors		
Some wildlife exposure factors were based on taxonomically similar species	Low	Uncertain
Hazard estimates for the hawk, bobcat and mule deer assume that these species spend all of their time at the B4029 RFI Site. This assumption is unlikely to be true and it results in an overestimation of potential risks to these species due to chemicals present in soils at the site. The minimum reported foraging ranges for the red-tailed hawk, bobcat and mule deer are 195, 1,152 and 192 acres, respectively, as compared to 0.34 acres for the B4029 RFI Site. When the foraging ranges of these species are accounted for in the ERA, the RME HQs are all less than one. Hazard estimates for large-home-range receptors (hawk, bobcat and mule deer) will be addressed for the entire SSFL facility after all RFI site assessments have been completed and potential site-specific risks are evaluated.	Medium	Conservative
Exposure Pathways		
Dermal and inhalation (for surface-dwelling animals) exposure pathway not quantified.	Low	Not Conservative
Toxicity Reference Value		
High degree of uncertainty in extrapolation of dose-response data from laboratory animals to representative receptors.	High	Uncertain
Use of acute/subchronic-to-chronic and endpoint-to-NOAEL uncertainty factors to estimate chronic NOAEL-equivalent TRVs.	Medium	Conservative
Lack of TRVs for amphibians and reptiles -- note that no threatened or endangered amphibians or reptiles are known to reside at SSFL	Medium	Not Conservative
Use of chronic NOAEL-equivalent TRVs	High	Conservative

Notes:
Low - This uncertainty is considered to have minimal impact on the total risk estimate.
Medium - This uncertainty is considered to have moderate impact on the total risk estimate.
High - This uncertainty is considered to have significant impact on the total risk estimate.

bgs - below ground surface
CPEC - chemical of potential ecological concern
CTE - central tendency exposure
EPC - exposure point concentration
ERA - ecological risk assessment
HI - hazard index
NOAEL - no observable adverse effects level
PAH - polycyclic aromatic hydrocarbon
RFI - Resource Conservation and Recovery Act Facility Investigation
RME - reasonable maximum exposure
SSFL - Santa Susana Field Laboratory
SQL - sample quantitation limit
SVOC - semivolatile organic chemicals
TPH - total petroleum hydrocarbons
TRV - toxicity reference value
UCL - upper confidence limit

Table A.5-1
B4029 RFI Site Surficial Media Site Action Recommendations
(Page 1 of 1)

Area	Chemical Use Area Number	CMS Areas (1)	Recommended for Further Consideration in CMS Based On:		
			Residential Receptor (2)	Recreational Receptor (2)	Ecological Receptor (2)
Building 4029 and Concrete Pads (3)	1	--	--	--	--
Building 4029 Access Road	2	--	--	--	--
Former OCY Tank Pipeline	3	--	--	--	--

General Notes:

'--' Indicates area is recommended for No Further Action (NFA) for respective receptor, or parameter not applicable; not recommended for CMS evaluation.
Note: Additional characterization data pending at B4029 Access Road; current risk assessment findings acceptable for receptors.

Notes:

(1) As indicated above and described in Section A.5, no Building 4029 RFI site areas are recommended for further evaluation in the CMS (See Section A.5).

(2) CMS recommendations are based on compounds considered risk drivers (excess cancer risk > 1 x 10^{-6} or hazard index > 1) and/or significant risk contributors.

(3) Although barium and zinc were identified as risk drivers for the thrush and deer mouse, each was detected at a concentration more than slightly above background at only one location; thus, area is not recommended for further evaluation in the CMS.

Acronyms:
CMS - Corrective Measures Study
NFA - no further actions
OCY - Old Conservation Yard
RFI - Resource Conservation and Recovery Act Facility Investigation

FIGURES

1783400 1788400 1793400 1798400

267400

262400

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Report Group 7 Area

Report Group 7 Area

Building 4029 RFI Site

UNDEVELOPED LAND

UNDEVELOPED LAND

NASA PROPERTY AREA I

Outfall 010

Outfall 009

Outfall 004

Outfall 003

Outfall 012

Outfall 013

Outfall 014

Outfall 006

Outfall 005

Outfall 017

Outfall 015

Outfall 008

Outfall 018

Area IV Borrow Pit

AREA IV

AREA III

AREA II (NASA)

1.37 in

Outfall 011 Outfall 019

AREA I

UNDEVELOPED LAND

Outfall 002

Outfall 001

Elevation Legend

< 950 ft	1550 - 1625 ft
950 - 1025 ft	1625 - 1700 ft
1025 - 1100 ft	1700 - 1775 ft
1100 - 1175 ft	1775 - 1850 ft
1175 - 1250 ft	1850 - 1925 ft
1250 - 1325 ft	1925 - 2000 ft
1325 - 1400 ft	2000 - 2075 ft
1400 - 1475 ft	2075 - 2150 ft
1475 - 1550 ft	> 2150 ft

1783400 1788400 1793400 1798400

0 1,300

FEET

MAP COORDINATES IN STATEPLANE, NAD 27, ZONE V

AREA I
SWMU 4.1 - B1 Area
SWMU 4.2 - Area I Landfill
SWMUs 4.3, 4.4 and AOC - Instrument and Equipment Laboratories (IEL)
SWMU 4.5, 4.6 - LOX Plant Former Sump/Clarifier and Drum Disposal Area
SWMU 4.7 - Component Test Laboratory III (CTL-III) Area
SWMU 4.8 - Area I Burn Pit
SWMU 4.9, 4.10, 4.11, AOC - Advanced Propulstion Test Facility (APTF) Area
SWMU 4.12 - Laser Engineering Test Facility (LETF) Component Test Lab (CTL-1) Area
SWMU 4.14 Canyon Area
SWMU 4.15 and AOC - Bowl Area and Building 901 Leachfield
SWMU 4.16 - Area I Reservoir (R-1 Pond)
SWMU 4.17 - Perimeter Pond
AOC - Building 1359 Sump
AOC - Happy Valley Area
AOC - CTL-V

AREA II
SWMU 5.1 - Area II Landfill
SWMU 5.2 - ELV Final Assembly Building 2206
SWMU 5.5 and AOC - Building 2204 Area
SWMU 5.6 - Former Incinerator Ash Pile
SWMU 5.7 - Hazardous Waste Storage Area Waste Coolant Tank (WCT)
SWMU 5.9, 5.10, 5.11 - Alfa Area
SWMU 5.12, 5.13, 5.14, 5.15 - Alfa/Bravo Skim Pond and Bravo Area
SWMU 5.18, 5.19 - Coca Area
SWMU 5.20, 5.21, 5.22 - Propellant Load Facility (PLF)
SWMU 5.23, 5.24 - Delta Area
SWMU 5.26 - R-2A and R2B Ponds
AOC - Building 2515 Sewage Treatment Plant
AOC - Storable Propellant Area (SPA)
AOC - Alfa/Bravo Fuel Farm
AOC - Coca/Delta Fuel Farm

AREA II (cont)
AOC - Building 2224 Leach Field

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

AREA IV
SWMU 7.1 - Building 4056 Landfill
SWMU 7.2 - Building 4133, Sodium Burn Facility
SWMU 7.3 -Former Sodium Disposal Facility (FSDF)
SWMU 7.4 - Old Conservation Yard (OCY)
SWMU 7.5 - Building 4100 Trench
SWMU 7.6 - Radioactive Materials Handling Facility (RMHF)

AREA IV (cont)
SWMU 7.7 - Rockwell International Hot Laboratory (RIHL)
SWMU 7.8 - New Conservation Yard (NCY)
SWMU 7.9 - ESADA Chemical Storage Area
SWMU 7.10 - Former Coal Gasification PDU
SWMU 7.11 - Building 4029, Reactive Metal Storage Yard
AOC - Former Hazardous Materials Storage Area (HMSA)
AOC - Chemistry Laboratory Metals Clarifier
AOC - Pond Dredge Area
AOC - Sodium Reactor Experiment (SRE) Area
AOC - SE Drum Storage Yard
AOC - SNAP Facility
AOC - Boeing Area IV Leach Fields
AOC - DOE Area IV Leach Fields
AOC - Building 4008 Warehouse

Legend

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

B4029
RFI Site Location Map
SANTA SUSANA FIELD LABORATORY

Document: RFI-Report-Group7-Appendix-B4029-RFI_Site_Location.mxd

MWH

Date: Jun 11, 2009

FIGURE A.1-1

Chemical Use Areas
B4029 RFI Site

Base Map Legend

- Administrative Area Boundary
- RFI Site Boundary
- Report Group Boundary
- Existing Building
- Removed Building
- Other Tanks
- Solvent Tank
- Petroleum Fuel/Oil Tank
- Hydrazine Tank
- Awning
- Sump
- Vaults and Pits
- Ponds
- (R) = Removed Tank
- Dirt Road
- A/C Paving
- Fence
- Pipe
- Leach Field
- Sewer Line
- Manhole
- NPDES Outfall
- Well
- Drainage
- Surface Water Divide
- Rock Outcrop
- Excavation
- Elevation Contour

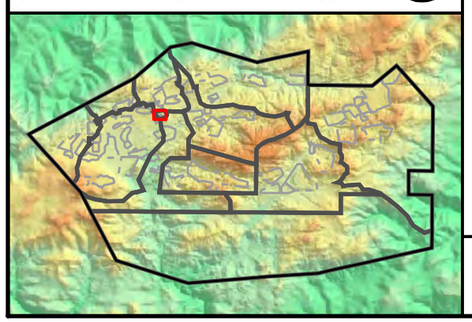
Chemical Use Area

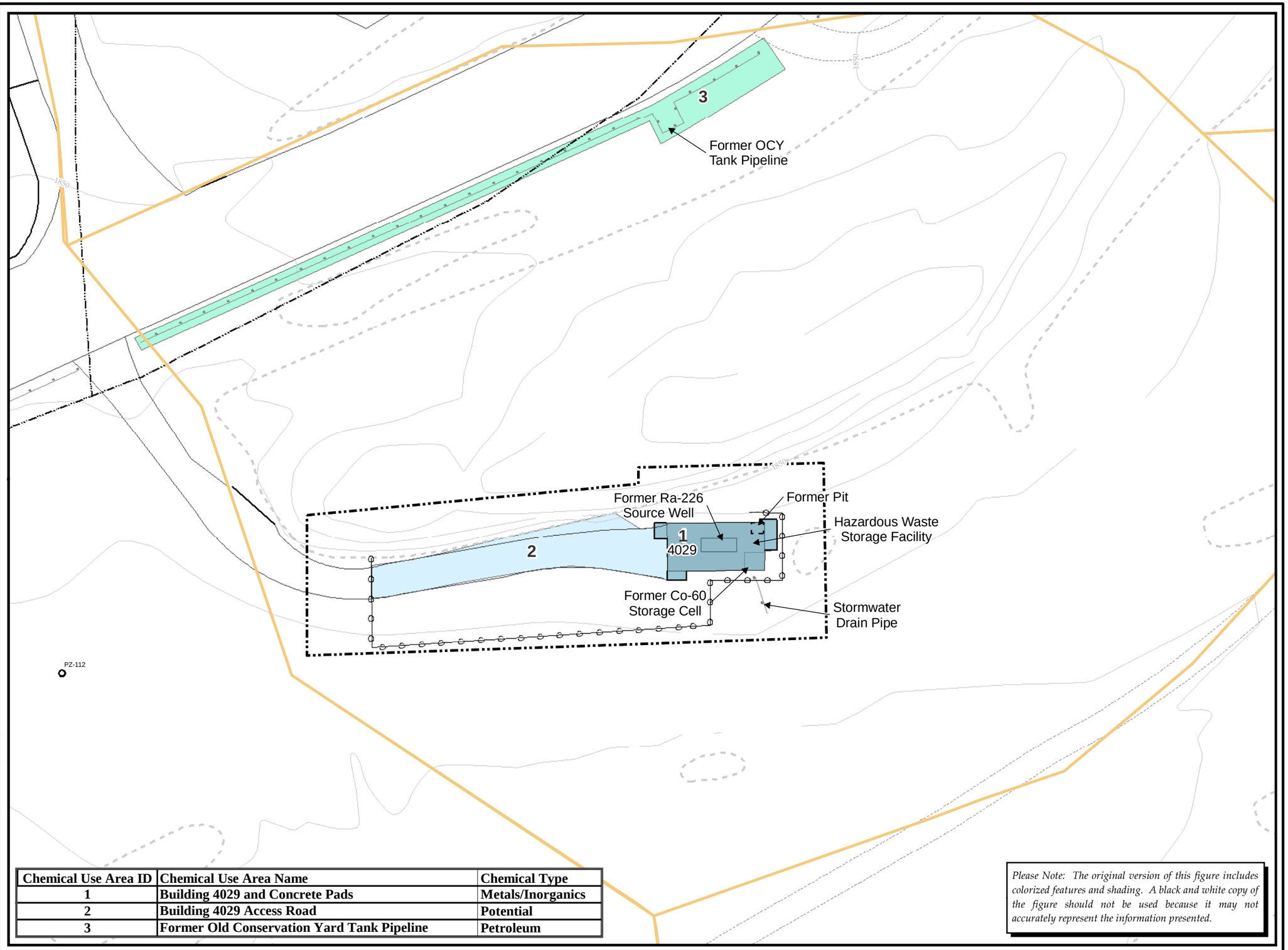
- Multiple Use
- Solvents
- Petroleum
- Oils / PCBs
- Metals / Inorganics
- Perchlorate / Energetics
- Hydrazine
- Debris
- Leach Field
- Potential

Document: RFI-Report-Group7-Appendix-B4029-CUA_11x17.mxd Date: Jun 07, 2009

1 inch = 40 feet

0 40 80 Feet





Chemical Use Area ID	Chemical Use Area Name	Chemical Type
1	Building 4029 and Concrete Pads	Metals/Inorganics
2	Building 4029 Access Road	Potential
3	Former Old Conservation Yard Tank Pipeline	Petroleum

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SANTA SUSANA FIELD LABORATORY

FIGURE A.2-1

Sample and Trench Locations
B4029 RFI Site

Base Map Legend

- Administrative Area Boundary
- RFI Site Boundary
- Report Group Boundary
- Existing Building
- Removed Building
- Other Tanks
- Solvent Tank
- Petroleum Fuel/Oil Tank
- Hydrazine Tank
- Awning
- Sump
- Vaults and Pits
- Ponds
- Dirt Road
- (R) = Removed Tank
- A/C Paving
- Fence
- Pipe
- Leach Field
- Sewer Line
- Manhole
- NPDES Outfall
- Well
- Drainage
- Surface Water Divide
- Rock Outcrop
- Trench
- Cross Section
- Excavation
- Elevation Contour

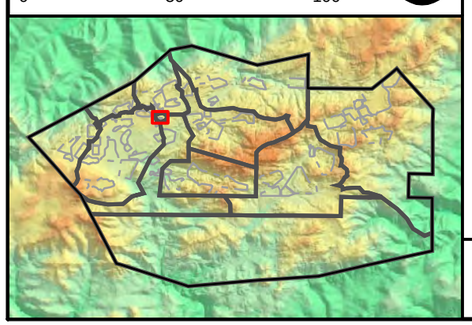
Sample Location Legend

- B4029 Sample Location

Document: RFI-Report-Group7-Appendix-B4029-SampleLocations_11x17.mxd Date: Jun 11, 2009

1 inch = 50 feet

0 50 100 Feet



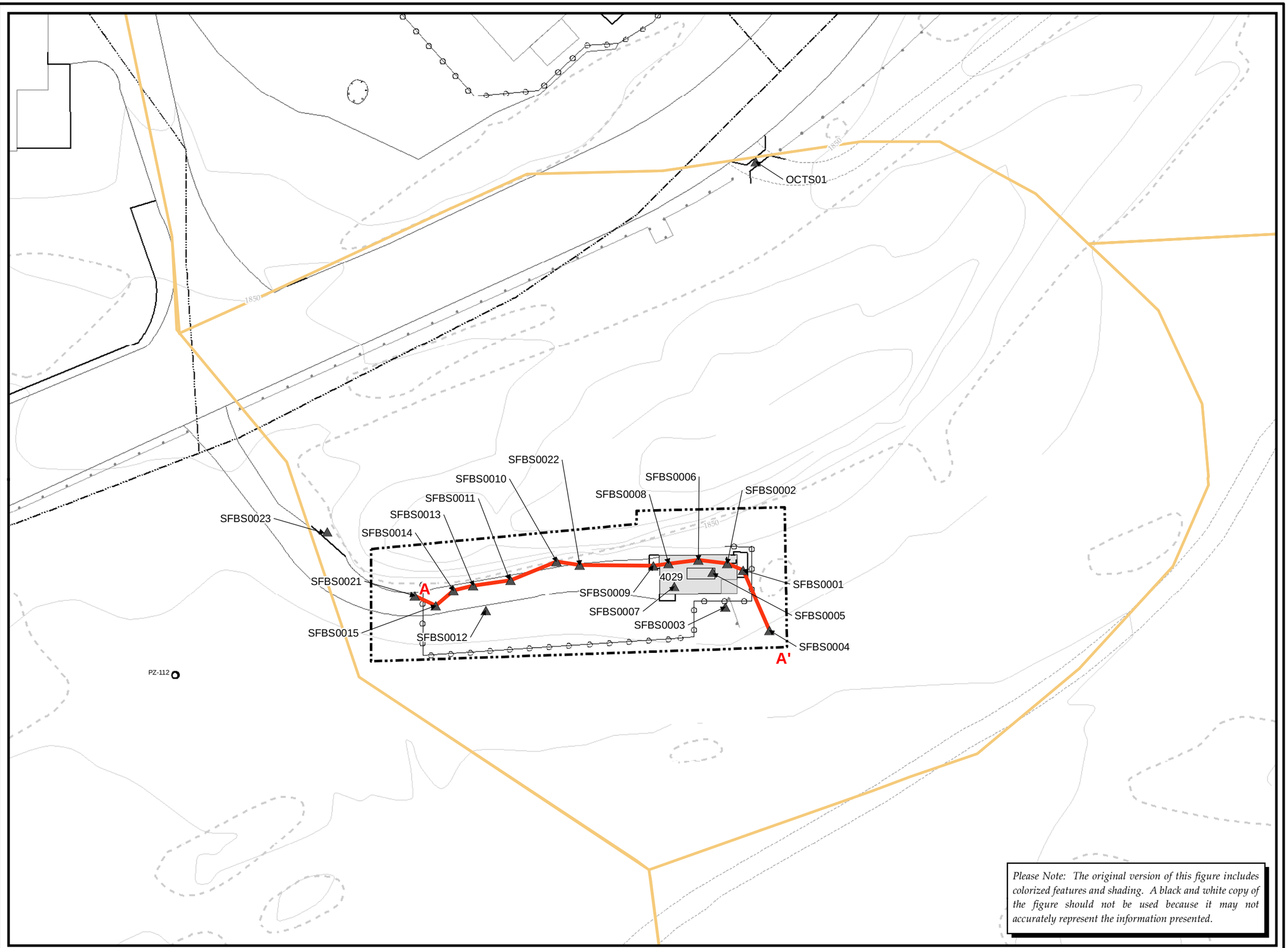


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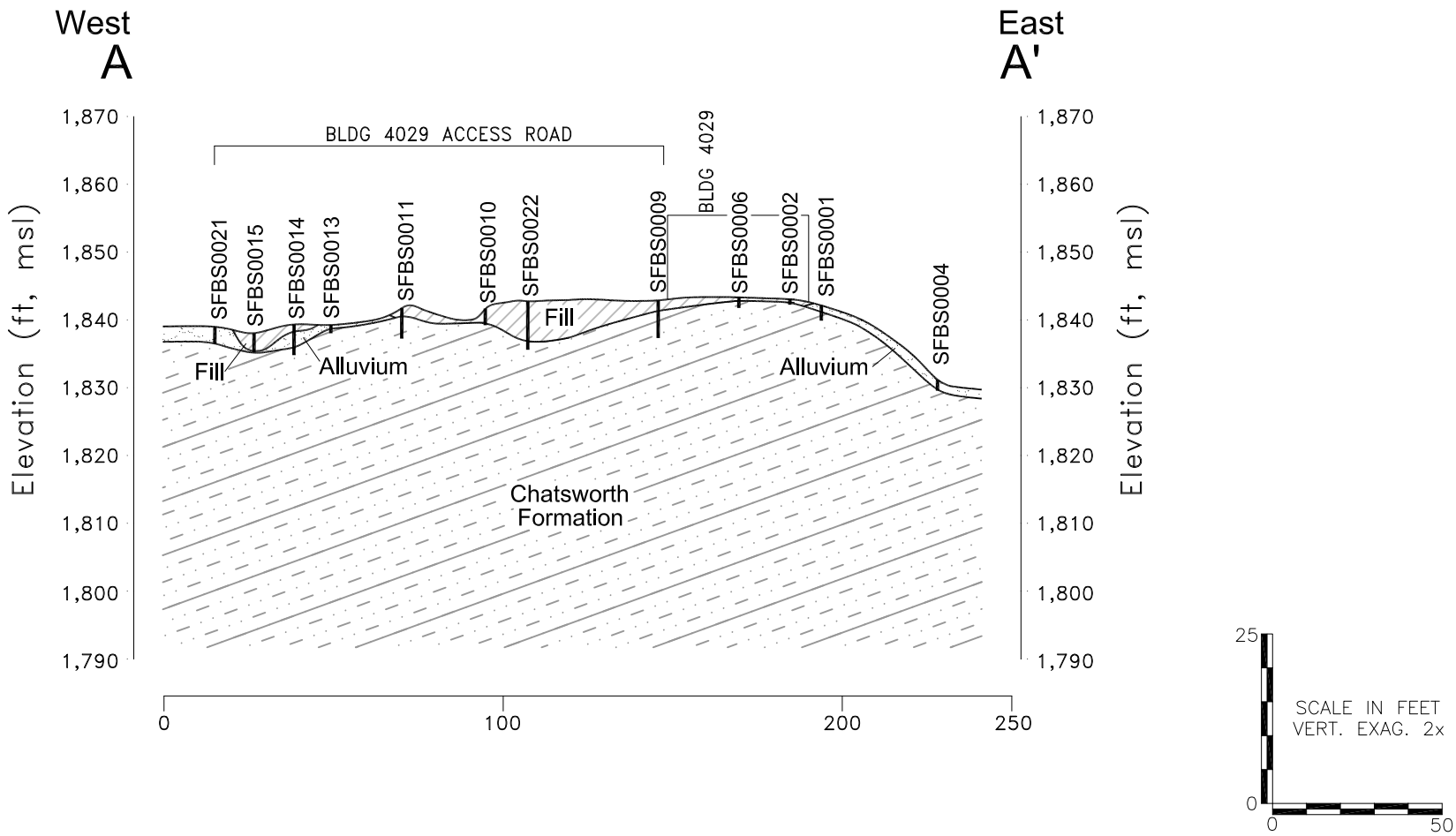
FIGURE A.2-2



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VENTURA COUNTY, CALIFORNIA
MAY 2009

SURFICIAL CROSS SECTION A-A'
BLDG 4029 RFI SITE

FIGURE A.2-3

JOB No. -- FILE No. INDUSTRIAL\CAD MLUEBKE\BOEING SANTA SUSANA\GROUP 7 FIGS\SHALLOW CORSS ECTIONS

Soil Disturbance Areas
B4029 RFI Site

Base Map Legend

- Administrative Area Boundary
- RFI Site Boundary
- Report Group Boundary
- Existing Building
- Removed Building
- Other Tanks
- Solvent Tank
- Petroleum Fuel/Oil Tank
- Hydrazine Tank
- Awning
- Sump
- Vaults and Pits
- Ponds
- Dirt Road
- A/C Paving
- Fence
- Pipe
- Leach Field
- NPDES Outfall
- Well
- Drainage
- Surface Water Divide
- Rock Outcrop
- Excavation
- Elevation Contour

Note: This figure is created to depict current conditions.

Soil Disturbance Areas

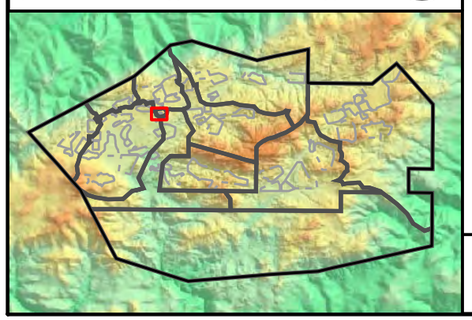
- Excavation
- Excavation-Backfill
- Grading
- Building Foundation & Asphalt / Concrete Demolition (minimal grading)

Note: The soil disturbances shown include only those areas or features found within the RFI Site.

Document: RFI-Report-Group7-Appendix-B4029-SoilDisturbance_11x17.mxd Date: Jun 07, 2009

1 inch = 50 feet

0 50 100 Feet



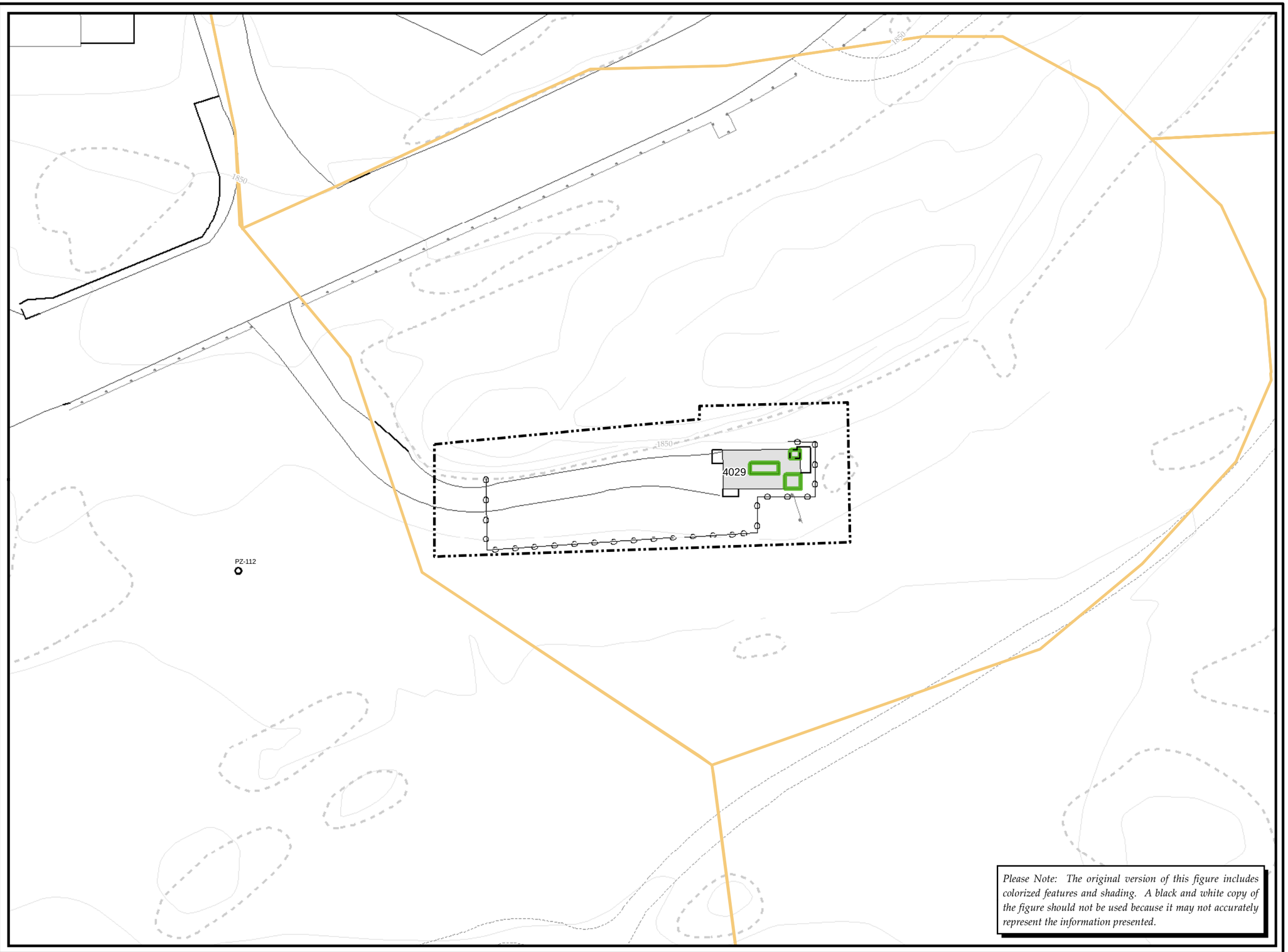


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FIGURE A.2-4

Soil Sample Location Symbol Legend

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

Data Box Information

(Historical Sample)

Sample Location ID: **RMDF5**

- **1.00** — Depth in Feet
- **Primary** — Sample Type
- **RMDF5S01** — Unique Sample Identifier
- **7/10/2005** — Date

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

12.05	Detect with sample concentration shown
<0.06	Non-Detect with lab detection limit shown
J	Analyte positively identified; Associated numerical value is considered estimated
*	Data validation not performed
E	Data not validated, laboratory qualifier for estimated value
QC	Data not validated, laboratory qualifier for internal lab QC issue
NA	Analysis not conducted
[#]	If more than one result per column, the maximum is presented, with number of results in backets.

Detect	Non-Detect	
12.05	<0.06	Exceeds Res RBSL
12.05	<0.06	Exceeds Eco RBSL
12.05	<0.06	Exceeds Res RBSL + Eco RBSL

Comparison Levels

	Res RBSL	Eco RBSL
Soil Matrix VOCs	**(mg/kg)**	**(mg/kg)**
Acetone	482.1439	42.7106
Methyl ethyl ketone	62.0000	2,540.0000
m-Xylene & p-Xylene	-	-
o-Xylene	0.1900	64.0659
Soil Matrix VOCs	**(ug/kg)**	**(ug/kg)**
1,2,4-Trimethylbenzene	40.7349	64,065.8554
1,3,5-Trimethylbenzene	36.0000	64,065.8554
Acetone	482143.9253	42,710.5703
Cumene	-	-
Ethylbenzene	4.6450	210,000.0000
Methyl ethyl ketone	62000.0000	2,540,000.0000
Methylene chloride	4.0000	24,985.6836
Naphthalene	1146590.7159	210,000.0000
m-Xylene & p-Xylene	-	-
n-Butylbenzene	0.0000	-
n-Propylbenzene	203.2675	210,000.0000
o-Xylene	190.0000	64,065.8554
p-Cymene	-	-
sec-Butylbenzene	29754.6624	210,000.0000
Styrene	7200.0000	427,105.7027
Tetrachloroethene	0.4300	5,979.4798
Toluene	233.5017	3,416.8456
Xylenes, Total	150.0000	64,065.8554
Soil Vapor VOCs	**(µg/L)**	**(µg/L)**
1,1,2-Trichloro-1,2,2-trifluoroethane	-	-
Benzene	0.0950	0.5700
Ethylbenzene	290.0000	23.0000
m-Xylene & p-Xylene	-	-
o-Xylene	29.0000	16.0000
Tetrachloroethene	0.4523	24.0000
Toluene	110.0000	0.0840
Xylenes, Total	-	-

Data Date: April 2009

Note: (µg/kg) = micrograms per kilogram
Note: (µg/L) = micrograms per liter
Note: (µg) = micrograms
Note: For the chemical result boxes, if results are not listed for a VOCs analyte, this indicates the analyte was not analyzed.

Res RBSL Residential Risk-Based Screening Level
Eco RBSL Ecological Risk-Based Screening Level

Base Map Legend

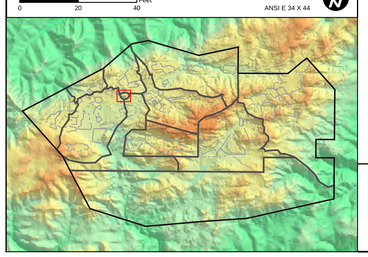
- Administrative Area Boundary
- RFI Site Boundary
- Report Group Boundary
- Existing Building or Structure
- Removed Building or Structure
- Other Tanks
- Solvent Tank
- Petroleum Fuel/Oil Tank
- Hydrazine Tank
- Awning
- Sump
- Vaults and Pits
- Ponds
- Dirt Road
- A/C Paving
- Fence
- Pipe
- Leach Field
- NPDES Outfall
- Well
- Drainage
- Surface Water Divide
- Rock Outcrop
- Trench
- Excavation
- Elevation Contour

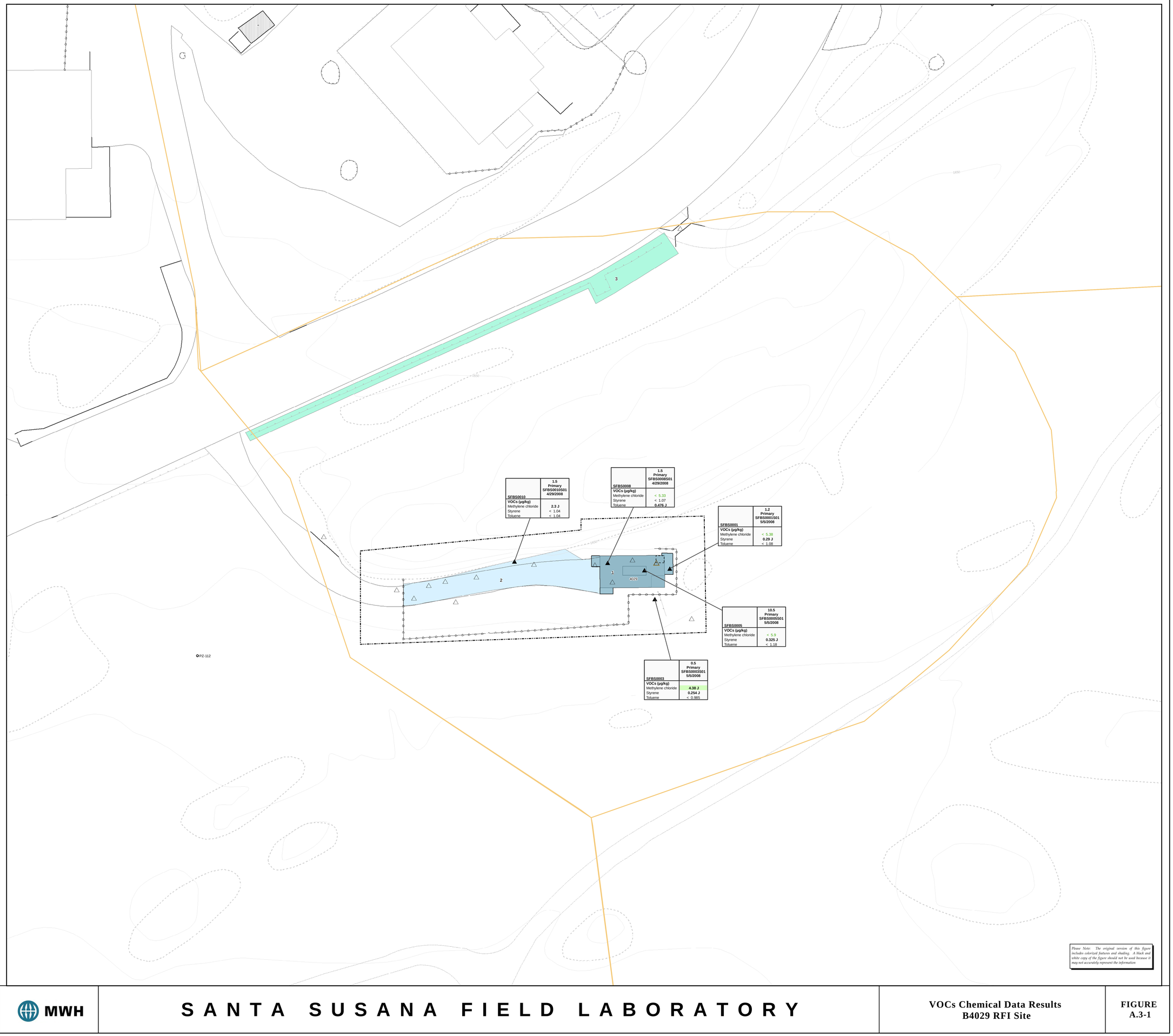
Chemical Use Area

- Multiple Use
- Metals / Inorganics
- Leach Field
- Solvents
- Perchlorate / Energetics
- Potential
- Petroleum
- Hydrazine
- Oils / PCBs
- Debris

Document: RFI-Report-Group7-Boxplot-B4029-VOC.mxd Date: Jun 10, 2009

1 inch = 20 feet
0 20 40 Feet
ANSI E 34 X 44





SFBS0010	1.5 Primary SFBS0010S01 4/29/2008
VOCs (µg/kg)	
Methylene chloride	2.3 J
Styrene	< 1.04
Toluene	< 1.04

SFBS0008	1.5 Primary SFBS0008S01 4/29/2008
VOCs (µg/kg)	
Methylene chloride	< 5.33
Styrene	< 1.07
Toluene	0.476 J

SFBS0001	1.2 Primary SFBS0001S01 5/5/2008
VOCs (µg/kg)	
Methylene chloride	< 5.38
Styrene	0.29 J
Toluene	< 1.08

SFBS0005	10.5 Primary SFBS0005S01 5/5/2008
VOCs (µg/kg)	
Methylene chloride	< 5.9
Styrene	0.325 J
Toluene	< 1.18

SFBS0003	0.5 Primary SFBS0003S01 5/5/2008
VOCs (µg/kg)	
Methylene chloride	4.38 J
Styrene	0.254 J
Toluene	< 0.985

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VOCs Chemical Data Results
B4029 RFI Site

FIGURE A.3-1

Soil Sample Location Symbol Legend

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

Data Box Information

(Historical Sample)

Sample Location ID: RMDF5

1.00	Depth in Feet
Primary	Sample Type
RMDF5S01	Unique Sample Identifier
7/10/2005	Date

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

12.05	Detect with sample concentration shown
<0.06	Non-Detect with lab detection limit shown
J	Analyte positively identified; Associated numerical value is considered estimated
*	Data validation not performed
E	Data not validated, laboratory qualifier for estimated value
QC	Data not validated, laboratory qualifier for internal lab QC issue
NA	Analysis not conducted
[#]	If more than one result per column, the maximum is presented, with number of results in backets.

Detect	Non-Detect	
12.05	<0.06	Exceeds Res RBSL
12.05	<0.06	Exceeds Eco RBSL
12.05	<0.06	Exceeds Res RBSL + Eco RBSL

Comparison Levels

SVOCs	Res RBSL (µg/kg)	Eco RBSL (µg/kg)
1-Methyl naphthalene	24716.0871	210000.0000
2-Methylnaphthalene	230000.0000	210000.0000
Acenaphthene	3400000.0000	2455.5351
Acenaphthylene	3400000.0000	270383.6107
Anthracene	17000000.0000	2384.0085
Benzo(a)anthracene	600.0000	1418.4033
Benzo(a)pyrene	60.0000	5595.0847
Benzo(b)fluoranthene	600.0000	4359.7436
Benzo(ghi)perylene	0.0000	6411.1389
Benzo(k)fluoranthene	600.0000	5762.7470
Butyl benzyl phthalate	377249.0243	339549.0336
Chrysene	6000.0000	2358.9445
Di-n-butyl phthalate	5700000.0000	488.2013
Di-n-octyl phthalate	2300000.0000	13000.0000
Dibenzo(a,h)anthracene	170.0000	5595.0847
Diethyl phthalate	46000000.0000	6940467.6688
Dimethyl phthalate	570000000.0000	4438.1939
Fluoranthene	2300000.0000	38000.0000
Fluorene	2300000.0000	1645.5450
Indeno(1,2,3-cd)pyrene	600.0000	5820.8899
Naphthalene	1146590.7159	210000.0000
Phenanthrene	17000000.0000	1313.8397
Pyrene	1700000.0000	18000.0000
bis(2-Ethylhexyl) phthalate	250000.0000	4926.3953
n-Nitrosodimethylamine	45.0000	20000.0000

Note: (µg/kg) = micrograms per kilogram

Data Date: April 2009

Note: For the chemical result boxes, if results are not listed for a SVOCs analyte, this indicates the analyte was not analyzed.

Res RBSL Residential Risk-Based Screening Level
Eco RBSL Ecological Risk-Based Screening Level

Base Map Legend

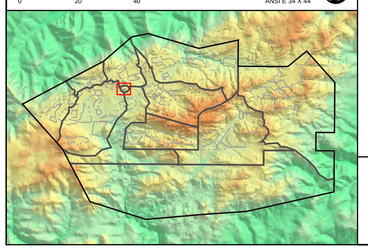
- Administrative Area Boundary
- RFI Site Boundary
- Report Group Boundary
- Existing Building or Structure
- Removed Building or Structure
- Other Tanks
- Solvent Tank
- Petroleum Fuel/Oil Tank
- Hydrazine Tank
- Awning
- Sump
- Vaults and Pits
- Ponds
- Dirt Road
- A/C Paving
- Fence
- Pipe
- Leach Field
- NPDES Outfall
- Well
- Drainage
- Surface Water Divide
- Rock Outcrop
- Trench
- Excavation
- Elevation Contour

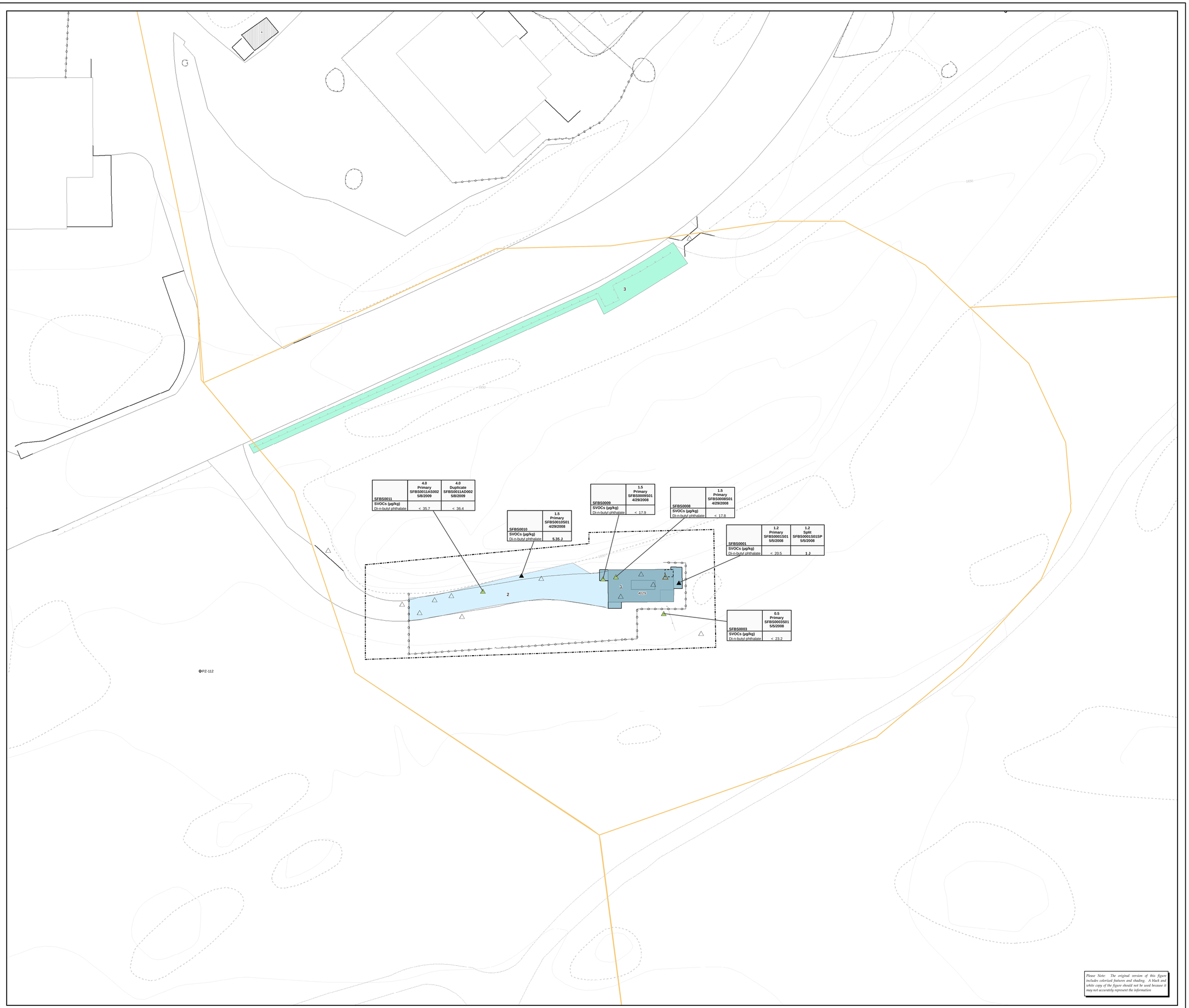
Chemical Use Area

- Multiple Use
- Metals / Inorganics
- Leach Field
- Solvents
- Perchlorate / Energetics
- Potential
- Petroleum
- Hydrazine
- Oils / PCBs
- Debris

Document: RFI-Report-Group7-Boxplot-B4029-SVOC.mxd Date: Jun 10, 2009

1 inch = 20 feet
0 20 40 Feet
ANSI E 34 X 44





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SVOCs Chemical Data Results
B4029 RFI Site

FIGURE A.3-2

Soil Sample Location Symbol Legend

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

Data Box Information

(Historical Sample)

Sample Location ID: RMDF5

1.00 — Depth in Feet
Primary — Sample Type
RMDFSS01 — Unique Sample Identifier
7/1/2005 — Date

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

12.05	Detect with sample concentration shown
<0.06	Non-Detect with lab detection limit shown
J	Analyte positively identified; Associated numerical value is considered estimated
*	Data validation not performed
E	Data not validated, laboratory qualifier for estimated value
QC	Data not validated, laboratory qualifier for internal lab QC issue
NA	Analysis not conducted
[#]	If more than one result per column, the maximum is presented, with number of results in backets.

Detect 12.05 **Non-Detect** <0.06 Exceeds Res RBSL

Comparison Levels

TPHs	Res RBSL (mg/kg)
Gasoline Range Organics (C08-C11)	1.1
Gasoline Range Organics (C9-C22)	1.1
Kerosene Range Organics (C12-C14)	1,400.0
Diesel Range Organics (C15 - C22)	1,400.0
Lubricant Oil Range Organics (C21-C30)	1,400.0

Note: (mg/kg) = milligrams per kilogram

Data Date: April 2009

Note: For the chemical result boxes, if results are not listed for a TPH analyte this indicates the analyte was not analyzed.

Note: Kerosene, diesel and lubricant oil range organics have a combined ResRBSL of 1400 mg/kg for all three hydrocarbon ranges (C12-C30).

Res RBSL Residential Risk-Based Screening Level

Base Map Legend

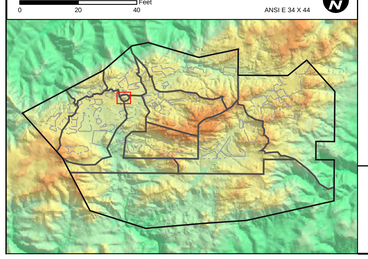
- Administrative Area Boundary
- RFI Site Boundary
- Report Group Boundary
- Existing Building or Structure
- Removed Building or Structure
- Other Tanks
- Solvent Tank
- Petroleum Fuel/Oil Tank
- Hydrazine Tank
- Awning
- Sump
- Vaults and Pits
- Ponds
- Dirt Road
- A/C Paving
- Fence
- Pipe
- Leach Field
- NPDES Outfall
- Well
- Drainage
- Surface Water Divide
- Rock Outcrop
- Trench
- Excavation
- Elevation Contour

Chemical Use Area

- Multiple Use
- Metals / Inorganics
- Leach Field
- Solvents
- Perchlorate / Energetics
- Potential
- Petroleum
- Hydrazine
- Oils / PCBs
- Debris

Document: RFI-Report-Group7-Boxplot-B4029-TPH.mxd Date: Jun 10, 2009

1 inch = 20 feet
0 20 40 Feet
ANSI E 34 X 44



OCTS01	4.0 Primary RS870 5/7/1999
TPH (mg/kg)	
Lubricant Oil Range Organics (C21-C30)	< 11

SFBS0009	1.5 Primary SFBS0009S01 4/29/2008	4.5 Primary SFBS0009S02 4/29/2008
TPH (mg/kg)		
Lubricant Oil Range Organics (C21-C30)	1.24 J	< 3.55

SFBS0008	1.5 Primary SFBS0008S01 4/29/2008	3.5 Primary SFBS0008S02 4/29/2008
TPH (mg/kg)		
Lubricant Oil Range Organics (C21-C30)	< 3.55	< 3.58

SFBS0011	1.5 Primary SFBS0011S01 4/29/2008	4.5 Primary SFBS0011S02 4/29/2008
TPH (mg/kg)		
Lubricant Oil Range Organics (C21-C30)	13	493

SFBS0010	1.5 Primary SFBS0010S01 4/29/2008
TPH (mg/kg)	
Lubricant Oil Range Organics (C21-C30)	8.25

SFBS0006	1.5 Primary SFBS0006S01 5/5/2008
TPH (mg/kg)	
Lubricant Oil Range Organics (C21-C30)	< 4.03

SFBS0013	1.2 Primary SFBS0013S01 4/29/2008
TPH (mg/kg)	
Lubricant Oil Range Organics (C21-C30)	345

SFBS0023	1.6 Primary SFBS0023S001 5/8/2009
TPH (mg/kg)	
Lubricant Oil Range Organics (C21-C30)	4.22

SFBS0001	1.2 Primary SFBS0001S01 5/5/2008	1.2 Split SFBS0001S01SP 5/5/2008
TPH (mg/kg)		
Lubricant Oil Range Organics (C21-C30)	< 4.78	< 5.5

SFBS0014	1.5 Primary SFBS0014S01 4/29/2008	4.5 Primary SFBS0014S02 4/29/2008
TPH (mg/kg)		
Lubricant Oil Range Organics (C21-C30)	4.81	30.9

SFBS0005	10.5 Primary SFBS0005S01 5/5/2008	10.5 Duplicate SFBS0005D01 5/5/2008
TPH (mg/kg)		
Lubricant Oil Range Organics (C21-C30)	< 4.15	< 9.18

SFBS0004	1.5 Primary SFBS0004S01 5/5/2008
TPH (mg/kg)	
Lubricant Oil Range Organics (C21-C30)	< 4.28

PZ-112

SFBS0015	1.5 Primary SFBS0015S01 4/29/2008
TPH (mg/kg)	
Lubricant Oil Range Organics (C21-C30)	8.18

SFBS0007	1.5 Primary SFBS0007S01 5/5/2008
TPH (mg/kg)	
Lubricant Oil Range Organics (C21-C30)	< 3.53

SFBS0003	0.5 Primary SFBS0003S01 5/5/2008
TPH (mg/kg)	
Lubricant Oil Range Organics (C21-C30)	< 3.46

SFBS0012	1.5 Primary SFBS0012S01 4/29/2008	10.5 Primary SFBS0012S03 4/29/2008	5.5 Primary SFBS0012S02 4/29/2008
TPH (mg/kg)			
Lubricant Oil Range Organics (C21-C30)	14.5	144	9.64

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TPH Chemical Data Results
B4029 RFI Site

FIGURE A.3-3

Soil Sample Location Symbol Legend

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

Data Box Information

(Historical Sample)

Sample Location ID: **RMDF5**

1.00 — Depth in Feet
Primary — Sample Type
RMDF5S01 — 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
*	Data validation not performed
E	Data not validated, laboratory qualifier for estimated value
QC	Data not validated, laboratory qualifier for internal lab QC issue
NA	Analysis not conducted
[#]	If more than one result per column, 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
12.05	<0.06	Exceeds Background + Res RBSL
12.05	<0.06	Exceeds Background + Eco RBSL
12.05	<0.06	Exceeds Background + Res RBSL + Eco RBSL

Comparison Levels

Metals	Background (mg/kg)	Res RBSL (mg/kg)	Eco RBSL (mg/kg)
Aluminum	20,000	75,000	12.0000
Antimony	8.7000	30.0000	0.0949
Arsenic	15.0000	0.0950	1.9180
Barium	140.0000	15000.0000	14.6026
Beryllium	1.1000	150.3254	5.0873
Boron	9.7000	15000.0000	6.7600
Cadmium	1.0000	77.8248	0.0208
Chromium	36.8000	114000.0000	930.0000
Cobalt	21.0000	22.7763	8.9498
Copper	29.0000	3000.0000	1.0886
Hexavalent Chromium	0.0000	110.0000	0.2000
Iron	-	-	-
Lead	34.0000	150.0000	0.0632
Lithium	37.0000	152.2000	10.0000
Mercury	0.0900	23.0000	0.1000
Molybdenum	5.3000	380.0000	0.1073
Nickel	29.0000	1500.0000	0.1020
Phosphate			-
Potassium	6,400.0000	-	-
Selenium	0.6550	380.4156	0.1738
Silver	0.7900	380.4197	0.5397
Sodium	110.0000	-	-
Thallium	0.4600	4.9455	2.8798
Vanadium	62.0000	369.1094	1.5000
Zinc	110.0000	23000.0000	20.7553
Zirconium	8.6000	0.0000	7.4316
Inorganics			
Chloride	-	-	-
Cyanide	-	1,500.0000	290.0000
Fluoride	6.7000	4600.0000	0.0000
Nitrate-N	-	-	-
Sulfate	-	-	-
pH			
pH	-	-	-

Note: (mg/kg) = milligrams per kilogram

Data Date: April 2009

Note: For the chemical result boxes, if results are not listed for a Metal/pH/Inorganic analyte, this indicates the analyte was not analyzed.

Background — **Background Level**
Res RBSL — **Residential Risk-Based Screening Level**
Eco RBSL — **Ecological Risk-Based Screening Level**

Base Map Legend

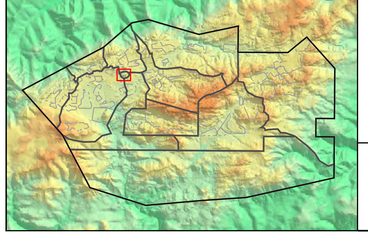
- Administrative Area Boundary
- RFI Site Boundary
- Report Group Boundary
- Existing Building or Structure
- Removed Building or Structure
- Other Tanks
- Solvent Tank
- Petroleum Fuel/Oil Tank
- Hydrazine Tank
- Awning
- Sump
- Vaults and Pits
- Ponds
- Dirt Road
- A/C Paving
- Fence
- Pipe
- Leach Field
- NPDES Outfall
- Well
- Drainage
- Surface Water Divide
- Rock Outcrop
- Trench
- Excavation
- Elevation Contour

Chemical Use Area

- Multiple Use
- Metals / Inorganics
- Leach Field
- Solvents
- Perchlorate / Energetics
- Potential
- Petroleum
- Hydrazine
- Oils / PCBs
- Debris

Document: RFI-Report-Group7-Boxplot-B4029-Metals.mxd — Date: Jun 10, 2009

1 inch = 20 feet
0 — 20 — 40 Feet
ANSI E 34 X 44



SFBS0013	1.2 Primary SFBS0015S01 4/29/2008
Metals (mg/kg)	
Aluminum	**10600**
Antimony	< 0.31
Arsenic	**2.8**
Barium	**79**
Beryllium	**0.42 J**
Boron	< 1
Cadmium	**0.17 J**
Chromium	**20.6**
Cobalt	**6.3 J**
Copper	**11**
Lead	**4.4**
Lithium	**26.3**
Mercury	< 0.0101
Molybdenum	**0.47**
Nickel	**17.2**
Potassium	**2650**
Selenium	< 0.523
Silver	**0.1 J**
Sodium	**130 J**
Thallium	**0.2 J**
Vanadium	**31.9**
Zinc	**54 J**
Zirconium	**1.2**
Inorganics (mg/kg)	
Inorganics (pH Units)	
pH	**7.1**

SFBS0011	1.5 Primary SFBS0011S01 4/29/2008	4.5 Primary SFBS0011S02 4/29/2008
Metals (mg/kg)		
Aluminum	**11100**	**11700**
Antimony	< 1.63	< 0.325
Arsenic	**3**	**4.2**
Barium	**70.9**	**68.4**
Beryllium	**0.53**	**0.62**
Boron	< 1.05	< 1.05
Cadmium	**0.17 J**	**0.18 J**
Chromium	**21.3**	**23.4**
Cobalt	**6 J**	**6.2 J**
Copper	**10.5**	**12.8**
Lead	**4.7**	**4.9**
Lithium	**21.2**	**24.1**
Mercury	**0.012**	**0.015**
Molybdenum	**0.53**	**2.3**
Nickel	**13.4**	**17.4**
Potassium	**3280**	**2740**
Selenium	< 0.532	< 0.524
Silver	< 0.0426	< 0.0419
Sodium	**120 J**	**110 J**
Thallium	**0.22**	**0.28**
Vanadium	**35**	**33.7**
Zinc	**52 J**	**56.6 J**
Zirconium	**1.3**	**1.2**
Inorganics (mg/kg)		
Inorganics (pH Units)		
pH	**6.64**	**6.24**

SFBS0010	1.5 Primary SFBS0010S01 4/29/2008
Metals (mg/kg)	
Aluminum	**11100**
Antimony	< 0.32
Arsenic	**4.5**
Barium	**78.9**
Beryllium	**0.44 J**
Boron	**1 J**
Cadmium	**0.22**
Chromium	**22.9**
Cobalt	**6.8 J**
Copper	**14.2**
Lead	**7.6**
Lithium	**24.6**
Mercury	**0.049**
Molybdenum	**0.38**
Nickel	**17.8**
Potassium	**2810**
Selenium	< 0.515
Silver	**0.047 J**
Sodium	**91.1 J**
Thallium	**0.24**
Vanadium	**31.7**
Zinc	**73.8 J**
Zirconium	**1.5**
Inorganics (mg/kg)	
Fluoride	**0.45 J**
Inorganics (pH Units)	
pH	**7.51**

SFBS0022	1.0 Primary SFBS0022S01 11/18/2008	1.0 Duplicate SFBS0022D01 11/18/2008	5.0 Primary SFBS0022S02 11/18/2008
Metals (mg/kg)			
Barium	**119**	**97.9**	-
Lithium	**20.5**	**17.7**	-
Sodium	**112**	**110**	**94.4**
Zinc	**46.7**	**43.8**	-
Inorganics (mg/kg)			
Inorganics (pH Units)			
pH	**7.28**	**6.85**	**7.65**

SFBS0009	1.5 Primary SFBS0009S01 4/29/2008	4.5 Primary SFBS0009S02 4/29/2008
Metals (mg/kg)		
Aluminum	**11000**	**17400**
Antimony	< 0.33	< 1.59
Arsenic	**4**	**4.2**
Barium	**77.8**	**57**
Beryllium	**0.56**	**0.57**
Boron	**1.2 J**	< 1.03
Cadmium	**0.2 J**	**0.13 J**
Chromium	**20.2**	**27.6**
Cobalt	**9.4 J**	**9.4 J**
Copper	**11.5**	**12.9**
Lead	**8**	**6.8**
Lithium	**22.7**	**30.1**
Mercury	< 0.0094	**0.014**
Molybdenum	**0.42**	**0.27**
Nickel	**15.3**	**15.3**
Potassium	**2880**	**2420**
Selenium	< 0.513	< 0.518
Silver	< 0.0411	< 0.0415
Sodium	**140 J**	**184 J**
Thallium	**0.25**	**0.27**
Vanadium	**31.1**	**37.4**
Zinc	**56 J**	**57.7 J**
Zirconium	**1.6**	**1.5**
Inorganics (mg/kg)		
Inorganics (pH Units)		
pH	**7.85**	**7.33**

SFBS0008	1.5 Primary SFBS0008S01 4/29/2008	3.5 Primary SFBS0008S02 4/29/2008
Metals (mg/kg)		
Aluminum	**11500**	**12700**
Antimony	< 1.62	< 1.61
Arsenic	**3.3**	**3.9**
Barium	**54.3**	**56.7**
Beryllium	**0.41 J**	**0.62**
Boron	< 1.05	< 1.04
Cadmium	**0.13 J**	**0.14 J**
Chromium	**17.5**	**26.7**
Cobalt	**6.6 J**	**7.7 J**
Copper	**8.6**	**12.4**
Lead	**3.5**	**5.8**
Lithium	**17.9**	**21.9**
Mercury	**0.018**	**0.017**
Molybdenum	**0.25**	**0.24**
Nickel	**12.2**	**13.7**
Potassium	**1980**	**2240**
Selenium	< 0.512	< 0.528
Silver	< 0.041	**0.061 J**
Sodium	**129 J**	**172 J**
Thallium	**0.21**	**0.26**
Vanadium	**28.1**	**38.5**
Zinc	**52.9 J**	**56.9 J**
Zirconium	**1.2**	**1.4**
Inorganics (mg/kg)		
Fluoride	**0.391 J**	-
Inorganics (pH Units)		
pH	**6.61**	**7.24**

SFBS0006	1.5 Primary SFBS0006S01 5/5/2008
Metals (mg/kg)	
Aluminum	**15100**
Antimony	< 0.35
Arsenic	**7.4**
Barium	**185**
Beryllium	**1.1**
Boron	**1.7 J**
Cadmium	**0.26**
Chromium	**34.6**
Cobalt	**12**
Copper	**26.3**
Lead	**10.7**
Lithium	**60.8**
Mercury	**0.0092 J**
Molybdenum	**0.59**
Nickel	**37.9**
Potassium	**4310**
Selenium	< 0.559
Silver	**0.05 J**
Sodium	**220 J**
Thallium	**0.51**
Vanadium	**52.4**
Zinc	**129**
Zirconium	**1.6**
Inorganics (mg/kg)	
Inorganics (pH Units)	
pH	**8.5**

SFBS0001	1.2 Primary SFBS0001S01 5/5/2008	1.2 Split SFBS0001S01SP 5/5/2008
Metals (mg/kg)		
Aluminum	**12500**	**17000 J**
Antimony	< 1.66	**0.47 J**
Arsenic	**7.2**	**5.3 J**
Barium	**98.5**	**71 J**
Beryllium	**0.74**	**1.1**
Boron	**1.4 J**	< 1.1
Cadmium	**0.12 J**	**0.097 J**
Chromium	**29.6**	**27 J**
Cobalt	**7.9**	**7 J**
Copper	**11.9**	**12 J**
Lead	**8.9**	**6.7 J**
Lithium	**26.9**	**26 J**
Mercury	**0.0071 J**	< 0.0061
Molybdenum	**0.59**	**0.39 J**
Nickel	**13.8**	**13 J**
Potassium	**2100**	**2600**
Selenium	< 0.523	**0.43 J**
Silver	**0.055 J**	**0.022 J**
Sodium	**94.9**	**110 J**
Thallium	**0.33**	**0.33 J**
Vanadium	**43.8**	**41 J**
Zinc	**69.5**	**74 J**
Zirconium	**2.5**	**1.8 J**
Inorganics (mg/kg)		
Fluoride	**1.74 J**	**3.2 J**
Inorganics (pH Units)		
pH	**7.49**	**8**

SFBS0014	1.5 Primary SFBS0014S01 4/29/2008	4.5 Primary SFBS0014S02 4/29/2008
Metals (mg/kg)		
Aluminum	**17500**	**13700**
Antimony	< 0.341	< 0.334
Arsenic	**5**	**3.9**
Barium	**104**	**94.9**
Beryllium	**0.92**	**0.66**
Boron	**1.6 J**	< 1.08
Cadmium	**0.15 J**	**0.21 J**
Chromium	**21.9**	**20.4**
Cobalt	**5.8 J**	**6.7 J**
Copper	**8.5**	**9.8**
Lead	**6.7**	**5.4**
Lithium	**24**	**22.5**
Mercury	**0.011**	**0.015**
Molybdenum	**0.52**	**0.52**
Nickel	**14.3**	**17.4**
Potassium	**2190**	**2580**
Selenium	< 0.544	< 0.543
Silver	**0.048 J**	**0.067 J**
Sodium	**97.5 J**	**115 J**
Thallium	**0.23**	**0.22**
Vanadium	**37.5**	**33.1**
Zinc	**43.2 J**	**51.7 J**
Zirconium	**2.3**	**1.9**
Inorganics (mg/kg)		
Inorganics (pH Units)		
pH	**6.56**	**6.99**

SFBS0021	1.0 Primary SFBS0021S01 11/18/2008	1.0 Split SFBS0021S01SP 11/18/2008
Metals (mg/kg)		
Barium	**165**	**91.1**
Lithium	**20**	**18.8**
Sodium	**103**	**89 J**
Zinc	**48.3**	**42.3**
Inorganics (mg/kg)		
Inorganics (pH Units)		
pH	**6.25**	**6.67**

SFBS0015	1.5 Primary SFBS0015S01 4/29/2008
Metals (mg/kg)	
Aluminum	**10400**
Antimony	< 0.325
Arsenic	**2.7**
Barium	**88.6**
Beryllium	**0.5**
Boron	**1.3 J**
Cadmium	**0.22**
Chromium	**14.4**
Cobalt	**5 J**
Copper	**8**
Lead	**6.5**
Lithium	**15**
Mercury	**0.013**
Molybdenum	**0.49**
Nickel	**9.5**
Potassium	**3010**
Selenium	< 0.533
Silver	**0.053 J**
Sodium	**96.3 J**
Thallium	**0.23**
Vanadium	**25.1**
Zinc	**48.8 J**
Zirconium	**2**
Inorganics (mg/kg)	
Inorganics (pH Units)	
pH	**5.79**

SFBS0012	1.5 Primary SFBS0012S01 4/29/2008	10.5 Primary SFBS0012S03 4/29/2008	5.5 Primary SFBS0012S02 4/29/2008
Metals (mg/kg)			
Aluminum	**19200**	**14100**	**10900**
Antimony	< 1.72	< 0.331	< 0.339
Arsenic	**4.7**	**3.7**	**3.5**
Barium	**102**	**66.8**	**88.9**
Beryllium	**1.1**	**0.63**	**0.53 J**
Boron	< 1.11	< 1.07	< 1.09
Cadmium	**0.19 J**	**0.13 J**	**0.17 J**
Chromium	**24.9**	**21.2**	**22.1 J**
Cobalt	**6.5 J**	**6.7 J**	**6.4**
Copper	**10.3**	**11.7**	**10.9**
Lead	**7**	**5.2**	**5.4**
Lithium	**24.3**	**24.1**	**23.3 J**
Mercury	**0.012**	**0.012**	**0.012**
Molybdenum	**0.52**	**0.59**	**0.38**
Nickel	**12.5**	**11.1**	**14.7**
Potassium	**1790**	**2870**	**3530**
Selenium	< 0.56	< 0.545	< 0.541
Silver	**0.048 J**	< 0.0436	< 0.0433
Sodium	**90.8 J**	**144 J**	**81.4**
Thallium	**0.24**	**0.25**	**0.27**
Vanadium	**40.8**	**31.7**	**37.6**
Zinc	**48.4 J**	**55.8 J**	**57.5**
Zirconium	**2.1**	**1.1**	**2.3**
Inorganics (mg/kg)			
Inorganics (pH Units)			
pH	**6.05**	**6.92**	**6.71**

SFBS0007	1.5 Primary SFBS0007S01 5/5/2008
Metals (mg/kg)	
Aluminum	**9240**
Antimony	< 0.323
Arsenic	**3.5**
Barium	**89.7**
Beryllium	**0.6**
Boron	**1.8 J**
Cadmium	**0.15 J**
Chromium	**18**
Cobalt	**6.4**
Copper	**8.2**
Lead	**5.4**
Lithium	**19.4**
Mercury	**0.0034 J**
Molybdenum	**0.58**
Nickel	**11.4**
Potassium	**2620**
Selenium	< 0.524
Silver	**0.045 J**
Sodium	**164**
Thallium	**0.25**
Vanadium	**28.8**
Zinc	**48.6**
Zirconium	**2.2**
Inorganics (mg/kg)	
Inorganics (pH Units)	
pH	**6.33**

SFBS0003	0.5 Primary SFBS0003S01 5/5/2008
Metals (mg/kg)	
Aluminum	**10300**
Antimony	< 0.309
Arsenic	**3.5**
Barium	**109**
Beryllium	**0.62**
Boron	**1.4 J**
Cadmium	**0.39**
Chromium	**16.8**
Cobalt	**5.8**
Copper	**7.4**
Lead	**7**
Lithium	**17.7**
Mercury	**0.0073 J**
Molybdenum	**0.59**
Nickel	**10**
Potassium	**2140**
Selenium	< 0.519
Silver	**0.047 J**
Sodium	**62.6**
Thallium	**0.24**
Vanadium	**28.4**
Zinc	**328**
Zirconium	**2.5**
Inorganics (mg/kg)	
Fluoride	**1.77 J**
Inorganics (pH Units)	
pH	**7.01**

SFBS0004	1.5 Primary SFBS0004S01 5/5/2008
Metals (mg/kg)	
Aluminum	**11100**
Antimony	< 0.315
Arsenic	**6.1**
Barium	**115**
Beryllium	**0.71**
Boron	**1.9 J**
Cadmium	**0.21**
Chromium	**24.5**
Cobalt	**7.2**
Copper	**11.8**
Lead	**8.8**
Lithium	**30.2**
Mercury	**0.0081 J**
Molybdenum	**0.56**
Nickel	**14.4**
Potassium	**3620**
Selenium	< 0.493
Silver	**0.052 J**
Sodium	**58.1**
Thallium	**0.32**
Vanadium	**39.1**
Zinc	**89.1**
Zirconium	**2.5**
Inorganics (mg/kg)	
Inorganics (pH Units)	
pH	**6.89**

SFBS0005	10.5 Primary SFBS0005S01 5/5/2008	10.5 Duplicate SFBS0005D01 5/5/2008
Metals (mg/kg)		
Aluminum	**5740**	**9490**
Antimony	< 0.353	< 0.301
Arsenic	**7.2**	**4.8**
Barium	**94**	**93.7**
Beryllium	**0.95**	**0.52**
Boron	< 1.14	**0.99 J**
Cadmium	**0.17 J**	**0.21**
Chromium	**26.9**	**16.4**
Cobalt	**9.5**	**5.7**
Copper	**13.2**	**7.6**
Lead	**7.9**	**11.3**
Lithium	**32.8**	**25.6**
Mercury	**0.014**	**0.03**
Molybdenum	**0.57**	**0.48**
Nickel	**14.8**	**9.9**
Potassium	**1960**	**3710**
Selenium	< 0.573	< 0.5
Silver	**0.048 J**	**0.047 J**
Sodium	**245**	**59.9**
Thallium	**0.35**	**0.27**
Vanadium	**31.6**	**28**
Zinc	**133**	**61.1**
Zirconium	**1.7**	**2.5**
Inorganics (mg/kg)		
Inorganics (pH Units)		
pH	**7.31**	**8.7**

PZ-112

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

MWH

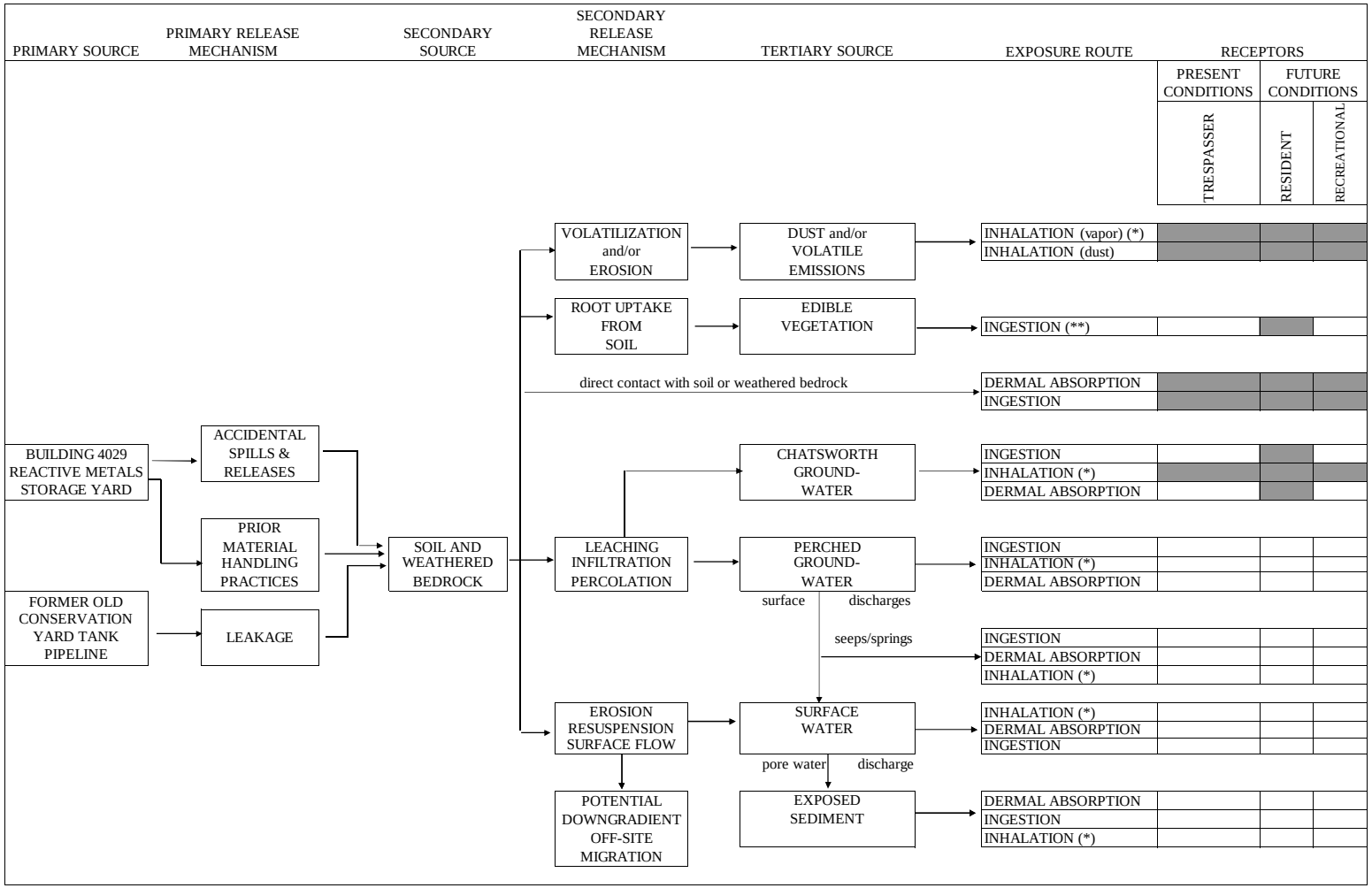
SANTA SUSANA FIELD LABORATORY

Metals / pH / Inorganics Chemical Data Results
B4029 RFI Site

FIGURE A.3-6

Figure A.4-1

Human Health Risk Assessment Conceptual Site Model
B4029 RFI Site



NOTES:

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

(*) Exposure limited to volatile compounds as defined in the text; residential receptors include both indoor and outdoor air exposure to volatiles; non-residental receptors include only outdoor air exposure. Exposure to fugitive dust is limited to non-VOC compounds. For residents, exposures to reporting area Chatsworth formation groundwater includes pathways associated with domestic use. For residents, exposures to Chatsworth formation groundwater includes pathways associated with migration to indoor and outdoor air.

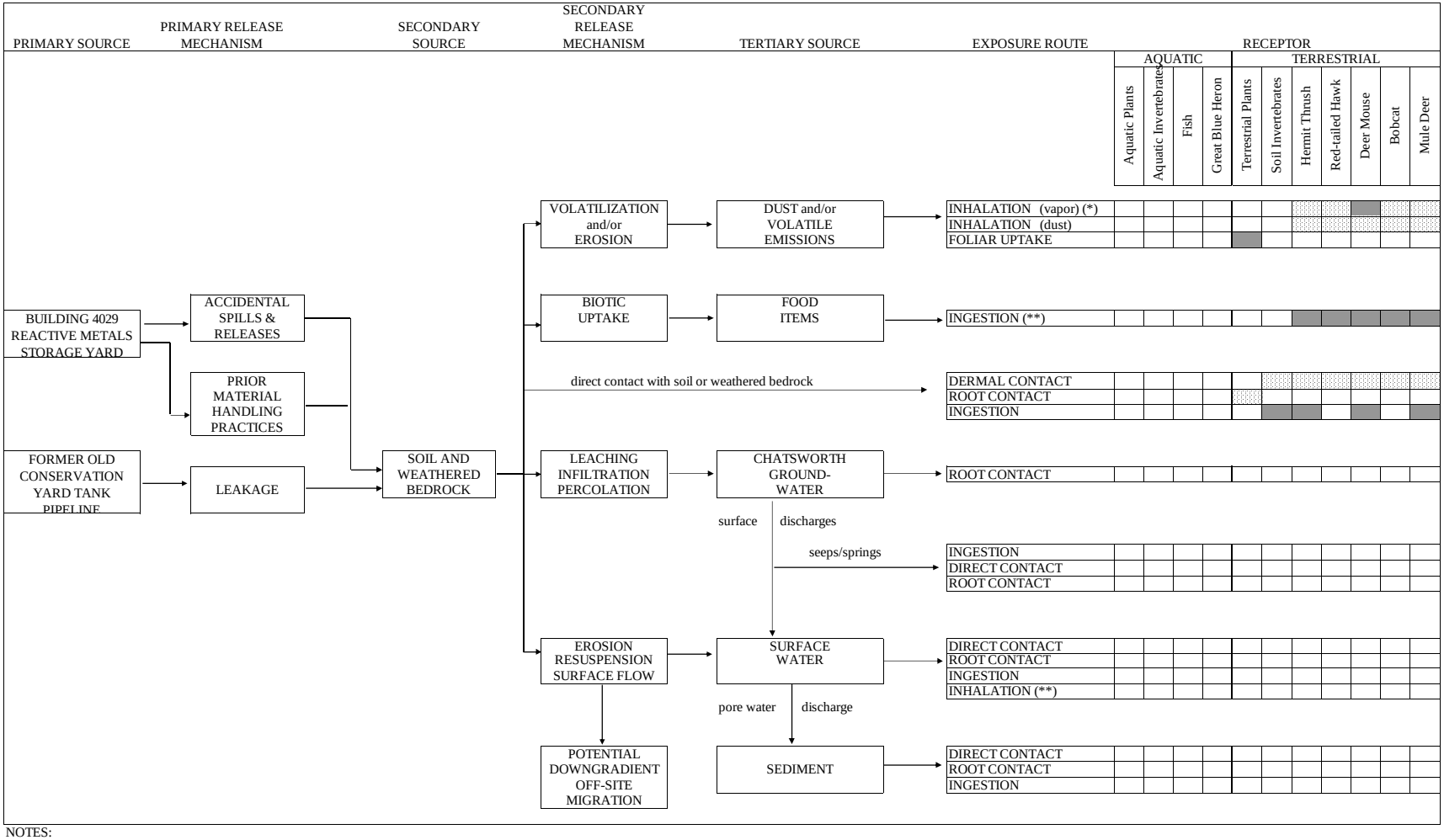
(**) Exposure limited to bioaccumulatable compounds as described in the text.

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

- incomplete exposure pathways not evaluated in this risk assessment

Figure A.4-2

Ecological Risk Assessment Conceptual Site Model
B4029 RFI Site



NOTES:
(*) Exposure limited to volatile compounds as defined in the text.
(**) Exposures limited to bioacummulative compounds as defined in the text.

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

- incomplete exposure pathways not evaluated in this risk assessment

- minor exposure pathway not evaluated in this risk assessment

Surficial Media Site
Action Recommendtions
B4029 RFI Site

Base Map Legend

- Administrative Area Boundary
- RFI Site Boundary
- Report Group Boundary
- Existing Building
- Removed Building
- Other Tanks
- Solvent Tank
- Petroleum Fuel/Oil Tank
- Hydrazine Tank
- Awning
- Sump
- Vaults and Pits
- Ponds
- Dirt Road
- A/C Paving
- Fence
- Pipe
- Leach Field
- NPDES Outfall
- Well
- Drainage
- Surface Water Divide
- Rock Outcrop
- Excavation
- Elevation Contour

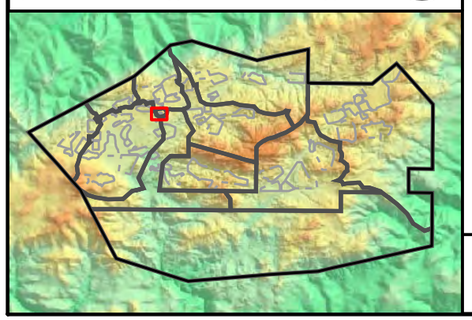
Note: This figure is created to depict current conditions.

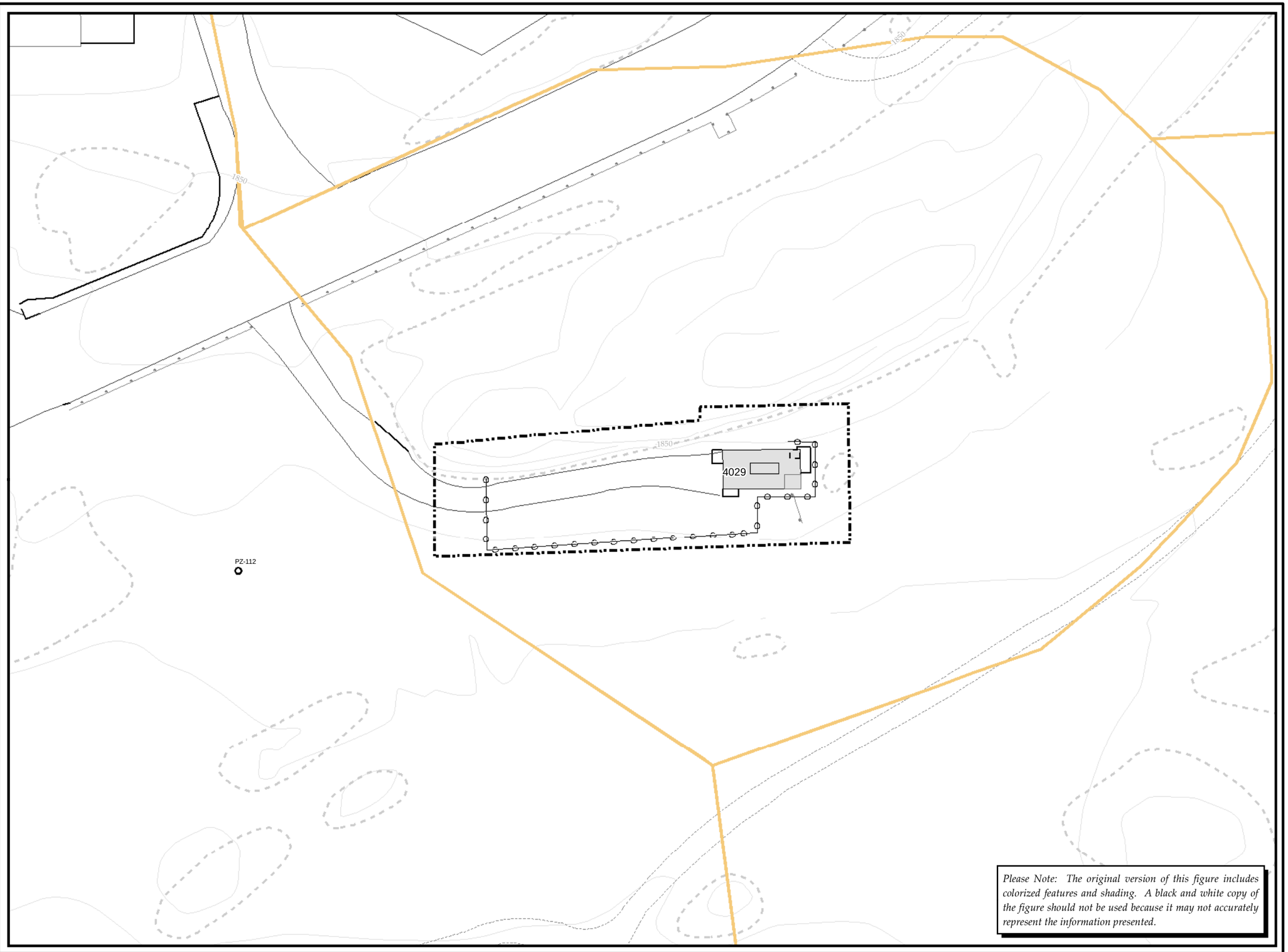
There are no CMS Areas at the B4029 RFI Site

Document: RFI-Report-Group7-Appendix-B4029-CMS_11x17.mxd Date: Jun 09, 2009

1 inch = 50 feet

0 50 100 Feet





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

MWH

SANTA SUSANA FIELD LABORATORY

FIGURE A.5-1

APPENDIX A

ATTACHMENT A-1

REGULATORY AGENCY CORRESPONDENCE
(Electronic Copy)

Rocketdyne Division
Rockwell International Corporation
6633 Canoga Avenue
Canoga Park, California 91303

Telex: 698478
ROCKETDYN CNPK

Rockwell International

CERTIFIED-RETURN RECEIPT REQUESTED
In reply refer to 93RC03139

19 March 1993

Ms. Florence Pearson
California Environmental Protection Agency
Department of Toxic Substances Control
Region 3
1011 N. Grandview Avenue
Glendale, CA 91201

Subject: CEQA Compliance For Energy Technology Engineering Center, EPA ID# CAD000629972

Dear Ms Pearson:

Enclosed is the additional information, requested by your department, from Rockwell International Corporation, Energy Technology Engineering Center (ETEC) regarding compliance with the California Environmental Quality Control Act (CEQA). This information includes the project description and the environmental setting for the Hazardous Waste Management Facility (alkali metal) storage and treatment facility. The project description includes facility operation and history, size, capacity and proposed activities to be permitted. The environmental setting describes the location of the site, topography, meteorology, surface water hydrology and geologic and groundwater conditions.

If you have any questions or need additional information, please call the undersigned at (818)586-5771 or Ms. Carole Missirlian at (818)586-6040.

Sincerely,

ROCKWELL INTERNATIONAL CORPORATION
Rocketdyne Division

M. C. Shoemaker

M.C. Shoemaker, Director
Environmental Protection

MCS/cm
Enclosure

cc DTSC/S. Haddad

Hazardous Waste Management Facility

Project Description and Environmental Setting

1.0 PROJECT DESCRIPTION

1.1 Site History

The Energy Technology Engineering Center (ETEC) is a U.S. Department of Energy Installation located at the Rockwell International Corporation, Santa Susana Field Laboratory. It is a complex of experimental research, development and testing facilities. Included are facilities that have used, or are presently utilizing alkali metals such as sodium and sodium-potassium alloys (NaK).

The Hazardous Waste Management Facility, Building T029 and T133, is dedicated to the storage and treatment of sodium and NaK wastes and their reaction products, i.e. oxides, hydroxides, and carbonates generated at ETEC to render them acceptable for recycle or disposal. The treatment and storage buildings are shown in the Operation Plan Figure 1-1.

The treatment building, T133, was designed in 1977 as approved by Robert O. Broslow (California Registration C8957 and 5789). It is located approximately 900 feet to the northwest of the storage building.

The storage building, T029, was designed in 1959 as approved by Elmer H. McDonie (California Registration C9513). When the HWMF was activated in 1978, the building was designated as the storage building for waste alkali materials.

1.2 Description of Facility Operations

1.2.1 Treatment

Alkali metal (sodium and NaK) waste treatments are conducted at Building T133. There are basically only two types of treatment processes performed at the facility. First, the treatment of solid alkali metals (sodium) and second, the treatment of liquid alkali metals (NaK).

For sodium, the components or drums containing the sodium metal are opened and placed on the treatment pan and heated with a natural gas burner until the sodium melts. For NaK, the liquid metal is fed to the treatment pan through a specially designed feed system. The metal in the pan (sodium or Nak) reacts with the air in the treatment chamber to form oxides which either remain in the pan or are exhausted through a wet (water) scrubber to remove the oxide aerosols prior to release to the atmosphere.

In both cases the reactive metals are converted to caustic aqueous solution, which is stored at T133 for recycle to Rocketdyne or disposal to an approved off-site facility.

In preparation for treatment, components may be cut into smaller sections to be handled in the treatment room. This operation is performed on the cement-based handling area of the treatment facility and within a carbon steel secondary containment.

1.2.2 Storage

Waste sodium, NaK and their reaction products are stored in containers in the HWMF storage building T029.

The Rocketdyne Traffic Department picks up the waste container from the generation site and delivers it to the HWMF, storage building T029. Operations personnel unlock the gate on the road providing access to Building T029 so that the container can be placed in the building. In the storage building, T029, containers are placed on pallets which in turn are stored on pallet racks. The racks are located on the building perimeter and provide unimpeded access to handling equipment as necessary for movement of stored materials.

1.3 Facility Size

1.3.1 Treatment Facility

The Treatment Facility includes B/133, the treatment building, and ancilliary equipment required for the process. The overall area is approximately 6,000 sq. ft. Building 133 is a lightweight metal building with an exterior covering of sheet steel attached to framework of I-beams and channel section structural members. The building is mounted on a cast-in-place concrete slab with an area of 462 sq.ft. The treatment area includes support equipment for hoisting metal parts into and out of the treatment chamber; air handling equipment to remove the reaction products generated by treatment of alkali metals; a wet scrubber to remove metal oxides prior to discharged to the atmosphere; and three tanks to store hydroxide solution before and after treatment. The treatment building plot plan is shown on the attached Operation Plan Figure II-9.

1.3.2 Storage Building

Building 029 is a prefabricated metal building covered with corrugated sheet steel on the exterior. It is bolted down to a cast-in-place concrete floor with an area of 800 sq. ft. that is elevated above the surrounding grade so that it is protected from flooding by storm water run-off. The storage building plot plan is shown on the attached Operation Plan Figure II-10.

1.4 Facility Capacity

1.4.1 Treatment Facility

Design of the treatment pan limits the surface area of the molten metal of 6.25 sq. ft. which will provide a maximum oxidation rate of 62.5 lb/hr based on experimental evidence of oxidation rates of 5 to 10 pounds/hour per square foot of exposed surface area. Aerosols released per 100 pounds of alkali metal are 2.0 pounds and 1.86 pounds for sodium and NaK respectively.

Sodium hydroxide tankage capacity is T-1 (Drain Tank) = 1300 gallons and T-3 (Storage Tank) = 5000 gallons and the NaK Feed Tank = 300 gallons.

1.4.2 Storage Building

Containers used for storage are enclosed drums, such as 5 to 55 gallon drums, 85 gallon overpack drums, and containers such as 44 cu. ft. component boxes. The storage building has the capacity to store a volume of 5500 gallons in drums and containers located around the perimeter of the storage area.

1.5 Proposed Activities to be Permitted

1.5.1 Treatment Facility

1. Treat an estimated maximum annual quantity of 10,000 lb of sodium and 1000 lb of NaK at a maximum reaction rate of 62.5 lb/hr.

2. Produce an estimated maximum annual quantity of 2,000,000 lb of 1% or 200,000 lb of 10% hydroxide solution resulting from the above treatment process.

3. Provide storage for a maximum of 6300 gallons of hydroxide solution generated during the treatment process.

1.5.2 **Storage Facility**

1. Provide storage for a maximum of 5500 gallons of waste sodium, NaK or reaction products around the perimeter of the building T029.

2.0 ENVIRONMENTAL SETTING

2.1 Description of Site Location

The Santa Susana Field Laboratory (SSFL) is located at the top of Woolsey Canyon road, 5 miles west of the town of Chatsworth in the Simi Hills, Ventura County, California. The property boundaries of the SSFL, including the boundaries of a Government Option Area, where the Energy Technology Engineering Center (ETEC) is located, are shown in attached Figure II-1, as well as, in Figure II-2. The Hazardous Waste Management Facility (HWMF) consists of a storage building, T029, and a treatment building, T133, which are a distance of approximately 900 feet apart, and are both located within the ETEC boundaries.

1. Latitude: 34° 13' 46" N
2. Longitude:118° 42' 30" W
3. Township:T2N
4. Range: R17W
5. Sections:25 and 30
6. Principal meridian: San Bernardino
7. Assessors parcel numbers:

   Book 685, page 5; Parcels 5 and 6 of the Ventura County Assessors Map, which includes the entire Santa Susana Field Laboratory. The HWMF is located in Area IV of the SSFL with the storage facility located in Parcel 5 and the treatment facility in Parcel 6.

8. Location:

   a. Figure II-2 is a property layout of the SSFL Area IV showing location of treatment, T133, and storage, T029, buildings associated with the HWMF in relation to parcel boundaries.

2.2 Topography

The detailed topographic map (Figure II-2) includes the following information.

1. Map Layout

   a. Scale

      (1) One inch represents 200 feet.
      (2) The contour interval is five feet.

   b. North arrow

   c. Date map completed: the base topographic map was completed in 1967; Hazardous Waste Management Facility information was added in November 1988.

2. Land Characteristics

   a. Existing contours and elevations. The 5 foot contour interval reveals the pattern of surface water flow near the facility.

   b. Proposed final contours and elevations of the completed facility (for new facilities only): not applicable since the facility is existing and the ground surface will not be altered.

   c. The Santa Susana Field Laboratory, which includes the Hazardous Waste Management Facility (HWMF) does not lie within the 100-year floodplain.

      Source of data:

      Federal Insurance Administration
      Department of Housing and Urban Development
      Flood Hazard Boundary Map
      Ventura County, California
      Map No. 46
      Revision Date: 10/18/77

2.3 Metrology

The amount of precipitation which enters the groundwater system depends on the volume and intensity of rainfall and antecedent moisture conditions. A precipitation station has been maintained at the SSFL since 1959. The mean annual precipitation as measured at the SSFL station has been approximately 17.6 inches with a standard deviation of about 9 inches. Because of the high variability in annual precipitation, groundwater recharge may vary significantly from year to year. Precipitation is not evenly distributed throughout the year. The dry season normally extends from May through October and the wet season commonly extends from December through March. During the dry season it is not uncommon to have several successive months with no measurable precipitation.

The mean temperature at the site ranges from 53 to 95 °F, although temperatures below freezing and in excess of 100 °F have been observed. During the spring, summer and fall five to ten knot breezes from the northwest are common. During the winter months winds tend to be less, except for days with occasional gusts as high as forty knots. A wind rose prepared from data collected at the SSFL is shown in Figure II-5

2.4 Surface Water Hydrology

There are no natural rivers or streams located at the SSFL. Seasonal flow occurs as a result of rainfall. Approximately 65% of the site's surface are contributes runoff to the south, ultimately into Bell Canyon. Approximately 18 % of the surface are of the site drains to the east ultimately into Dayton Canyon. Approximately 1% of the surface are of the site also drains to the east discharging to Woolsey Canyon. The area along the northern border drains to Meier Canyon. Approximately 16% of the site surface area drains to the north.

2.5 Geology

The SSFL is located in the Simi Hills of eastern Ventura County, California. The Simi Hills are in the northern Transverse Range geomorphic province and separate the Simi Valley from the western part of the San Fernando Valley. The Simi Valley is a broad east/west trending synclinal depression and the Simi Hills form the southern flank of the syncline. The Simi Hills are composed primarily of exposures of the Upper Cretaceous Chatsworth Formation.

The principal geologic units at the SSFL are the Chatsworth Formation and the shallow alluvium which discontinuously overlies the Chatsworth Formation. In addition, the Martinez Formation is exposed in the southwestern portion of the SSFL and the Topanga Formation is exposed in the extreme southeastern portion if the site's Buffer Zone.

Chatsworth Formation

The Upper Cretaceous Chatsworth Formation underlies most of the SSFL. It is composed primarily of well-consolidated, massively bedded sandstone with interbeds of siltstone and claystone. At the site, the Chatsworth Formation beds dip to the northwest at approximately 20 to 30 degrees. Well developed fractures and joints are present in the Chatsworth Formation outcrops. To the northwest of the SSFL, the Chatsworth Formation is overlain by the Paleocene Martinez Formation.

Martinez Formation

The Tertiary Martinez Formation is exposed to the north and northwest of the site and in portions south of Burro Flats. The Martinez Formation is younger than the Chatsworth Formation and is composed of bedded marine sandstones and shales with a basal conglomerate. The Martinez Formation to the north of the site dips to the northwest at approximately 30 to 35 degrees.

Alluvium

The Chatsworth Formation and the Martinez Formation are overlain by a discontinuous layer of thin Quaternary alluvium, most notable in Burro Flats and along ephemeral drainages. The Quaternary alluvium consists of mixtures of unconsolidated sand, silt and clay. The thickness of the alluvium varies from a few inches to as much as 20 feet. The alluvium is underlain in some places by a zone of Chatsworth Formation which has been weathered in place.

Zones of weakness in the Chatsworth Formation are formed by fractures or faults, or by easily eroded siltsone/claystone outcrops. In some places these zone of weaknesses have been eroded to form canyons which are part of the surface drainage system. Deposit of alluvium are thickest along these drainages.

2.6 Groundwater Conditions

Groundwater conditions at the SSFL have been evaluated based on data compiled from 176 wells and other sources located at, or adjacent to the site. The first 17 wells constructed at the site in the late 1940s to mod 1950s were deep, water supply wells. From 1984 to 1991, 147 monitor wells were constructed in order to evaluate groundwater conditions at the entire SSFL site.

There are two groundwater systems at the site: 1) a shallow groundwater system (Shallow Zone) in the surficial alluvium and the underlying zones of weathered sandstone and siltstone/claystone and isolated shallow fracture systems; and 2) a deeper regional groundwater system in the fractures Chatsworth Formation. In some parts of the SSFL, the two systems appear to be hydraulically connected.

Shallow Zone

The Shallow Zone is characterized as a thin layer of Quaternary alluvium distributed primarily in the Burro Flats area and along ephemeral drainages. The Shallow Zone is discontinuous at the site. It may be saturated along ephemeral drainages and in the southern part of the Burro Flats. Some portions of the Shallow Zone are saturated only during and immediately following the wet season.

Depth to groundwater in the Shallow Zone has generally ranged from a few feet to about 30 feet. Groundwater occurs under unconfined conditions. The saturated thickness of the Shallow Zone ranges from less than one foot to as much as 10 feet. The surface of the saturated portion of the Shallow Zone is, in general, a subdued expression of the topographic surface. Water in the Shallow Zone may move laterally to an area of discharge or downward into the underlying Chatsworth Formation.

Chatsworth Formation

The principal water bearing system at the SSFL is the Chatsworth Formation. It is predominantly composed of well-consolidated, massive, fractured sandstone with interbeds of siltstone and claystone. Fractures occurring within the Chatsworth Formation may be associated with bedding planes, jointing, and/or faulting.

The permeability of the Chatsworth Formation is very low except along open fractures. The permeability of unfractured Chatsworth Formation appears to be sufficiently low to be considered as virtually impermeable. Permeabilities determined from recently collected rock cores ranged from only 10^{-6} to 10^{-8} centimeter per second (cm/sec) for the coarsest grained sandstone cores.

Wells constructed along major fracture zones at the site produce greater volumes of groundwater relative to wells constructed in unfractured areas. Groundwater within the fractures of the Chatsworth Formation occurs under both confined and unconfined conditions. The saturated thickness of the Chatsworth Formation groundwater is not known. During 1992, the static depth to groundwater wells completed in the Chatsworth Formation groundwater system ranged from about 0 feet at well RD-30 located along the northwest border of the SSFL, to more than 370 feet at well RD-51C located along the north border of the central portion of the SSFL.

Figure I-1 ETEC and Area IV SSFL

Hazardous Waste Treatment (Bldg. 133) Plot Plan

Rockwell International
Rocketdyne Division

Figure II-9 Treatment Building T133 Plot Plan

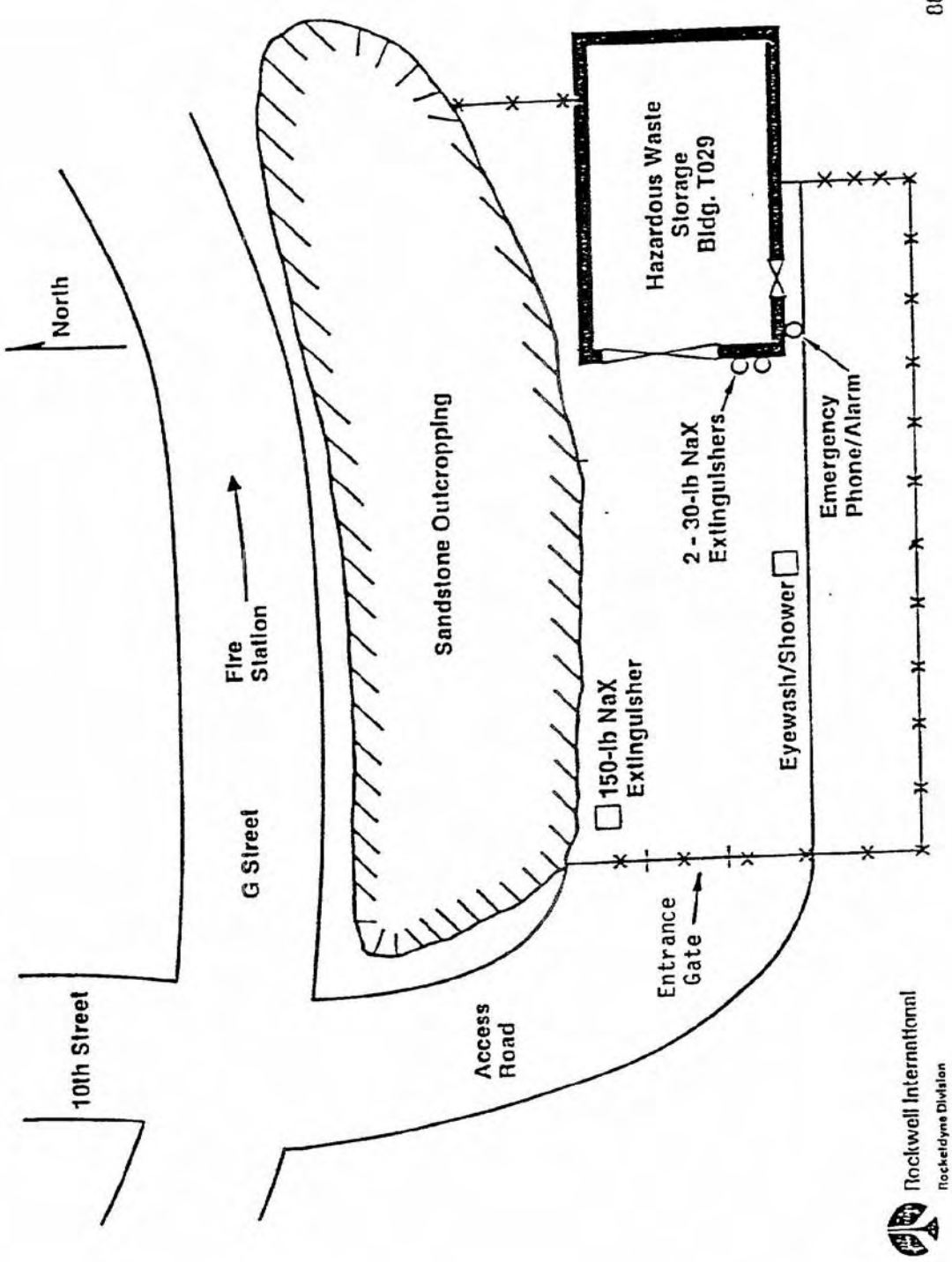


Figure II-10 Storage Building T029 Plot Plan

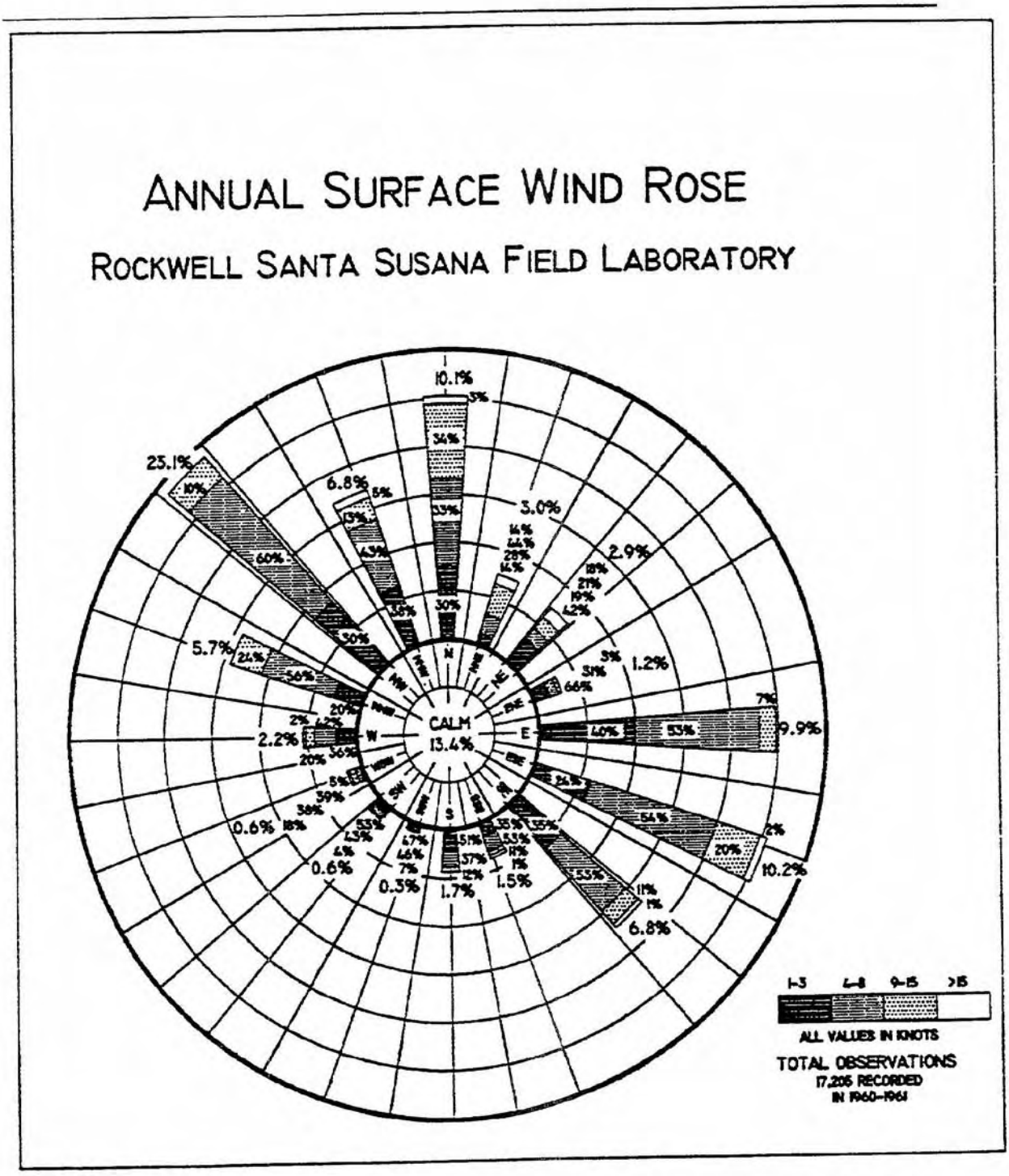


Figure II-5 Annual Surface Windrose (1960-1961), RDFTL

Department of Energy
Oakland Operations Office
1301 Clay Street
Oakland, California 94612-5208

APR 21 1997

RECEIVED
APR 28 1997
DRF 0110

Mr. Mark Gabler
Director
Energy Technology Engineering Center
Rocketdyne Division
Boeing North American, Inc.
P.O. Box 7930
Canoga Park, CA 91309-7930

Subject: Release of Facilities for Unrestricted Non-Radiologic Use

Dear Mr. Gabler:

The Department of Energy has completed the extensive process to verify that three facilities at ETEC (Buildings 023, 028, and 029) are no longer radioactively contaminated. Dockets, comprehensive compilations of both the operational history and the cleanup history, of these facilities were reviewed by the appropriate offices within DOE. Subsequently, DOE published a notice in the Federal Register that certified the radiological condition of these facilities.

The Department of Energy hereby officially notifies the Energy Technology Center that Building 023, Building 028, and Building 029 are immediately available for unrestricted non-radiologic use.

Sincerely,

Roger H. Liddle
Director
Environmental Restoration Division

cc: J. Davis, AMEM
P. Hill, WMD
H. DeGraca, EPD
H. Joma, AMEM
M. Lopez, ERD

Post-it® Fax Note 7671	Date 29 Apr 97	# of pages ▶ One
To Gaylord, Rutherford, Barnes	From Brian	
Co./Dept.	Co.	
Phone #	Phone #	
Fax #	Fax #	

Department of Toxic Substances Control

Edwin F. Lowry, Director
1011 N. Grandview Avenue
Glendale, California 91201

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Gray Davis
Governor

CERTIFIED MAIL

September 19, 2000

Mr. Roger Marshall
Site Restoration Manager
Boeing Company (BC)
6633 Canoga Avenue
P.O. Box 7922
Canoga Park, California 91309-7922

Dear Mr. Marshall:

On July 19, 2000, the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC), conducted an inspection of Boeing Company (BC) located at Top of Woolsey Canyon Road, Semi Hills, California 93063. The enclosed report describes the findings of this inspection.

There were no violations observed during the inspection. DTSC will not require you to submit a written response to this inspection report. DTSC will take no further action in regards to the findings found during this inspection.

All pertinent information derived from the inspection are included as attachments to the report. This report will become a public document; you may request that any trade secret or facility security information be withheld from public disclosure.
(See Health and Safety Code Section 25173 enclosed).

If you have any questions regarding this letter, or if you wish to meet with DTSC to discuss any questions or concerns you have with the inspection or the report, please call Ahmed Hegab, Hazardous Substances Scientist at (818) 551-2902.

Sincerely,

Roberto Kou, Unit Chief
Statewide Compliance Division
Glendale Office

004265 ec

09-20-00A09-5 OEFLE

cert. 7099322000080830 1992

BNA08665414

COMPLIANCE EVALUATION INSPECTION REPORT

I. GENERAL INFORMATION:

Company Name:	Boeing Company (BC)
Facility Location:	Top of Woolsey Canyon Road Semi Hills, California 93063
Facility Mailing Address:	6633 Canoga Avenue, California P.O. Box 7922 Canoga Park, California 91309-7922
Telephone Number:	(818) 586-5329
Fax Number:	(818) 586-5194
EPA ID Number:	CAD 000 629 972
Facility Type:	Permitted treatment and storage facility. Permit expires on 11/30/2003.
Waste Streams:	Facility is inactive and has not operated since April 1997. Currently no waste streams is stored or treated at area IV. Waste streams include Alkali reactive metals (D001) and hydroxide solution (D002).
Regulatory Status:	Permitted, undergoing closure
Regulated Units:	Area IV regulated units include the Treatment Chamber in building T133 for the treatment of the on-site generated Alkali metal wastes (sodium or sodium potassium); Tanks T1 and T3 in building T029 for storage of sodium and potassium hydroxides) ; Tank T2 in Building T133 for the storage of sodium-potassium (Na K) and On-site generated hazardous waste Containers Storage Area in Building T029.

All of the above units are currently inactive.

Inspected by: Ahmed E. Hegab, Ph.D, Hazardous Substances Scientists (HSS)

Date of Inspection: July 19, 2000

Type of Inspection: Compliance Evaluation Inspection.

Facility Rep.: Roger Marshall, DOE Site Restoration, Manager
James Sherman, Environmental Affairs Officer
Gilbert L. Fuents, Environmental Engineer in charge

Type of Business: Boeing is an aerospace company. Santa Susana Field Laboratory (SSFL) principal business activities include rocket engine testing as well as research and development for aerospace, energy technology and laser technology.

II. CONSENT:

Consent to conduct inspection that involves: taking photographs, reviewing and copying records, questioning personnel and inspecting hazardous waste handling areas. Yes/No **Yes**.

Consent given by (name and title): Gilbert Fuents, Environmental Engineer in charge.

III. NARRATIVE OF OBSERVATIONS/DISCUSSION WITH OPERATOR:

On July 19, 2000, at approximately 1030 hours, I arrived at BC located at Top of Woolsey Canyon Road, Semi Hills, California 93063, Ventura County. I met with Gilbert L. Fuents and stated the purpose of my visit to conduct a routine compliance evaluation inspection. I asked him consent to conduct the walk-through inspection, to review records and plans and if necessary obtain photo-copies of records or other applicable documents related to hazardous waste activities, take photographs and samples. Gilbert L.Fuents granted his consent to me. Then I asked him to explain the BC's operation, hazardous waste activities, major waste streams and how BC manages the hazardous waste streams. Mr.Fuents Said that Area IV is inactive and all the hazardous waste activities were terminated since April 1997. It was formerly called Energy System Group Operation. In this area, operation was including the research and

development of the nuclear reactor subsystem and designs; thermal hydraulic structural testing of component for Department of Energy program; and development of co-generation power plant. Then he said "currently, the regulated units in Buildings T133 and T029 do not have any hazardous waste activity or even waste but only maintenance and weed abatement".

At about 1050 hours Mr. Fuentes and I arrived at Building T133. Mr. Fuentes stated that the unit in Building T133, was shut down and cleaned of any hazardous waste in 1997. Then he said that the only activity is the weekly inspection for maintenance, house keeping and weed abatement. I did not also observe any hazardous waste activity and the building was empty from any hazardous waste. Mr. Fuentes also escorted me to building T029 which was empty and I observed no violation in Building T133 or T029. During my walk-through of the facility we visited other generation areas. I inspected the 90-day hazardous waste storage (Department 543) and Building 352. I did not observe any violation in these areas.

At approximately 1242 hours, I completed the walk-through inspection and asked Mr. Fuentes to make available for review all plans and records pertaining to permitted Area IV and gave him a list of records I wanted to review.
Mr. Fuentes then said that most of the records in Building 133 and the remaining document in the main office.
Then, I reviewed the following documents:

IV. Record Review:

a. **Manifests, Bills of Lading, LDR's, Exception Reports:**
Manifests were reviewed for years of 1996,1997 and 1998. BC's Uniform Hazardous Waste Manifest Tracking logs were also reviewed.
No violations were observed.

b. **Training Plan and Records:**
The hazardous material/waste training plan and records were reviewed.
No violations were observed.

c. **Waste Analysis Plan and Records):**
Waste Analysis Plan and records are exempt based DTSC's letter dated 9-16-1999 (Attachment A)

d. **Contingency Plan:**
The contingency plan was reviewed. No violations were observed.

e. **Operation Log:**
Operation logs for the period of February 1997- present were reviewed. No violations were observed.

f. **Financial Responsibility:**
BC is exempt from the financial responsibility audit because it is a federal facility as the Department of Energy owns this facility.

g. **Closure Plan**:
Closure plan was reviewed and no violation was noted.

h. **Annual/ Biennial Reports:**
These reports are exempt based DTSC's letter dated 9-16-1999 (Attachment A).

i. **Incident Report:**
None to report at this time, according to Gilbert Fuents.

j. **Inspection Records:**
The inspection logs for Tank 1 and Tank 2 were reviewed . No violations were observed.

k. **SB 14 Plans:**
Not Applicable.

l. **Part A:**
The revised Part A dated 12/2/1999, was reviewed and no violation was found.

m. **Part B:**
The Part B was reviewed and no violation was noted.

V. VIOLATIONS:

No violations.

VI. CONCLUSIONS:

At approximately 1440 hours, on July 19, 2000, I held an exit interview with Roger Marshall, James Sherman, and Gilbert L. Fuents. Then I told them that I did not observe any violations during my inspection and DTSC will send them a complete inspection report within 65 days. Then I gave Roger Marshall the Summary of Observations for his signature. I also asked him to make a copy of the complete signed document for his records (Attachment B).

VII. ATTACHMENTS:

A. DTSC letter to BC dated 9-16-1999- 10 pages.

B. Summary of Observation - 1 Page.

Ahmed E. Hegab

Ahmed E. Hegab
Hazardous Substances Scientists

9-19-2000
Date

ATTACHMENT

A

BNA08665420

Department of Toxic Substances Control

Edwin F. Lowry, Director
1011 N. Grandview Avenue
Glendale, California 91201

Winston H. Hickox
Secretary for
Environmental
Protection

Gray Davis
Governor

September 16, 1999

Ms. Majelle Lee
The Boeing Company
Rocketdyne Propulsion & Power
6633 Canoga Avenue MC T487
Post Office Box 7922
Canoga Park, California 91309-7922

Dear Ms. Lee:

REQUEST FOR SUSPENSION OF PERMIT REQUIREMENTS FOR HAZARDOUS WASTE MANAGEMENT FACILITY AT BOEING ROCKETDYNE SANTA SUSANA FIELD LABORATORY (SSFL) AREA IV

The Department of Toxic Substances Control (DTSC) reviewed your letter dated July 29, 1999 which asked DTSC to suspend certain permit requirements for the Hazardous Waste Management Facility (HWMF). A list of these requirements were enclosed with the letter.

DTSC issued a Hazardous Waste Facility Treatment and Storage Permit (93-3-TS-0021, CAD000629972) to Rockwell and to Energy Technology Engineering Center (ETEC, a part of the US Department of Energy) in November 1993. The HWMF is currently undergoing closure. Boeing notified DTSC that the HWMF was beginning closure with a letter dated July 21, 1998. DTSC reviewed an updated closure plan and issued a Notice of Deficiency on June 29, 1999. The Closure Plan is currently being revised. Meanwhile, the permitted facility remains inactive which includes two units -- Building 133 (treatment) and Building T029 (storage). A recent site visit by DTSC staff on August 17, 1999 confirms the apparent inactivity of these units. Boeing requested suspension of certain requirements applicable to the operation of an active facility but no longer applicable to an inactive and closing facility. Because the closure plan is currently being revised and has not been approved, permit requirements applicable to an active facility may still be enforced. Any concurrence to suspend these permit requirements is conditional upon the units remaining inactive and not treating or storing any waste material. Any concurrence to suspend these permit requirements can only be used up to the finalization of the Closure Plan, at which time the requirements of the approved Closure Plan takes precedence.

005841 RC

09 17-99A10:18 RCVD

BNA08665421

Rocketdyne Propulsion & Power
6633 Canoga Avenue
P.O. Box 7922
Canoga Park, CA 91309-7922

7 October 1999
In reply refer to 99RC-2722

BOEING

Mr. Jose Kou
California Environmental Protection Agency
Department of Toxic Substances Control
Facilities Permitting Branch
Region 3
1011 North Grandview Avenue
Glendale, CA 91201

Subject: Administrative changes to 133-AN-0001, "Operation Plan – Hazardous Waste Management Facility, Santa Susana Field Laboratory, Ventura County, California", Energy Technology Engineering Center, Rocketdyne Division, Rockwell International, December 17, 1992.

Dear Mr. Kou:

In a recent letter you asked that Boeing NA, Rocketdyne Propulsion and Power submit administrative changes to the Hazardous Waste Management Facility Operation Plan to the Department of Toxic Substances Control as they occur throughout the closure process. In the interest of completeness, we are submitting the following information which reflect the administrative changes to the Operation Plan:

Page	Section	Heading	New Information
5	I.A.2.	Facility Name	Hazardous Waste Management Facility
5	I.A.4.	Mailing Address	P.O. Box 7922 Canoga Park, Ca 91309
5	I.A.6.	Contact Telephone	(818) 586-5283
6	I.A.7	SIC Code	99980-Miscellaneous
6	I.B.1	Operator Name	The Boeing Company

BNA08665422

Page	Section	Heading	New Information
7	I.B.2	Mailing Address	P.O. Pox 7922 Canoga Park, CA 91309
7	I.B.3	Operator Telephone	(818) 586-5283
7	I.C.1	Owner Name	U.S. Department of Energy Oakland Operations Office
7	I.C.2	Mailing Address	1301 Clay Street Oakland, CA 94612
7	I.C.3	Owner Telephone	(510) 637-1794
7	I.D.1	Contact Person	Majelle Lee
8	I.D.2	Title	Program Manager
8	I.D.3	Telephone	(818) 586-5283
8	I.D.4	Address	P.O. Box 7922 Canoga Park, CA 91309

BOEING

If you have any questions regarding the updates to the Hazardous Waste Management Facility Operation Plan, please contact Brian Sujata at (818) 586-6043.

Majelle Lee

Majelle E. Lee
Program Manager
ETEC Closure Program

Shea- 086634

Fuentes, Gilbert L

From: Sujata, Brian D
Sent: Thursday, November 04, 1999 4:17 PM
To: Amar, Ravnesh; Fuentes, Gilbert L; Marshall, Roger A; Moore, Roger M
Cc: Venable, Thomas C; Shestag, Steven L
Subject: HWMF Inspections During Closure

The Department of Toxic Substances Control recently concurred, with some conditions, Rocketdyne's request to suspend the Operation Plan requirements for the duration of the HWMF Closure. Two of the conditions are to maintain certain facility security standards and to keep the facility in a safe condition.

The HWMF inspection must now be conducted on a weekly basis; daily inspections are no longer required. In addition, a new inspection form has been developed to reflect the facility requirements while closure is taking place.

HWMF Inspection.DOC

I suggest that I meet with the HWMF facility personnel when the weekly inspections are started so that I may offer interpretive guidance in the use of the new form.

Brian

DTSC concurs with most of the proposed suspensions of permit requirement suspensions, as outlined in the July 29, 1999 enclosure. Specifically:

1) **Modify Operations Plan to update names and administrative changes:**
DTSC agrees to suspend the requirement of modifying the Operation Plan whenever names and administration changes occur. HOWEVER, Boeing-Rocketdyne must continue to submit this information to DTSC, when appropriate, while the closure plan is being revised. Submission of the information in a letter would be appropriate.

2) **Annual review and update of Waste Analysis Plan:**
DTSC agrees to suspend the requirement of reviewing and modifying the Waste Analysis Plan on an annual basis. The Waste Analysis Plan dealt with the waste generated during normal operation of the facility. When appropriate, Boeing is still required to properly test and manage any contaminated equipment or precipitation that has come in contact with contaminated equipment.

3) **Annual painting of scrubber tank and ancillary equipment:**
DTSC agrees to suspend the requirements of annually painting the scrubber tank and ancillary equipment.

4) **All other forms of scheduled maintenance:**
DTSC agrees to suspend the requirements of scheduled maintenance for the storage and treatment units. DTSC also agrees to suspend the recording requirements for the scheduled maintenance of the storage and treatment units. However, for safety and security reasons, Boeing is still required to perform certain maintenance tasks including, but not limited to, the maintenance of security fencing, maintenance of the structural integrity of the buildings and maintenance of all equipment and structures to prevent safety hazards. If appropriate, pest control must be maintained at these units to ensure worker safety.

5) **Daily/Weekly inspections to ensure containers, tanks and safety systems are in proper working order:**
DTSC agrees to suspend the requirements of daily and weekly inspections of containers, tanks and safety systems to ensure proper working orders. DTSC also agrees to suspend the recording requirements for these inspections. However, for safety and security reasons, Boeing is still required to provide, at a minimum, weekly inspections of the units to ensure the sites remain secure and are safe for workers to enter the sites.

TANK T-2 is a double-walled tank which was used to store NaK prior to transferring the material into the treatment unit's burn pan. Although material from the tank has been removed, residual NaK may remain. Boeing informs DTSC that a direct inspection of the interior of Tank T-2 has not been performed and is waiting for the finalization of the Closure Plan. Until direct inspection of the interior of Tank T-2 is performed, Boeing must assume NaK residuals remain in the tank. Until directed otherwise, or until the finalization of the Closure Plan, Boeing must inspect and maintain Tank T-2 as if residual NaK remains in the tank. Boeing would not be required to inspect or maintain Tank T-2 at a level appropriate for an active facility.

6) **Biennial inspections of tanks and scrubber towers to measure wall thicknesses:** DTSC agrees to suspend the requirements for biennial inspections of tanks and scrubber towers to measure wall thickness.

7) **Biennial inspections of the HWMF burn pan to determine damage and corrosion:** DTSC agrees to suspend the requirements for biennial inspections of the HWMF burn pan to determine damage and corrosion.

With the above clarifications, DTSC concurs with Boeing's request to suspend Permit Requirements for the Hazardous Waste Management Facility, Permit No. 93-3-TS-0021 as specified in the enclosure to your July 29, 1999 letter (a copy has been enclosed). If you wish to discuss this matter further, you may contact Stephen Baxter, P.E., at (818) 551-2940.

Sincerely,

José Kou, P.E., Chief
Southern California Permitting Branch

Enclosure

cc: See next page

cc: Mr. Steve Lafflam (w/enclosure)
The Boeing Company
Rocketdyne Propulsion & Power
6633 Canoga Avenue MC T4-87
P.O. Box 7922
Canoga Park, California 91309-7922

Ms. Karen Baker, CEG, CHG, Chief (w/enclosure) R4-2-55
Geology & Corrective Action Branch
Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, California 90630

Ms. Florence Gharibian, Chief (w/enclosure) R3-6
Southern California Statewide Compliance Branch
1011 North Grandview Avenue
Glendale, California 91201

Mr. Gerard Abrams (w/enclosure) R1-2
Hazardous Substances Engineering Geologist
Land Disposal Branch
Department of Toxic Substances Control
10151 Croydon Way, Suite 3
Sacramento, California 95827

Ms. Ann Spivey (w/enclosure) HQ-2
Fees Unit
Department of Toxic Substances Control
Post Office Box 806
Sacramento, California 95812-0806

bcc: Roberto Kou (w/enclosure) R3-6
Unit Chief
Statewide Compliance Division
Southern California Region

Stephen Baxter (w/enclosure) R3-4
Senior Hazardous Substances Engineer
Southern California Permitting Branch

Stephen Cain (w/enclosure) R3-2
Public Participation Specialist
Public Participation Unit

ATTACHMENT

B

BNA08665429

SUMMARY OF OBSERVATIONS

On July 19, 2000, the Department of Toxic Substances Control (DTSC), California Environmental Protection Agency, conducted an inspection at:

Facility Name: Boeing Company

Facility Address: Top of Woolsey Canyon Rd: Semi Hills Ca. 93063

Mailing Address: P. O. Box 7922 Canoga Park Ca. 91309-7922

EPA ID Number: CAD 000 629 972

County Name: Ventura County

As a result of that inspection, no violations of hazardous waste laws, regulations, and requirements were discovered. DTSC will provide you a complete inspection report within 65 days of the date of this inspection.

DTSC greatly appreciates the efforts that you have made to comply with the hazardous waste laws and regulations.

Company Representative Accepting Summary	Department Representative
Signature Roger A. Marshall	Signature Ahmed E. Hegab
Title Manager, DOE Site Restoration	Title Haz. Sub. Scientist
Date 7-19-00	Date 7-19-2000
Name: Roger A. Marshall	Name Ahmed E. Hegab, Ph.D.

Linda S. Adams
Secretary for
Environmental Protection

Department of Toxic Substances Control

Maureen F. Gorsen, Director
1011 North Grandview Avenue
Glendale, California 91201

Arnold Schwarzenegger
Governor

M E M O R A N D U M

TO: DTSC File for:
Hazardous Waste Management Facility, Bldg 29 / 133
Santa Susana Field Laboratory, Area IV, Ventura County
EPA ID CAD000629972

FROM: Stephen Baxter, P.E.
Senior Hazardous Substances Engineer
Southern California Permitting and Corrective Action Branch

DATE: December 22, 2006

SUBJECT: DETERMINATION OF APPEAL FOR THE APPROVAL OF THE CLOSURE PLAN FOR THE HAZARDOUS WASTE MANAGEMENT FACILITY, AREA IV, SANTA SUSANA FIELD LABORATORY, EPA ID AD000629972

The Department of Toxic Substances Control (DTSC) has resolved the issues concerning the appeal of DTSC's approval of the Closure Plan for the Hazardous Waste Management Facility (Bldg 29 and 133) located in Area IV of the Santa Susana Field Laboratory, Ventura County. DTSC denied the Petition for Review (Appeal request) on December 22, 2006 which allows the Closure Plan to be enacted as approved.

The Hazardous Waste Management Facility (HWMF) stored and treated alkali metals in Building 29 (storage) and Building 133 (treatment). The facility was owned by the U.S. Department of Energy (USDOE) and operated by USDOE and The Boeing Company (Boeing). Activity ceased in 1997 and DTSC received a closure notification letter dated July 21, 1998. Several draft revisions of the closure plan were subsequently reviewed.

Boeing submitted a Class 2 Permit Modification Request to DTSC dated January 23, 2004, which proposed final updates and modifications to the Closure Plan for the Hazardous Waste Management Facility (HWMF). A 60-day public comment period for the modified Closure Plan was held from January 30 to March 15, 2004. Upon public request, this comment period was extended to April 30, 2004. Meanwhile, Boeing held a public meeting on March 15, 2004 to present and discuss the modified Closure Plan.

After the comment period for the modified Closure Plan, DTSC develop an Initial Study and Negative Declaration (with mitigation measures) under the California Environmental Quality Act (CEQA). A public comment period for the draft Mitigated Negative Declaration was held from December 2, 2005 to January 17, 2006. (SCH # 2005121012)

DTSC developed a Response to Public Comments Document to address comments received during both comment periods. The Response to Public Comments Document (dated February 16, 2006) was finalized and reviewed prior to DTSC's decision for the Closure Plan.

DTSC approved the CEQA Mitigated Negative Declaration and then approved the Class 2 Permit Modification Closure Plan on February 16, 2006 (approval pursuant to CCR, title 22, section 66270.42) An approval letter of the same date was sent to the facility and a public notice was issued to the facility mailing list. Both the letter and the notice established a 30-day appeal period (pursuant to CCR, title 22, section 66271.18) for February 20 to March 21, 2006.

DTSC received two letters during the Appeal Period: one from Mr. Dave Einhorn, West Hills resident, dated March 17, 2006; and the other from Mr. Butch Britt, Ventura County Public Works Agency, dated March 2, 2006.

The Ventura County letter discussed transportation issues in the CEQA Mitigated Negative Declaration and the attached Transportation Plan. DTSC's appeal process (section 66271.18) is not applicable to CEQA issues; therefore, the letter did not present an "appeal" or "petition for review". The letter asked that the record be made aware of road conditions for Black Canyon Road and Box Canyon Road (letter attached). The letter was submitted to the administrative record and forwarded to Boeing and USDOE.

As previously mentioned, on December 22, 2006 DTSC issued an Order Denying the Petition for Review associated with Mr. Einhorn's letter. DTSC denied Mr. Einhorn's petition for review for reasons stated in the Appeal of Permit Decision. The decision was mailed to Mr. Einhorn on December 22, 2006 (letter and decision attached).

The Order represents DTSC's final permit decision for the HWMF Closure Plan, pursuant to section 66271.18(d). Resolution of these issues did not alter the Closure Plan. As of December 22, 2006, Boeing and USDOE may proceed to close the HWMF according to the approved Closure Plan.

APPENDIX A

ATTACHMENT A-2

SUBSURFACE INFORMATION
(Electronic Copy)

SOIL BORING LOGS

MWH

Boring ID: **SFBS0001**

Borehole Diam. (in.): **3**	Total Depth (ft): **1.2**	Project: **Group 7 SSFL RFI Data Gap Sampling**	
Northing (ft): **267490.88**	Easting (ft): **1787019.22**	Job Number: **1891451**	Site: **Building 4029**
Drill Start Date: **05-05-2008**	Start Time: **12:41**	Logged By: **A. Goldenberg**	Reviewed By: **B. Martasin, P.G.**
Drill Finish Date: **05-05-2008**	Finish Time: **12:55**	Drilling Contractor: **Envirosolve**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Hand Auger**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Serg**	
Comments: **Concrete at surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Slide hammer with drive sampler**		Soil Backfill Date: **05-05-2008**	Backfill Time: **12:56**

Sample Interval / Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
					0			Concrete 6 inches thick					
S			0.0				SM	Silty Sand, brown (10YR 4/3), medium dense, dry to moist, few subrounded gravel, porous [Alluvium]	10	5	30	20	35
S					1			Silty Sandstone, light yellowish brown (10YR 6/4), moderately hard, moist [Weathered Chatsworth Formation]					
								Total Depth = 1.2 ft; refusal on Chatsworth Formation Sandstone.					
								Collected soil samples S01 and S01SP.					
								Backfilled with native soil.					
					2								
					3								
					4								
					5								
					6								
					7								
					8								
					9								
					10								

LOG OF BORING GROUP7_2008.GPJ MWH WC.GDT 10/3/08

MWH

Boring ID: **SFBS0002**

Borehole Diam. (in.): **2**	Total Depth (ft): **0.8**	Project: **Group 7 SSFL RFI Data Gap Sampling**	
Northing (ft): **267494.50**	Easting (ft): **1787010.77**	Job Number: **1891451**	Site: **Building 4029**
Drill Start Date: **05-05-2008**	Start Time: **09:00**	Logged By: **A. Goldenberg**	Reviewed By: **B. Martasin, P.G.**
Drill Finish Date: **05-05-2008**	Finish Time: **09:20**	Drilling Contractor: **Strongarm**	Field Instrumentation: **N/A**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Geoprobe/Direct Push**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Danny**	
Comments: **Concrete at surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Geoprobe macrocore with acetate sleeve**		Soil Backfill Date: **05-05-2008**	Backfill Time: **09:20**

Sample Interval Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
					0			Concrete 5 inches thick over 5 inches of gravel					
					1			Total Depth = 0.8 ft (10 in.); refusal on Chatsworth Formation Sandstone. Three step-outs, each to depth of 0.8 ft, yielded no sample recovery. Backfilled with onsite material.					
					2								
					3								
					4								
					5								
					6								
					7								
					8								
					9								
					10								

LOG OF BORING GROUP7_2008.GPJ MWH WC.GDT 10/3/08

MWH

Boring ID: **SFBS0003**

Borehole Diam. (in.): **3**	Total Depth (ft): **0.5**	Project: **Group 7 SSFL RFI Data Gap Sampling**	
Northing (ft): **267471.62**	Easting (ft): **1787009.75**	Job Number: **1891451**	Site: **Building 4029**
Drill Start Date: **05-05-2008**	Start Time: **13:05**	Logged By: **A. Goldenberg**	Reviewed By: **B. Martasin, P.G.**
Drill Finish Date: **05-05-2008**	Finish Time: **13:35**	Drilling Contractor: **Envirosolve**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Hand Auger**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Serg**	
Comments: **Grass, soil, and gravel at surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Grab from auger**		Soil Backfill Date: **05-05-2008**	Backfill Time: **13:40**

Sample Interval	Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
	S			0.0		0		SM	Silty Sand with Gravel, dark brown (10YR 3/3), medium dense, dry, subrounded gravel [Fill]	15	10	30	15	30
									Total Depth = 0.5 ft; refusal on concrete at first boring and at three step-outs.					
						1			Collected soil sample S01.					
									Backfilled with native soil.					
						2								
						3								
						4								
						5								
						6								
						7								
						8								
						9								
						10								

LOG OF BORING GROUP7_2008.GPJ MWH WC.GDT 10/3/08

MWH

Boring ID: **SFBS0004**

Borehole Diam. (in.): **3**	Total Depth (ft): **1.5**	Project: **Group 7 SSFL RFI Data Gap Sampling**	
Northing (ft): **267459.25**	Easting (ft): **1787033.07**	Job Number: **1891451**	Site: **Building 4029**
Drill Start Date: **05-05-2008**	Start Time: **12:00**	Logged By: **A. Goldenberg**	Reviewed By: **B. Martasin, P.G.**
Drill Finish Date: **05-05-2008**	Finish Time: **12:25**	Drilling Contractor: **Envirosolve**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Hand Auger**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Serg**	
Comments: **Grass and weeds at surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Slide hammer with drive sampler**		Soil Backfill Date: **05-05-2008**	Backfill Time: **12:25**

Sample Interval / Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
S			0.0		0		SM	Silty Sand, dark yellowish brown (10YR 3/4), medium dense, dry to moist, porous, bioturbation (gopher) [Alluvium]	10	10	30	20	30
S					2			Total Depth = 1.5 ft; refusal on Chatsworth Formation Sandstone. Collected soil sample S01. Backfilled with native soil.					
					4								
					6								
					8								
					10								
					12								
					14								
					16								
					18								
					20								

LOG OF BORING GROUP7_2008.GPJ MWH WC.GDT 10/3/08

MWH

Boring ID: **SFBS0005**

Borehole Diam. (in.): **2**	Total Depth (ft): **10.5**	Project: **Group 7 SSFL RFI Data Gap Sampling**	
Northing (ft): **267485.44**	Easting (ft): **1787010.77**	Job Number: **1891451**	Site: **Building 4029**
Drill Start Date: **05-05-2008**	Start Time: **09:30**	Logged By: **A. Goldenberg**	Reviewed By: **B. Martasin, P.G.**
Drill Finish Date: **05-05-2008**	Finish Time: **10:08**	Drilling Contractor: **Strongarm**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Geoprobe/Direct Push**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Danny**	
Comments: **Concrete at surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Geoprobe macrocore with acetate sleeve**		Soil Backfill Date: **05-05-2008**	Backfill Time: **10:08**

Sample Interval	Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
						0			Concrete 5 inches thick					
								GP	Poorly Graded Gravel, pea gravel 1/2 to 3/4 in. diameter [Fill]	100				
		0				2			[No recovery to 8 ft; intense caving]					
		0				4								
						6								
						8		GP	Poorly Graded Gravel with Sand, brown (10YR 4/3), dense, dry, subangular to subrounded gravel [Fill]	50	30	20		
S				0.0		10			Silty Sandstone, yellowish brown (10YR 5/4), moderately hard, moist [Weathered Chatsworth Formation]					
S									Total Depth = 10.5 ft; refusal on Chatsworth Formation Sandstone.					
									Collected soil sample S01.					
						12			Hole caved in, not backfilled.					
						14								
						16								
						18								
						20								

LOG OF BORING GROUP7_2008.GPJ MWH WC.GDT 10/3/08

MWH

Boring ID: **SFBS0006**

Borehole Diam. (in.): **2**	Total Depth (ft): **1.5**	Project: **Group 7 SSFL RFI Data Gap Sampling**	
Northing (ft): **267496.31**	Easting (ft): **1786995.67**	Job Number: **1891451**	Site: **Building 4029**
Drill Start Date: **05-05-2008**	Start Time: **10:35**	Logged By: **A. Goldenberg**	Reviewed By: **B. Martasin, P.G.**
Drill Finish Date: **05-05-2008**	Finish Time: **10:50**	Drilling Contractor: **Strongarm**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Geoprobe/Direct Push**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Danny**	
Comments: **Concrete at surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Geoprobe macrocore with acetate sleeve**		Soil Backfill Date: **05-05-2008**	Backfill Time: **10:55**

Sample Interval	Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
						0			Concrete 6 inches thick					
S	S			0.0					Sandy Siltstone, brown (10YR 4/3) to pale brown (10YR 6/3), hard, moist, thinly bedded [Chatsworth Formation]					
						2			Total Depth = 1.5 ft; refusal on Chatsworth Formation Sandstone/Siltstone. Collected sample S01. Backfilled with bentonite.					
						4								
						6								
						8								
						10								
						12								
						14								
						16								
						18								
						20								

LOG OF BORING GROUP7_2008.GPJ MWH WC.GDT 10/3/08

MWH

Boring ID: **SFBS0007**

Borehole Diam. (in.): **2**	Total Depth (ft): **1.8**	Project: **Group 7 SSFL RFI Data Gap Sampling**	
Northing (ft): **267482.42**	Easting (ft): **1786982.98**	Job Number: **1891451**	Site: **Building 4029**
Drill Start Date: **05-05-2008**	Start Time: **11:01**	Logged By: **A. Goldenberg**	Reviewed By: **B. Martasin, P.G.**
Drill Finish Date: **05-05-2008**	Finish Time: **11:25**	Drilling Contractor: **Strongarm**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Geoprobe/Direct Push**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Danny**	
Comments: **Concrete at surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Geoprobe macrocore with acetate sleeve**		Soil Backfill Date: **05-05-2008**	Backfill Time: **11:30**

Sample Interval	Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
						0			Concrete 6 inches thick					
S	S			0.0					Sandy Siltstone, brown (10YR 4/3) to pale brown (10YR 6/3), hard, moist, thinly bedded [Weathered Chatsworth Formation]					
						2			Total Depth = 1.8 ft; refusal on Chatsworth Formation Sandstone/Siltstone. Collected sample S01. Backfilled with native soil and bentonite.					
						4								
						6								
						8								
						10								
						12								
						14								
						16								
						18								
						20								

LOG OF BORING GROUP7_2008.GPJ MWH WC.GDT 10/3/08

MWH

Boring ID: **SFBS0008**

Borehole Diam. (in.): **2**	Total Depth (ft): **3.5**	Project: **Group 7 SSFL RFI Data Gap Sampling**	
Northing (ft): **267494.50**	Easting (ft): **1786979.96**	Job Number: **1891451**	Site: **Building 4029**
Drill Start Date: **04-29-2008**	Start Time: **08:10**	Logged By: **A. Goldenberg**	Reviewed By: **B. Martasin, P.G.**
Drill Finish Date: **04-29-2008**	Finish Time: **08:35**	Drilling Contractor: **Strongarm**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Geoprobe/Direct Push**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Ken Lauerman**	
Comments: **Concrete at surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Geoprobe macrocore with acetate sleeve**		Soil Backfill Date: **04-29-2008**	Backfill Time: **08:39**

Sample Interval / Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
					0			Concrete 7.5 inches thick					
S			0.0				SM	Silty Sand, brown (10YR 4/3), medium dense to dense, dry to moist [Fill]		15	35	25	25
S					2			Silty Sandstone, yellowish brown (10YR 5/6), dense, moist [Weathered Chatsworth Formation]		20	30	25	25
S			0.0					Sandstone, light brownish gray (10YR 6/2), hard, moist [Chatsworth Formation]					
					4			Total Depth = 3.5 ft; refusal on Chatsworth Formation Sandstone.					
								Collected soil samples S01 and S02.					
								Backfilled with native soil and bentonite.					
					6								
					8								
					10								
					12								
					14								
					16								
					18								
					20								

LOG OF BORING GROUP7_2008.GPJ MWH WC.GDT 10/3/08

MWH

Boring ID: **SFBS0009**

Borehole Diam. (in.): **2**	Total Depth (ft): **5.5**	Project: **Group 7 SSFL RFI Data Gap Sampling**	
Northing (ft): **267493.23**	Easting (ft): **1786971.93**	Job Number: **1891451**	Site: **Building 4029**
Drill Start Date: **04-29-2008**	Start Time: **08:43**	Logged By: **A. Goldenberg**	Reviewed By: **B. Martasin, P.G.**
Drill Finish Date: **04-29-2008**	Finish Time: **09:00**	Drilling Contractor: **Strongarm**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Geoprobe/Direct Push**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Ken Lauerman**	
Comments: **Concrete at surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Geoprobe macrocore with acetate sleeve**		Soil Backfill Date: **04-29-2008**	Backfill Time: **09:00**

Sample Interval / Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
					0			Concrete 7.5 to 8 inches thick					
S			0.0				SM	Silty Sand, brown (10YR 4/3), dense, moist, slightly porous [Fill]		20	30	25	25
S													
					2			Sandstone, light yellowish brown (10YR 6/4), hard, moist [Weathered Chatsworth Formation]					
S			0.0		4								
S													
					6			Total Depth = 5.5 ft; refusal on Chatsworth Formation Sandstone. Collected soil samples S01 and S02. Backfilled with native soil and bentonite.					
					8								
					10								
					12								
					14								
					16								
					18								
					20								

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MWH

Boring ID: **SFBS0010**

Borehole Diam. (in.): **2**	Total Depth (ft): **2.5**	Project: **Group 7 SSFL RFI Data Gap Sampling**	
Northing (ft): **267495.38**	Easting (ft): **1786921.08**	Job Number: **1891451**	Site: **Building 4029**
Drill Start Date: **04-29-2008**	Start Time: **09:05**	Logged By: **A. Goldenberg**	Reviewed By: **B. Martasin, P.G.**
Drill Finish Date: **04-29-2008**	Finish Time: **09:25**	Drilling Contractor: **Strongarm**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Geoprobe/Direct Push**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Ken Lauerman**	
Comments: **Asphalt at surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Geoprobe macrocore with acetate sleeve**		Soil Backfill Date: **04-29-2008**	Backfill Time: **09:30**

Sample Interval / Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
					0			Asphalt 4 inches thick over 3 inches base					
S			0.0				SM	Silty Sand, brown (10YR 4/3), dense, dry [Fill]		25	30	30	15
S					2			Sandstone, light yellowish brown (10YR 6/4), hard, dry to moist [Weathered Chatsworth Formation]					
								Total Depth = 2.5 ft; refusal on Chatsworth Formation Sandstone.					
								Collected soil sample S01. One step-out required to collect sample volume.					
					4			Backfilled with native soil and bentonite.					
					6								
					8								
					10								
					12								
					14								
					16								
					18								
					20								

LOG OF BORING GROUP7_2008.GPJ MWH WC.GDT 10/3/08

MWH

Boring ID: **SFBS0011**

Borehole Diam. (in.): **2**	Total Depth (ft): **4.5**	Project: **Group 7 SSFL RFI Data Gap Sampling**	
Northing (ft): **267490.16**	Easting (ft): **1786896.98**	Job Number: **1891451**	Site: **Building 4029**
Drill Start Date: **04-29-2008**	Start Time: **09:35**	Logged By: **A. Goldenberg**	Reviewed By: **B. Martasin, P.G.**
Drill Finish Date: **04-29-2008**	Finish Time: **13:40**	Drilling Contractor: **Strongarm**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Geoprobe/Direct Push**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Ken Lauerman**	
Comments: **Asphalt at surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Geoprobe macrocore with acetate sleeve**		Soil Backfill Date: **04-29-2008**	Backfill Time: **13:40**

Sample Interval / Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
					0			Asphalt 3 inches thick over 2 inches base					
S			0.0				SM	Silty Sand, brown (10YR 4/3), medium dense, dry to moist [Fill]		20	40	20	20
S					2			Sandstone, light yellowish brown (10YR 6/4), hard, moist, massive, fractured, cemented [Weathered Chatsworth Formation]					
S													
S			0.0		4			Total Depth = 4.5 ft; refusal on Chatsworth Formation Sandstone. Collected soil samples S01 and S02. One step-out 3 ft to south required to collect sample volume. Backfilled with native soil and bentonite.					
					6								
					8								
					10								
					12								
					14								
					16								
					18								
					20								

LOG OF BORING GROUP7_2008.GPJ MWH WC.GDT 10/3/08

MWH

Boring ID: SFBS0011A

Borehole Diam. (in.): **3**	Total Depth (ft): **4.0**	Project: **SSFL Group 7 RFI Sampling - May 2009**	
Northing (ft): **267490.16**	Easting (ft): **1786896.99**	Job Number: **1006217.730706**	Site: **Building 4029**
Drill Start Date: **05-08-2009**	Start Time: **14:50**	Logged By: **M. Milman-Barris**	Reviewed By: **S. Valenzuela, P.G.**
Drill Finish Date: **05-08-2009**	Finish Time: **15:00**	Drilling Contractor: **B.L. Hall**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Hand Auger**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Ben Cisneros**	
Comments: **Boring about 18 in. south of original SFBS0011, in asphalt road**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Slide hammer with 6-inch stainless steel sleeve**		Soil Backfill Date: **05-08-2009**	Backfill Time: **15:05**

Sample Interval / Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
					0			Asphalt 3 inches thick					
							ML/CL	Clayey Silt, dark yellowish brown (10YR 4/4), stiff, moist, low plasticity, no debris [Fill]				10	90
S S			0.4		4			Total Depth = 4.0 ft; terminated prior to bedrock, no refusal. Collected soil samples S002 and D002. Backfilled with auger cuttings, capped with asphalt.					

LOG OF BORING GROUP7_2008.GPJ BOEING.GDT 5/18/09

MWH

Boring ID: **SFBS0012**

Borehole Diam. (in.): **2**	Total Depth (ft): **10.5**	Project: **Group 7 SSFL RFI Data Gap Sampling**	
Northing (ft): **267469.87**	Easting (ft): **1786883.96**	Job Number: **1891451**	Site: **Building 4029**
Drill Start Date: **04-29-2008**	Start Time: **12:20**	Logged By: **A. Goldenberg**	Reviewed By: **B. Martasin, P.G.**
Drill Finish Date: **04-29-2008**	Finish Time: **12:55**	Drilling Contractor: **Strongarm**	Field Instrumentation: **N/A**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Geoprobe/Direct Push**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Ken Lauerman**	
Comments: **Asphalt at surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Geoprobe macrocore with acetate sleeve**		Soil Backfill Date: **04-29-2008**	Backfill Time: **13:00**

Sample Interval / Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
					0			Asphalt 3 inches thick over 1 to 2 inches base					
S							SC	Clayey Sand, brown (10YR 4/3), medium dense, moist [Fill]		20	30	15	35
S					2								
							SM	Silty Sand, dark brown (10YR 3/3), medium dense to dense, moist [Fill]		20	30	25	25
S					4								
S							SM	Silty Sand, brown (10YR 4/3) to yellowish brown (10YR 5/4), dense, moist [Alluvium]		15	35	30	20
					6								
								Sandstone, light yellowish brown (10YR 6/4), hard, moist [Weathered Chatsworth Formation]					
					8								
S													
S					10								
								Total Depth = 10.5 ft; refusal on Chatsworth Formation Sandstone.					
								Collected soil samples S01, S02, and S03.					
					12			Backfilled with native soil and bentonite.					
					14								
					16								
					18								
					20								

LOG OF BORING GROUP7_2008.GPJ MWH WC.GDT 10/3/08

MWH

Boring ID: **SFBS0013**

Borehole Diam. (in.): **2**	Total Depth (ft): **1.2**	Project: **Group 7 SSFL RFI Data Gap Sampling**	
Northing (ft): **267482.84**	Easting (ft): **1786877.40**	Job Number: **1891451**	Site: **Building 4029**
Drill Start Date: **04-29-2008**	Start Time: **10:05**	Logged By: **A. Goldenberg**	Reviewed By: **B. Martasin, P.G.**
Drill Finish Date: **04-29-2008**	Finish Time: **10:20**	Drilling Contractor: **Strongarm**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Geoprobe/Direct Push**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Ken Lauerman**	
Comments: **Asphalt at surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Geoprobe macrocore with acetate sleeve**		Soil Backfill Date: **04-29-2008**	Backfill Time: **13:15**

Sample Interval / Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
					0			Asphalt 3 inches thick over 2 inches base					
S01			0.0					Sandstone, light yellowish brown (10YR 6/4), hard, moist, massive, fractured [Weathered Chatsworth Formation]					
					2			Total Depth = 1.2 ft; refusal on Chatsworth Formation Sandstone. Collected soil sample S01. One step-out 3 ft to southeast required to collect sample volume. Backfilled with native soil and bentonite.					
					4								
					6								
					8								
					10								
					12								
					14								
					16								
					18								
					20								

LOG OF BORING GROUP7_2008.GPJ MWH WC.GDT 10/3/08

MWH

Boring ID: **SFBS0014**

Borehole Diam. (in.): **2**	Total Depth (ft): **4.5**	Project: **Group 7 SSFL RFI Data Gap Sampling**	
Northing (ft): **267480.23**	Easting (ft): **1786866.91**	Job Number: **1891451**	Site: **Building 4029**
Drill Start Date: **04-29-2008**	Start Time: **10:50**	Logged By: **A. Goldenberg**	Reviewed By: **B. Martasin, P.G.**
Drill Finish Date: **04-29-2008**	Finish Time: **11:30**	Drilling Contractor: **Strongarm**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Geoprobe/Direct Push**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Ken Lauerman**	
Comments: **Asphalt at surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Geoprobe macrocore with acetate sleeve**		Soil Backfill Date: **04-29-2008**	Backfill Time: **11:30**

Sample Interval / Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
					0			Asphalt 2.5 inches thick					
S			0.0				SM	Silty Sand, brown (10YR 4/3), medium dense, dry to moist, glass debris, luster (mica) [Fill]		25	30	20	25
S					2		SM	Silty Sand, brown (10YR 4/3), dense, moist, roots and rootlets, porous [Alluvium]		25	30	25	20
S								Sandstone, light yellowish brown (10YR 6/4), hard, moist [Weathered Chatsworth Formation]		30	30	20	20
S			0.0		4			Total Depth = 4.5 ft; refusal on Chatsworth Formation Sandstone.					
								Collected soil samples S01 and S02. One step-out required for sample volume.					
					6			Backfilled with native soil and bentonite.					
					8								
					10								
					12								
					14								
					16								
					18								
					20								

LOG OF BORING GROUP7_2008.GPJ MWH WC.GDT 10/3/08

MWH

Boring ID: **SFBS0015**

Borehole Diam. (in.): **2**	Total Depth (ft): **2.8**	Project: **Group 7 SSFL RFI Data Gap Sampling**	
Northing (ft): **267472.22**	Easting (ft): **1786857.57**	Job Number: **1891451**	Site: **Building 4029**
Drill Start Date: **04-29-2008**	Start Time: **10:20**	Logged By: **A. Goldenberg**	Reviewed By: **B. Martasin, P.G.**
Drill Finish Date: **04-29-2008**	Finish Time: **10:35**	Drilling Contractor: **Strongarm**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Geoprobe/Direct Push**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Ken Lauerman**	
Comments: **Asphalt at surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Geoprobe macrocore with acetate sleeve**		Soil Backfill Date: **04-29-2008**	Backfill Time: **10:40**

Sample Interval / Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
					0			Asphalt 2 inches thick over 2 inches base					
S S			0.0		2		SM	Silty Sand, brown (10YR 4/3), dense, dry to moist, slightly porous [Fill]		20	40	20	20
					4			Total Depth = 2.8 ft; refusal on Chatsworth Formation Sandstone. Collected soil sample S01. Backfilled with native soil and bentonite.					
					6								
					8								
					10								
					12								
					14								
					16								
					18								
					20								

LOG OF BORING GROUP7_2008.GPJ MWH WC.GDT 10/3/08

MWH

Boring ID: **SFBS0021**

Borehole Diam. (in.): **2**	Total Depth (ft): **2.5**	Project: **SSFL Group 7 RFI Sampling - November 2008**	
Northing (ft): **267477.45**	Easting (ft): **1786846.67**	Job Number: **1891589.021101**	Site: **Building 4029**
Drill Start Date: **11-18-2008**	Start Time: **11:50**	Logged By: **S. Aichner**	Reviewed By: **S. Valenzuela, P.G.**
Drill Finish Date: **11-18-2008**	Finish Time: **12:10**	Drilling Contractor: **Strongarm**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Geoprobe/Direct Push**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Ken and Dan**	
Comments: **Asphalt surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Geoprobe macrocore with acetate sleeve**		Soil Backfill Date: **11-18-2008**	Backfill Time: **12:05**

Sample Interval / Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
					0			Asphalt 3 inches thick					
S S	100		0.4		2		SM	Silty Sand, dark yellowish brown (10YR 3/4), medium dense to dense, moist, micaceous, no staining or odor				60	40
								Total Depth = 2.5 ft; refusal on brownish yellow (10YR 6/6) weathered Chatsworth Formation Sandstone. Collected soil samples S001 and S001SP. Backfilled with geoprobe cuttings and hydrated bentonite, patched with asphalt.					
					4								
					6								
					8								
					10								
					12								
					14								
					16								
					18								
					20								

LOG OF BORING GROUP7_2008.GPJ BOEING.GDT 1/23/09

MWH

Boring ID: **SFBS0022**

Borehole Diam. (in.): **2**	Total Depth (ft): **7.0**	Project: **SSFL Group 7 RFI Sampling - November 2008**	
Northing (ft): **267493.57**	Easting (ft): **1786933.41**	Job Number: **1891589.021101**	Site: **Building 4029**
Drill Start Date: **11-18-2008**	Start Time: **NR**	Logged By: **S. Aichner**	Reviewed By: **S. Valenzuela, P.G.**
Drill Finish Date: **11-18-2008**	Finish Time: **11:10**	Drilling Contractor: **Strongarm**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Geoprobe/Direct Push**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Ken and Dan**	
Comments: **Asphalt surface**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Geoprobe macrocore with acetate sleeve**		Soil Backfill Date: **11-18-2008**	Backfill Time: **11:05**

Sample Interval / Retained / Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
					0			Asphalt 3 inches thick					
S			8.4				SM	Silty Sand, dark yellowish brown (10YR 4/4), medium dense, dry, micaceous, no staining or odor				60	40
S	100				2								
					4								
S			9.5										
	100				6			Sandstone, very pale brown (10YR 7/4), fine-grained, thinly bedded [Weathered Chatsworth Formation]					
								Total Depth = 7.0 ft; refusal on Chatsworth Formation Sandstone.					
					8			Collected soil samples S001, D001, and S002.					
								Backfilled with geoprobe cuttings and hydrated bentonite, patched with asphalt.					
					10								
					12								
					14								
					16								
					18								
					20								

LOG OF BORING GROUP7_2008.GPJ BOEING.GDT 1/23/09

MWH

Boring ID: SFBS0023

Borehole Diam. (in.): **3**	Total Depth (ft): **1.6**	Project: **SSFL Group 7 RFI Sampling - May 2009**	
Northing (ft): **267511.05**	Easting (ft): **1786800.56**	Job Number: **1006217.730706**	Site: **Building 4029**
Drill Start Date: **05-08-2009**	Start Time: **14:00**	Logged By: **M. Milman-Barris**	Reviewed By: **S. Valenzuela, P.G.**
Drill Finish Date: **05-08-2009**	Finish Time: **14:02**	Drilling Contractor: **B.L. Hall**	Field Instrumentation: **PID**
Depth 1st H_2O (ft): **N/A**	Date / Time: **N/A**	Drill Rig Type/Method: **Hand Auger**	
Depth H_2O After Drilling (ft): **N/A**	Date / Time: **N/A**	Driller's Name: **Ben Cisneros**	
Comments: **Concrete-lined drainage, some dry vegetation**		Well Comp. Date: **N/A**	Completion Time: **N/A**
Samplers: **Slide hammer with 6-inch stainless steel sleeve**		Soil Backfill Date: **05-08-2009**	Backfill Time: **14:10**

Sample Interval / Retained Sample Type	Recovery (%)	Blow Count/6"	PID (ppm)	Water Level	Depth (feet)	Graphic Log	USCS Soil Classification	Description	Est. % of Soil: Gravel	Coarse Sand	Med. Sand	Fine Sand	Silt/Clay
					0			Surface Elevation: 1838.4 ft					
								Concrete 8 inches thick					
S			0.6				CL/ML	Silty Clay, dark brown (10YR 3/3), soft, moist, medium plasticity, no cementation, rootlets, no debris [Alluvium]					100
					2			Total Depth = 1.6 ft; terminated prior to bedrock, no refusal.					
								Collected soil sample S001.					
								Backfilled with auger cuttings, capped with concrete.					
					4								
					6								
					8								
					10								
					12								
					14								
					16								
					18								
					20								

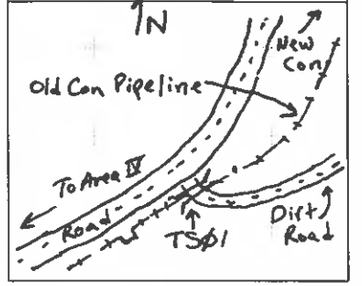
LOG OF BORING GROUP7_2008.GPJ BOEING.GDT 5/18/09

TRENCH LOGS

Project Name				FIELD TRENCH LOG	
Trench Number: OCTS#1	Project Number: 313150004	Elevation Datum	Location: Old Con Pipeline, ULS46	Sheet 1 of 1	
Equipment Supplier: Lopez	Operator: I	Date and Time Started: 5/7/99 0630	Date and Time Completed: 5/7/99 1145	Refusal? (Circle One) Yes / No	If Yes Depth = 4'
Equipment Type: Case 500L BackHoe	Trench Orientation: N62E	Total Depth: 4'	Total Number of Samples: 1	Photo (Circle One) Yes / No	No.
Bucket Width: 2' / Trench Length: 25'	Trench Width: 2'	No. of Samples / Bulk / Grab	Drive: 1 / Hand Auger	% Man-Made Debris: 5-10	
Geologist or Hydrogeologist/Date: T. Burton 5/7/99		Checked by/Date		Wall of Trench Shown (Circle One): N / E / W / NE / NW / SE / SW	

OGDEN

Plan View-Site Location
(Provide Sketch)

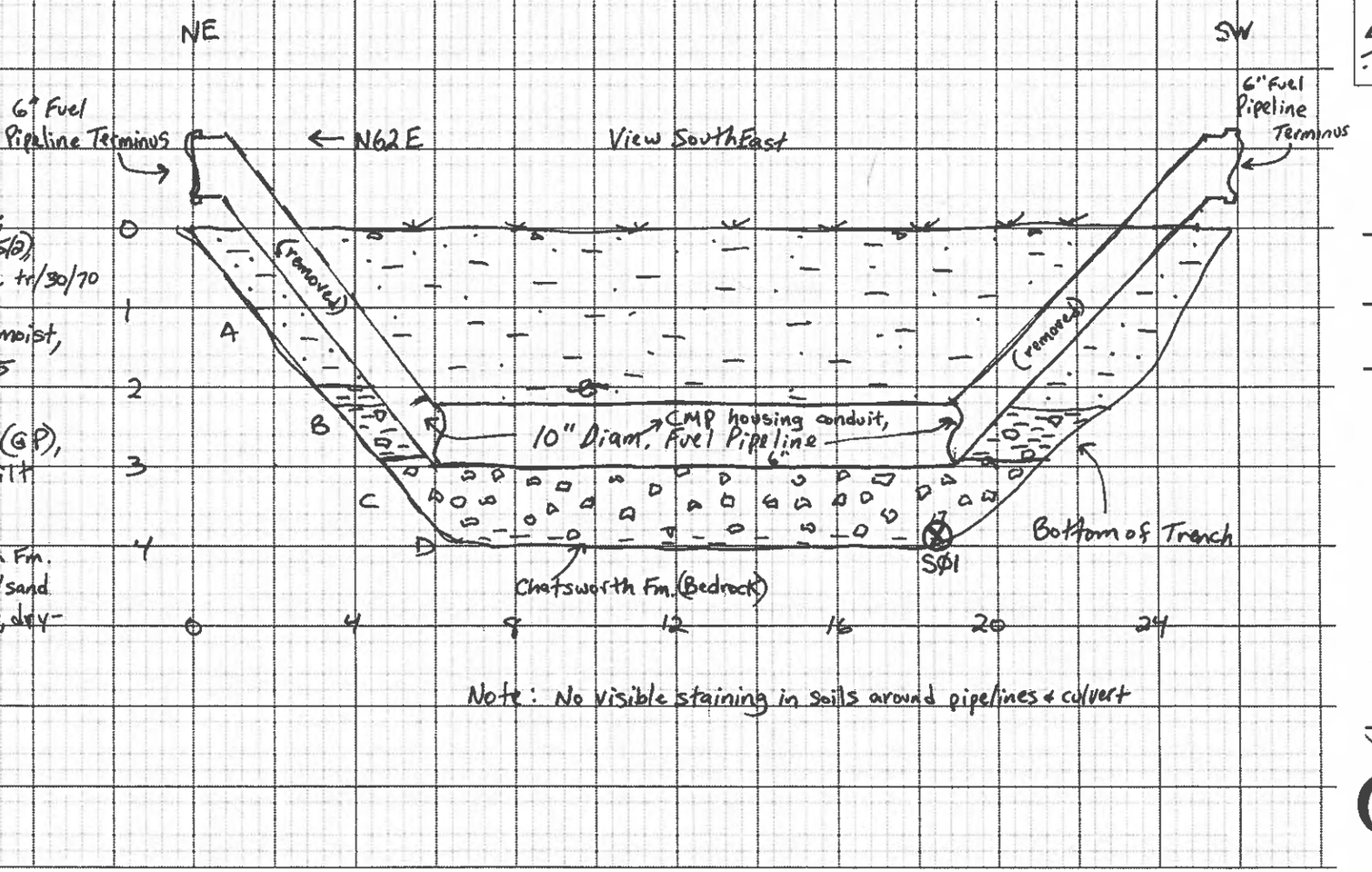


LENGTH (FEET)

DEPTH (FEET)

ENTER TRENCH DIRECTION

SCALE: 1" = 4' Horiz.
1" = 2' Vert.



Surface: flat, dry leaves, adj. to road;

A Sandy silt (ML), lt. grayish brn. (10YR 5/6), dry, v. loose, vf-fine sand, non-plastic, tr/30/70

B silt w/ sand (ML), brown (7.5YR 4/3), sl. moist, stiff, v. soft, non-plastic, 10/15/75

C Artificial Fill - Poorly graded gravel (GP), fine (pea gravel), some vf sand & silt 90/5/5

D Sandy silt (ML), weathered Chatsworth Fm. siltstone, interbedded with silt w/ sand (ML), olive brown (2.5Y 4/3), dense stiff, dry-moist, non-plastic

Note: No visible staining in soils around pipelines & culvert

EXPLANATION

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

PIEZOMETER LOGS

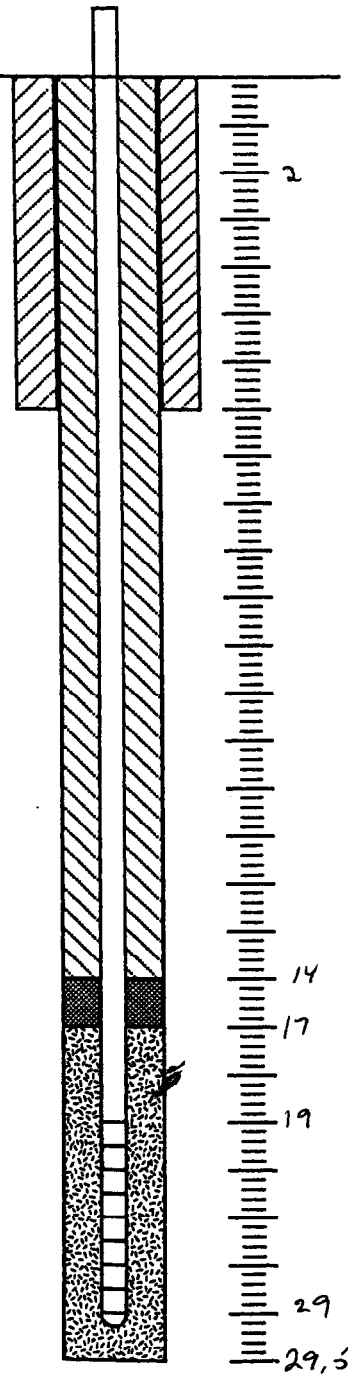
OGDEN

WELL COMPLETION RECORD

JOB NO. 3131500005 P205 WELL NO. P2055 HYDROGEOLOGIST R. SINGER

CLIENT BOEING DRILLER Layne

WELL LOCATION PT 057 DATE/TIME 01-02-01 16:15



Well Head Elevation _____

Ground Surface Elev. _____

Well Head Completion Method

_____

Drilling Method/Rig Type

_____

Surface Casing: Type _____

Diameter _____

Length _____

DETAILS OF CONSTRUCTION

Date Completed 01-02-01

Borehole Diameter (in.) 6"

Type and Size of Casing (in.) 2" PVC

Type and Size of Screen (in.) 2" PVC

Screen Perforation Diameter (in.) 0.020

Screen Length (ft.) 10'

Centralizer Depths (ft.) ____, ____, ____, ____,

Completion Technique:

1) Type of Filter Pack and Placement Method

#3 sand H.S. Aug.

2) Type of Bentonite and Placement Method

medium chip H.S. Aug

3) Type of Grout Mixture and Placement Method

Portland Cem Type II/V 0A

Description of Potential Problems With Well:

_____

_____

_____

_____

Development Technique

_____

MATERIALS

Cement (sks.) 2 bg @ 90 lbs

Filter Pack Material (ft.^{3}) 3 bgs @ 100

Casing Material (ft.) 30'

Bentonite (ft.^{3}) 1 bg @ 50 lbs

Top of Bentonite Seal 14 ft.

Top of Filter Pack 17 ft.

Top of Screen 19 ft.

Bottom of Screen 29 ft.

Bottom of Hole 29.5 ft.

GROUT

BENTONITE

FILTER PACK

NOTE: ALL DEPTHS ARE REFERENCED TO GROUND SURFACE

MONTGOMERY WATSON

Boring #: PT-058 MW#: PZ-112 Sheet 1 of 3

Project: DOE SHALLOW GROUNDWATER

Job #: Site: SE DRUM / SSFL

Logged By: T. HALL Reviewed By:

Drilling Contractor: LAYNE

Drill Rig Type/Method: CME 850 / HSA

Drillers Name: ENRIQUE PEREZ

Borehole Diam./Drill Bit Type: 8" DIAM / CARBIDE

Total Depth: 35.0'

Ref. Elev.: GROUND SURFACE

Sampler Type: 1.5' SPLIT SPOON

Site Sketch Map

Depth to 1st Water (▽): ≈ 25' bgs Time/Date: 0835 10/29/01

Drill Start Time/Date: 1110 10/26/01 Drill Finish Time/Date: 1420 10/26/01

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

Well Completion Time/Date: 1025 10/29/01

Depth to other Water Bearing Zones: N/A

Soil Boring Backfill Time/Date: N/A

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of: Gravel	Sand: Coarse	Sand: Medium	Sand: Fine	Silt/clay	
		6"				CONCRETE			HAND AUGER REFUSAL @ 2 FT						
0.0		6"	HAND AUGER				1	SM	ALLUVIUM: SILTY SAND WITH	5	5	30	40	20	
		6"							OCCASSIONAL GRAVEL (1/4"),						
0.0		6"					2	SM	LOOSE, MOIST, LOW PLASTICITY,						
									MED DENSE, YELLOWISH-						
							3		BROWN (SLIGHTLY)						
									HARDER DRILLING @ 4' WITH						
							4		COLOR CHANGE TO BROWNISH-YELLOW						
0.0		6"	14				5	SM	SAME AS ABOVE (ALLUVIUM)						
		6"	13												
0.0		3"	9			GROUT MIX	6	SM	~~HIGH~~ ALLUVIUM: FINE SILTY	—	TR	10	80	10	
									SAND, LOW PLASTICITY, LOW						
							7		DENSITY, FAIRLY WELL SORTED,						
									LESS CLAY THAN ABOVE, MOIST,						
							8		LOOSE, MICACEOUS, LIGHT BROWNISH-YELLOW						
									SOFTED DRILLING ~~@ 8'~~ 6'-8'						
							9	B.R.	HARDER @ ~~8~~ 9' WITH COLOR CHANGE (DARKER)						
									10'-10.4':						
0.0		6"	22				10		~~SILTSTONE~~ INTERBEDDED SILTSTONE & FINE-V. FINE	—	—	—	60	40	SAND. & T.S.
0.0		5"	100/5"			PORTLAND CEMENT			SILTY SANDSTONE, GREENISH-GREY	—	—	—	30	70	
							11		MODERATELY CEMENTED, OXIDIZED,						
									MOIST, BROKEN W/ OX'D FACES						
									10.4-10.9: SANDSTONE, FINE-MED	—	—	10	70	20	
							12		GRAIN, OXIDIZED, BROWNISH-YELLOW,						
									MICACEOUS, MOIST, SLIGHTLY-MOD CEMENTED						

QA/QC

Boring #: PT-058 MW#: PZ-112 Project: DOE SHALLOW GROUNDWATER Sheet 2 of 3

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts /6 in.	Retained for Analysis.	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of Sand: Gravel	All: Coarse	Med.	Fine	Silt/Clay
							2							
									HARDER DRILLING 9'-14'					
							3		HARDER @ 14					
							4							
0.0		3"	100/3"				15		SANDSTONE & CLAY: ALTERN					
									ATING LAYERS OF SAND-					
							6		STONE (FINE-MED GRAIN,	—	—	20	70	10
									MOD CEMENTATION OXIDI-					
							7		ZED, MOIST, BROWNISH-YELLOW					
									& CLAY (CL-GREENISH GREY)	—	—	—	—	100
							8							
									THIN ALTERNATING ZONES					
							9		OF HARDE & SOFTER DRILLING					
									VERY HARD @ 19.5-21					
							20							
0.0		2"	100/3"						SANDSTONE: MED-FINE	—	—	40	50	10
							1		GRAINS, MICACEOUS, WELL					
									CEMENTED, OXIDIZED, LIGHT					
							2		BROWNISH-YELLOW, COARSER					
									THAN ABOVE, MOIST					
							3							
									SOFTER 21-23					
							4		VERY HARD 23-25					
									SOFTER 25-32					
							25							
0.0		4"	100/6"						SAME AS ABOVE, MODERATE					
							6		CEMENTATION					
							7		SMALL HARD PIECES IN					
									CUTTINGS ARE SILTSTONE					
							8		AND VERY FINE, WELL					
									CEMENTE SILTY SANDSTONE.					
							9		THESE MAY COMPRISE THE					
									ALTERNATING HARD ZONES.					
							30							
0.0		4"	100/6"						SANDSTONE: FINE-MED GRAIN	—	—	30	60	10
							1		MICACEOUS, MOD CEMENTA-					
									TION, BROWNISH-YELLOW, MOIST					
							2							

Casing/Annulus: 2" DIAM SCH 40 BLANK PVC CASING TO SURFACE; PORTLAND CEMENT GROUT MIX; BENTONITE; 2" SCH 40 PVC SCREEN (0.020" SLOTS); RMC #3 NATURAL MONTEREY BEACH SAND

QA/QC

Boring #: PT-058 MW#: P2-112 Project: DOE SHALLOW GROUNDWATER Sheet 3 of 3

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis.	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of Sand: Gravel	Coarse	Med.	Fine	Silt/Clay
					SCREEN	RMC #3 SAND	2		SOFTER 32-35 (MORE)					
							3		(BIT MAY BE BURNT-UP)					
							4							
					SUMP				2"-6" THICK					
0.0		6"	100/5"	31			5		ALTERNATING LAYERS OF					
		6"	25						SILTY SANDSTONE AND	—	—	20	70	10
0.0		6"	56				6		SANDY SHALE/SILTSTONE.	—	—	—	30	70
									BOTH ARE OXIDIZED, MOIST,					
							7		SLIGHTLY CEMENTED					
							8							
							9							
							40		4 BGS RMC #3 SAND (NATURAL MONTE-					
									REY BEACH SAND).					
							1		1/2 BUCKET WYOBEN ENVIROPLUG COATED					
									1/4" TABLETS. HYDRATED IN PLACE					
							2		1/2 BG WYOBEN ENVIROPLUG MEDIUM					
									BENTONITE CHIPS. HYDRATED IN					
							3		PLACE & BY ADDING WATER.					
									4 SACKS COLTON PORTLAND CEMENT					
							4		TYPE II/V MIXED WITH 22 GALS					
									OF WATER					
							45							
							6							
							7							
							8							
							9							
							50							
							1							
							2							

QA/QC

RAY 7/5

MONTGOMERY WATSON

Boring #: PT-056 MW#: PZ-113 Sheet 1 of 2

Project: DOE SHALLOW GROUNDWATER

Job #: Site: NEW CON/SSFL

Logged By: T. HALL Reviewed By:

Drilling Contractor: LAYNE

Drill Rig Type/Method: CME 850 / HSA

Drillers Name: ENRIQUE PEREZ

Borehole Diam./Drill Bit Type: 8" / CARBIDE

Total Depth: 15.0

Ref. Elev.: GROUND SURF.

Sampler Type: 1.5' SPLIT SPOON

Site Sketch Map

Depth to 1st Water (▽): NONE Time/Date:

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

Depth to other Water Bearing Zones: N/A

Drill Start Time/Date: 1235 10/29/01 Drill Finish Time/Date: 1302 10/29/01

Well Completion Time/Date: ~~1530~~ 10/29/01 1320

Soil Boring Backfill Time/Date: N/A

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of Gravel	Sand Coarse	Sand Medium	Sand Fine	Silt/clay
0.0	↓				2" SCH 40 PVC CASING	CONCRETE	0	SM	SILTY SAND: MED TO FINE GRAINS, LOOSE, LOW DENSITY, LOW PLASTICITY, DRY, YELLOW-ISH-BROWN	—	—	20	60	20
							1							
							2	B.R.	HARD DRILLING @ 2'					
							3							
0.0	↓	2"	100/3"		2" SCH 40 PVC (0.020" SLOTS)	BENTONITE	4		SANDSTONE: FINE TO MED GRAINS, MICACEOUS, MODERATE CEMENTATION, OXIDIZED, MOIST, BROWNISH-YELLOW	—	—	30	60	10
							5							
							6							
							7		HARDER DRILLING 9.5-10.5					
							8		SOFTER DRILLING 10.5-13					
							9							
0.0	↓	2"	100/3"		2" SCH 40 PVC	RMC #3 MONTEREY SAND	10		SAME AS ABOVE EXCEPT INCREASED CEMENTATION (MOD-WELL) AND YELLOWISH-BROWN COLOR AND INCREASED MOISTURE CONTENT					
							11							
							12							

QA/QC

Boring #: PT-056 MW#: PZ-113 Project: DOE SHALLOW GROUNDWATER Sheet 2 of 2

PID/OVA	Sample Interval	Recovered (in.)	Blow Counts / 6 in.	Retained for Analysis.	Casing Type & Size	Annulus Filler	Depth (Feet)	USCS Soil Type	Soil Description	Estimated % Of Sand: Gravel	Coarse	Med.	Fine	Silt/Clay
							1 2							
							3							
							4							
0.0	↓	0.5"	100/5"		SCREEN	RMC #3 SAND	5		SANDSTONE: FINE - MED GRAINS, MICACEOUS, WELL CEMENTED, SLIGHTLY OXIDIZED, MOIST, YELLOWISH-GREY	—	—	40	50	10
							6							
							7		15' TD = ~~50~~ FT (REFUSAL)					
							8							
							9		3 BGS RMC #3 NATURAL MONTEREY BEACH SAND					
							0		1 BG WYOBEN ENVIROPLUG MEDIUM BENTONITE CHIPS HYDRATED IN 1.5' LIFTS.					
							1							
							2							
							3							
							4							
							5							
							6							
							7							
							8							
							9							
							0							
							1							
							2							

QA/QC

WELL LOGS

GROUNDWATER RESOURCES CONSULTANTS, INC.

TABLE A-93

LITHOLOGIC LOG OF MONITOR WELL RD-16

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
0 - 2	SILTY SAND	Brown, fine-grained, loose, slightly moist, no odor.
2 - 28	SANDSTONE	Yellow brown, fine-grained, well sorted, non-calcareous, dry, no odor.
		At 15 feet, some calcareous cement.
		At 19 feet, calcareous cementation increasing, color change to grey-brown.
28 - 176	SILTSTONE	Blue-grey, calcareous, with fine sandstone interlayers, slightly moist, no odor.
		From 47 to 48 feet, yellow brown sandstone.
		At 110 feet, moist.
176 - 220	SHALE	Grey, minor amount of fine-grained sandstone, moderately cemented.
		At 190 feet, increasing proportion of sandstone.

TOTAL DEPTH OF BOREHOLE: 220 FEET

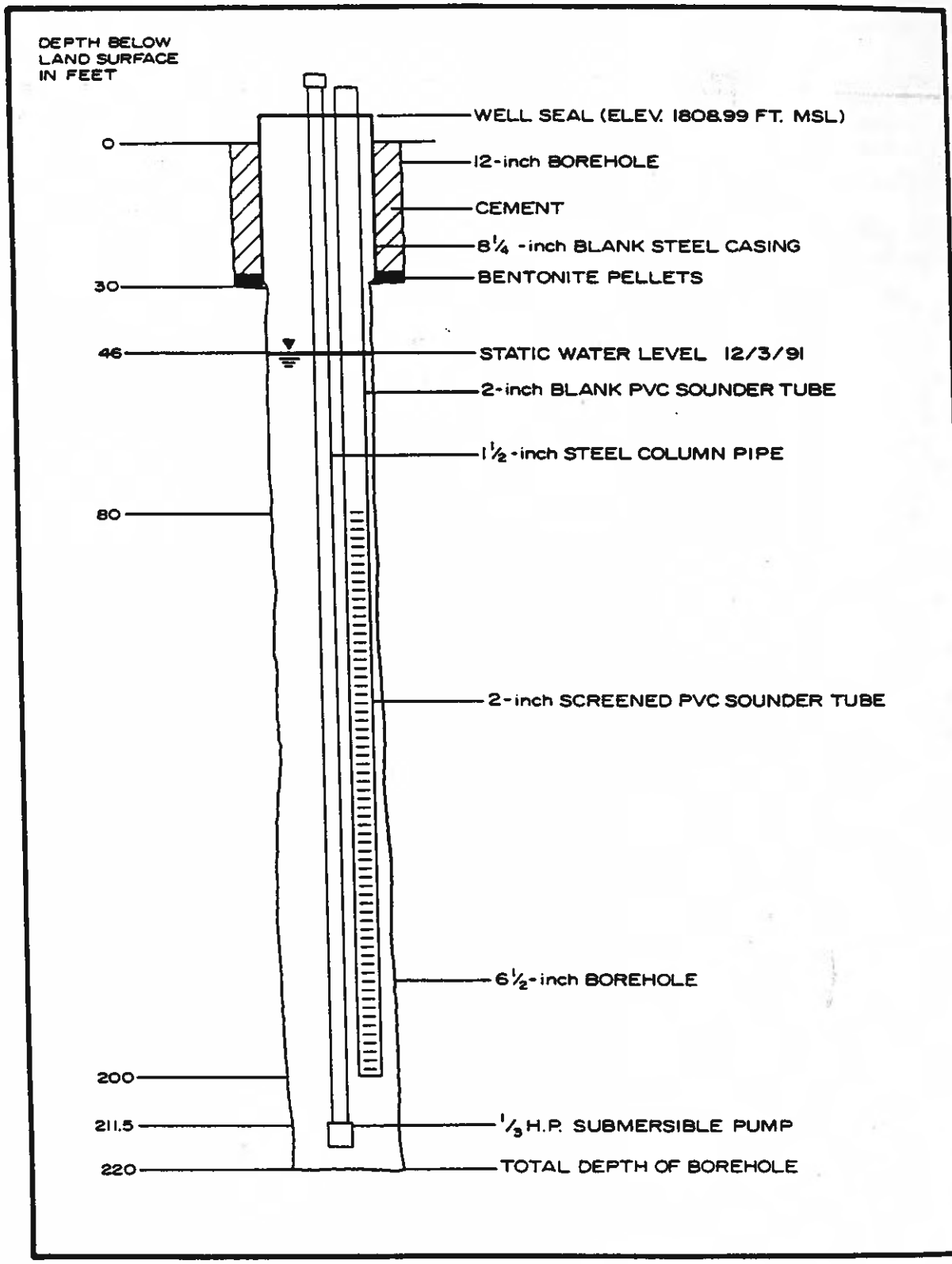


FIGURE E-18
SCHEMATIC DIAGRAM OF MONITOR WELL RD-16

TABLE C-8
RD-92 ROTARY DRILLING DATA
BOEING SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Logged By: Chris Brooks		Client: Boeing - SSFL ETEC	Page 1 of 4
Boring Number/Location: RD-92		Drilling Co: WDC Exploration	Job No: 26411-019
Length, Kelly: 10 ft. Rods: 20 ft.	Collars:	Subs: 5.7 ft. Bit: 0.5 Height of K.B.:	Date Started: 03/15/04
Type/Diameter of Bit: 6 in. Hammer		Drilling Fluid: Air Rig Type: Speedstar 30K	Date Finished: 03/16/04

Depth (feet)	Time		Color	Moisture Content (Air Rotary)	Sample	Description	Maximum Size (in.)	Particle Size Distribution %					Sorting			Grain Shape				Apparent Density					Plasticity				Odor Gas, etc (Air Rotary)	Reaction w/ HCL			
	Begin	End						Boulders	Cobbles	Gravel	Sand	Silt & Clay	Well	Medium	Poor	Angular	Subangular	Rounded	Subrounded	Very Loose	Loose	Compact	Dense	Very Dense	None	Low	Medium	High		None	Weak	Moderate	Strong
0																																	
																													None				
5			5YR 3/1	sl. moist	x	dark brown clayey SILT with some fine sand					5	95	x								x				x					x			
						lightly moist, loose																											
						bedrock around 5'																											
10			10YR 7/6	sl. moist	x	WEATHERED SANDSTONE, yellow					95	5		x					x		x				x						x		
						fine to medium grained																											
15			2.5Y 6/3	sl. moist	x	SANDSTONE, light grayish yellow	1/16				95	5		x					x		x				x						x		
						fine to medium grained, slightly moist																											
			2.5Y 7/2			color change to light gray at 18'																											
20					x	no sample collected - no cuttings return																											
25			2.5Y 7/2	sl. moist	x	SANDSTONE, light gray	1/16				95	5		x					x			x			x							x	
						fine to medium grained, slightly moist																											

Total Depth of Borehole (feet): 105 ft.
Groundwater, Depth Encountered: ~75 ft.
Static Water Level: 61 ft.

TABLE C-8
RD-92 ROTARY DRILLING DATA
BOEING SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Logged By: Chris Brooks			Client: Boeing - SSFL ETEC		Page 2 of 4
Boring Number/Location: RD-92			Drilling Co: WDC Exploration		Job No: 26411-019
Length, Kelly: 10 ft.	Rods: 20 ft.	Collars:	Subs: 5.7 ft.	Bit: 0.5	Height of K.B.: Date Started: 03/15/04
Type/Diameter of Bit: 6 in. Hammer			Drilling Fluid: Air		Rig Type: Speedstar 30K Date Finished: 03/16/04

Depth (feet)	Time Begin	Time End	Color	Moisture Content (Air Rotary)	Sample	Description	Maximum Size (in.)	Particle Size Distribution % Boulders	Cobbles	Gravel	Sand	Silt & Clay	Sorting Well	Medium	Poor	Grain Shape Angular	Subangular	Rounded	Subrounded	Apparent Density Very Loose	Loose	Compact	Dense	Very Dense	Plasticity None	Low	Medium	High	Odor Gas, etc (Air Rotary)	Reaction w/ HCL None	Weak	Moderate	Strong
30				sl. moist	x	SANDSTONE, massive, light gray, hard, slightly moist					100			x		x		x				x		x					x		
						continues to ~43.5'																							None			
35				sl. moist	x						100			x		x		x				x		x					x		
40				sl. moist	x	color change to bluish gray at 43.5'	1/16				100			x		x		x				x		x					x		
						fine to medium grained, predominantely fine grained																										
						slightly moist																										
45			2.5Y 7/1	sl. moist	x						95	5	x					x											x		
50			GL2 6/1	sl. moist	x	SANDSTONE, bluish gray, hard, slightly moist; fine/medium sand	1/16				95	5	x			x		x				x		x					x		
						possible healed fracture from 52-53'																										
55				sl. moist	x	soft drilling from 55-60'																								x		

Total Depth of Borehole (feet): 105 ft.
Groundwater, Depth Encountered: ~75 ft.
Static Water Level: 61 ft.

TABLE C-8
RD-92 ROTARY DRILLING DATA
BOEING SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Logged By: Chris Brooks		Client: Boeing - SSFL ETEC	Page 3 of 4
Boring Number/Location: RD-92		Drilling Co: WDC Exploration	Job No: 26411-019
Length, Kelly: 10 ft. Rods: 20 ft.	Collars:	Subs: 5.7 ft. Bit: 0.5 Height of K.B.:	Date Started: 03/15/04
Type/Diameter of Bit: 6 in. Hammer		Drilling Fluid: Air Rig Type: Speedstar 30K	Date Finished: 03/16/04

Depth (feet)	Time		Color	Moisture Content (Air Rotary)	Sample	Description	Maximum Size (in.)	Particle Size Distribution %					Sorting			Grain Shape				Apparent Density					Plasticity				Odor Gas, etc (Air Rotary)	Reaction w/ HCL			
	Begin	End						Boulders	Cobbles	Gravel	Sand	Silt & Clay	Well	Medium	Poor	Angular	Subangular	Rounded	Subrounded	Very Loose	Loose	Compact	Dense	Very Dense	None	Low	Medium	High		None	Weak	Moderate	Strong
60			2.5Y 6/3	sl. moist	x	SANDSTONE, fine to medium grained					95	5	x						x				x		x							x	
						bedding plane fracture at 61'																							None				
						color change to brownish below bedding plane																											
						slightly moist, predominantly fine sand																											
65			2.5Y 6/3	sl. moist	x	SANDSTONE, moderate yellowish brown to 90'	1/16				95	5	x						x			x			x					x			
						fine to medium grained, increasing in moisture content																											
						several parallel, high angle fractures between 65 and 70'																											
						bedding plane fracture between 69 and 69.5'																											
70					x	high angle fracture between 73 and 75'	1/16				100		x				x		x			x			x					x			
75					x	first water at about 75'	1/16				95	5		x			x		x			x			x					x			
						near vertical fracture between 78 and 84', showing																											
						~2-3 inches of displacement in thin mudstone bed at 81'																											
80					x	coarse grained layer from 84-85.5'					95	5		x			x		x			x			x						x		
85					x	significant mudstone in returns	1/24				85	15		x					x			x			x						x		
						oxidation staining between 86 and 94' indicative of																											
						possible healed, high angle fractures																											

Total Depth of Borehole (feet): 105 ft.
Groundwater, Depth Encountered: ~75 ft.
Static Water Level: 61 ft.

TABLE C-8
RD-92 ROTARY DRILLING DATA
BOEING SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Logged By: Chris Brooks			Client: Boeing - SSFL ETEC		Page 4 of 4
Boring Number/Location: RD-92			Drilling Co: WDC Exploration		Job No: 26411-019
Length, Kelly: 10 ft.	Rods: 20 ft.	Collars:	Subs: 5.7 ft.	Bit: 0.5	Height of K.B.: Date Started: 03/15/04
Type/Diameter of Bit: 6 in. Hammer			Drilling Fluid: Air		Rig Type: Speedstar 30K Date Finished: 03/16/04

Depth (feet)	Time Begin	Time End	Color	Moisture Content (Air Rotary)	Sample	Description	Maximum Size (in.)	Particle Size Distribution % Boulders	Cobbles	Gravel	Sand	Silt & Clay	Sorting Well	Medium	Poor	Grain Shape Angular	Subangular	Rounded	Subrounded	Apparent Density Very Loose	Loose	Compact	Dense	Very Dense	Plasticity None	Low	Medium	High	Odor Gas, etc (Air Rotary)	Reaction w/ HCL None	Weak	Moderate	Strong
90			2.5Y 5/3	moist	x	SANDSTONE, light olive brown, fine to medium grained					95	5	x					x				x		x					x			
						predominantly medium grained, moist																										
95			2.5Y 6/1	moist	x	SANDSTONE, light gray from 95-105'	1/8				95	5	x					x				x		x					x			
						fine to medium grained, moist																										
						below 95', predominantly bluish gray sandstone																							None			
						coarsening downward unit from 94-98'																										
						coarse sand at 98'																										
100			GL2 5/1	moist	x	contacts with mudstone layer from 98-98.5					95	5	x					x				x		x					x			
						SANDSTONE, bluish gray to 105'																										
						high angle fractures from 102-105' with oxidation staining																										
105				moist	x		1/16				95	5	x					x				x		x					x			

Total Depth of Borehole (feet): 105 ft.
Groundwater, Depth Encountered: ~75 ft.
Static Water Level: 61 ft.

TABLE A-35

LITHOLOGIC LOG OF MONITOR WELL RS-24

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 6.0	SANDY CLAYEY SILT	Brown, low plasticity, soft, dry.
6.0 - 7.0	SILTY SAND (WEATHERED CHATSWORTH FORMATION)	Light brown, loose, moist.
7.0 - 8.5	SILTY SANDSTONE (CHATSWORTH FORMATION)	Light brown, well cemented, moist.

TOTAL DEPTH OF BOREHOLE: 8.5 FEET

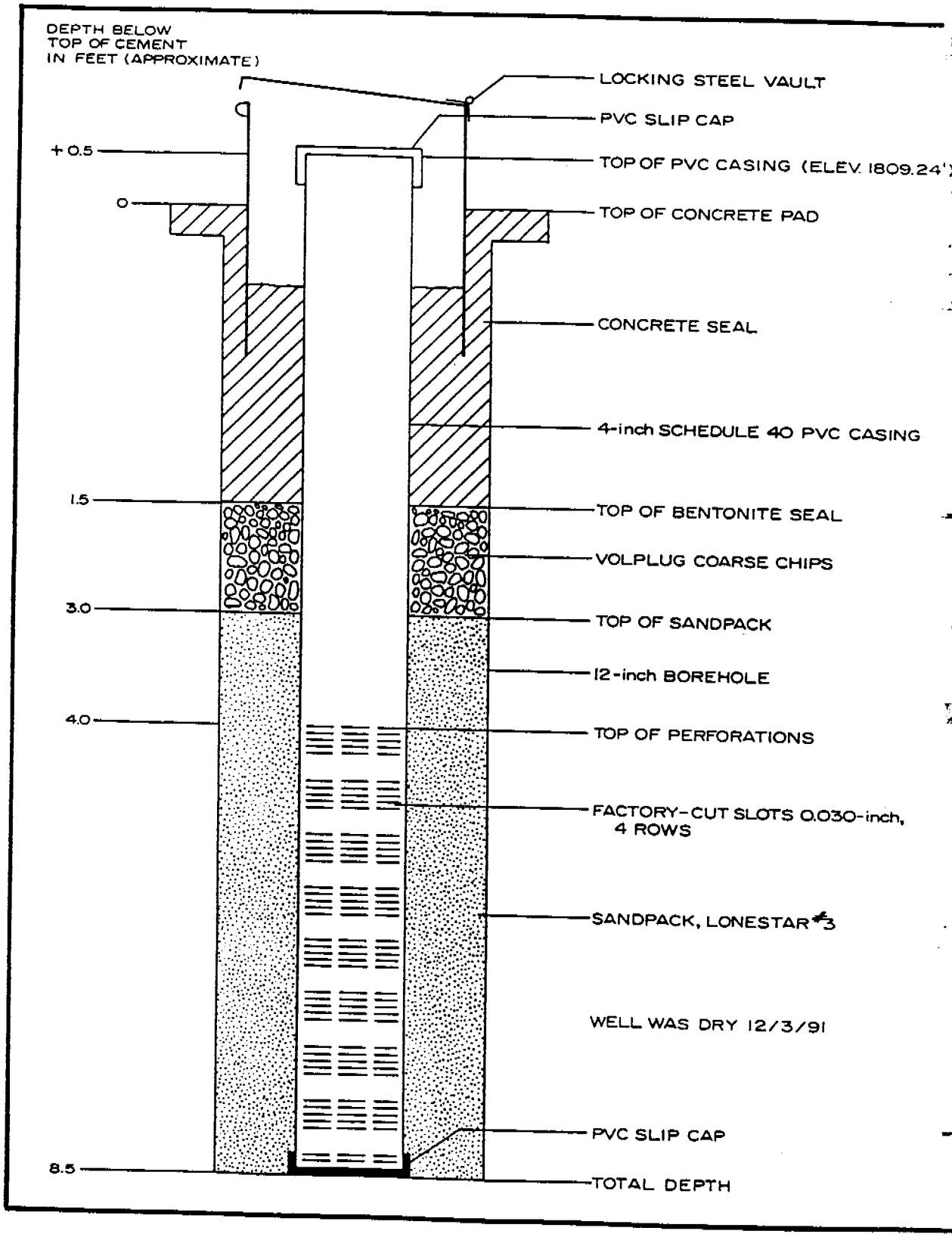


FIGURE C-24
SCHEMATIC DIAGRAM OF SHALLOW ZONE
MONITOR WELL RS-24

APPENDIX A

ATTACHMENT A-3

DATA QUALITY, VALIDATION AND LABORATORY REPORTS
(Electronic Copies Available on Request)

ATTACHMENT A-4

BUILDING EVALUATION DOCUMENTATION LOGS
(Electronic Copy)

Building Feature Documentation Logs

This attachment contains Building Feature Documentation Logs and map(s) showing the building feature locations. As required by DTSC, building feature inspections were performed and sampling requirements were determined consistent with the Standard Operating Procedures: Building Feature Evaluation and Sampling (MWH/CH2M HILL, 2008).

The logs presented in this attachment describe building feature conditions at the time of the site inspection, and they reflect sample recommendations as of the inspection date. The map(s) show recommended sample locations for both pre- and post-demolition samples.

Consistent with the standard operating procedures referenced above, pre-demolition samples were collected and analyzed prior to the publication of this report. In addition, post-demolition samples were collected for buildings that were demolished prior to the publication of this report. Therefore, since the map shows all recommended samples (both pre-demolition and post demolition), it should be noted that some of the locations have been sampled as of the date of this report, while others have not. For pre-demolition samples that were recommended as a result of the inspection, sample identification numbers are included on the logs. To further clarify:

- For building features where pre-demolition samples were warranted, sampling was completed, and the sample identification number(s) are presented on these logs. The sample locations and identification numbers are presented together on map(s) in the main body of this Appendix.

- For building features where post-demolition sampling was recommended and the buildings were demolished prior to the date of this report, samples were collected. The sample locations and identification numbers are presented together on map(s) in the main body of this Appendix.

- For building features where post-demolition sampling was recommended but buildings were not demolished prior the date of this report, samples will be collected at a later date. Recommended sample locations are shown on the map(s) within this attachment, but not on map(s) in the main body of this Appendix; sample identification numbers have not yet been assigned.

Base Map Legend

- Study Areas
- RFI Groups
- Existing Building or Structure
- A/C Paving
- Concrete
- Retaining Wall
- Fences
- Bedrock Outcrops
- Miscellaneous Instrastructure
- Pipe
- Elevation Contour

Figure Legend

- Pre-Demolition Soil Sample Location
- Door
- Concrete Patch
- Pipeline

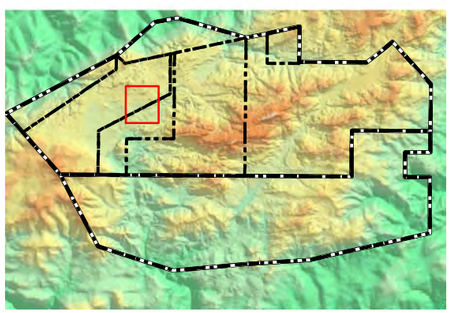
Chemical Use Area

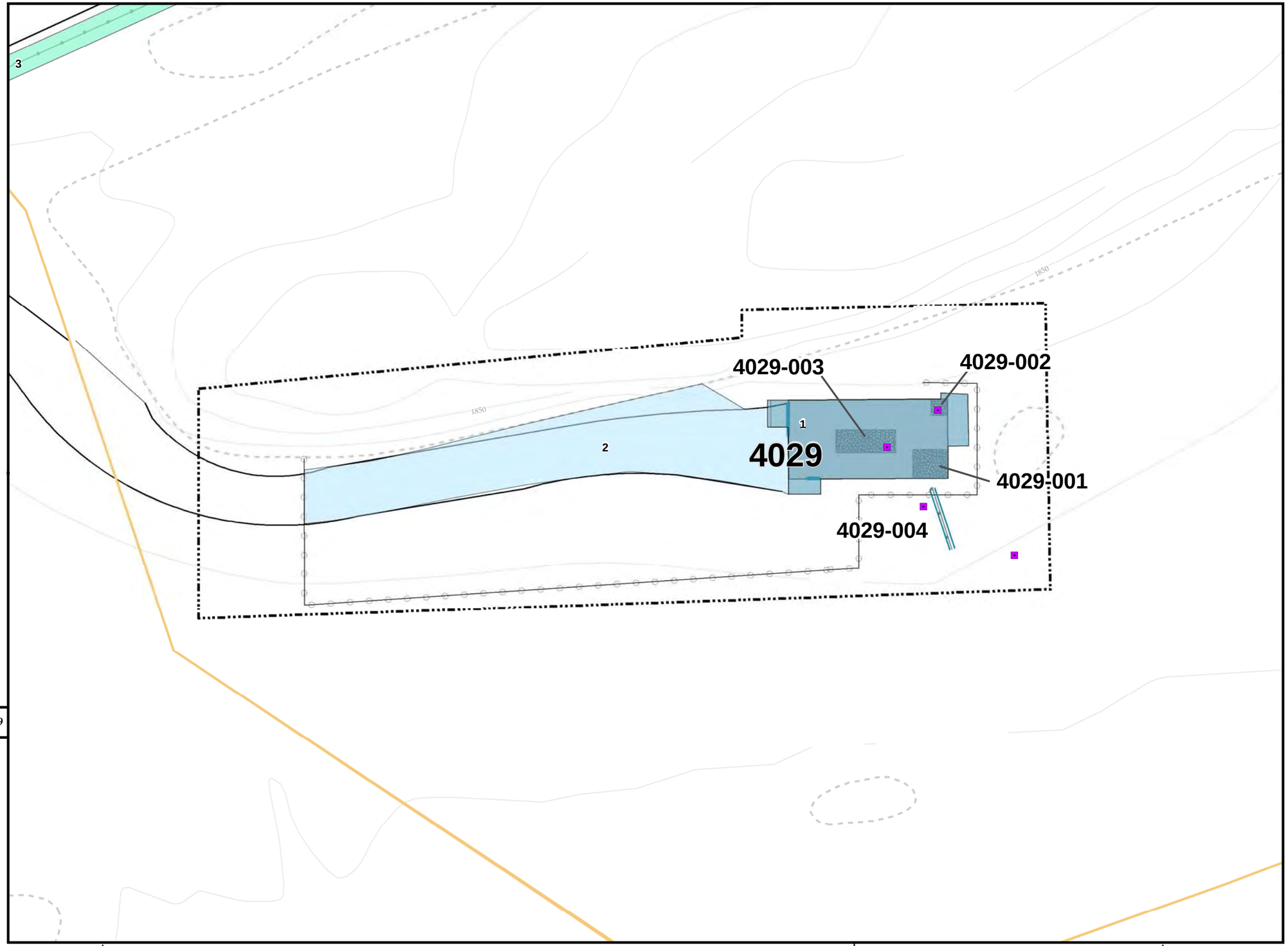
- Petroleum
- Metal
- Potential

Document: BFD_Bldg4029.mxd

Date: March 16, 2009

Feet
0 12.5 25





MWH

SANTA SUSANA FIELD LABORATORY

Internal Building Features
Building 4029
Group 7

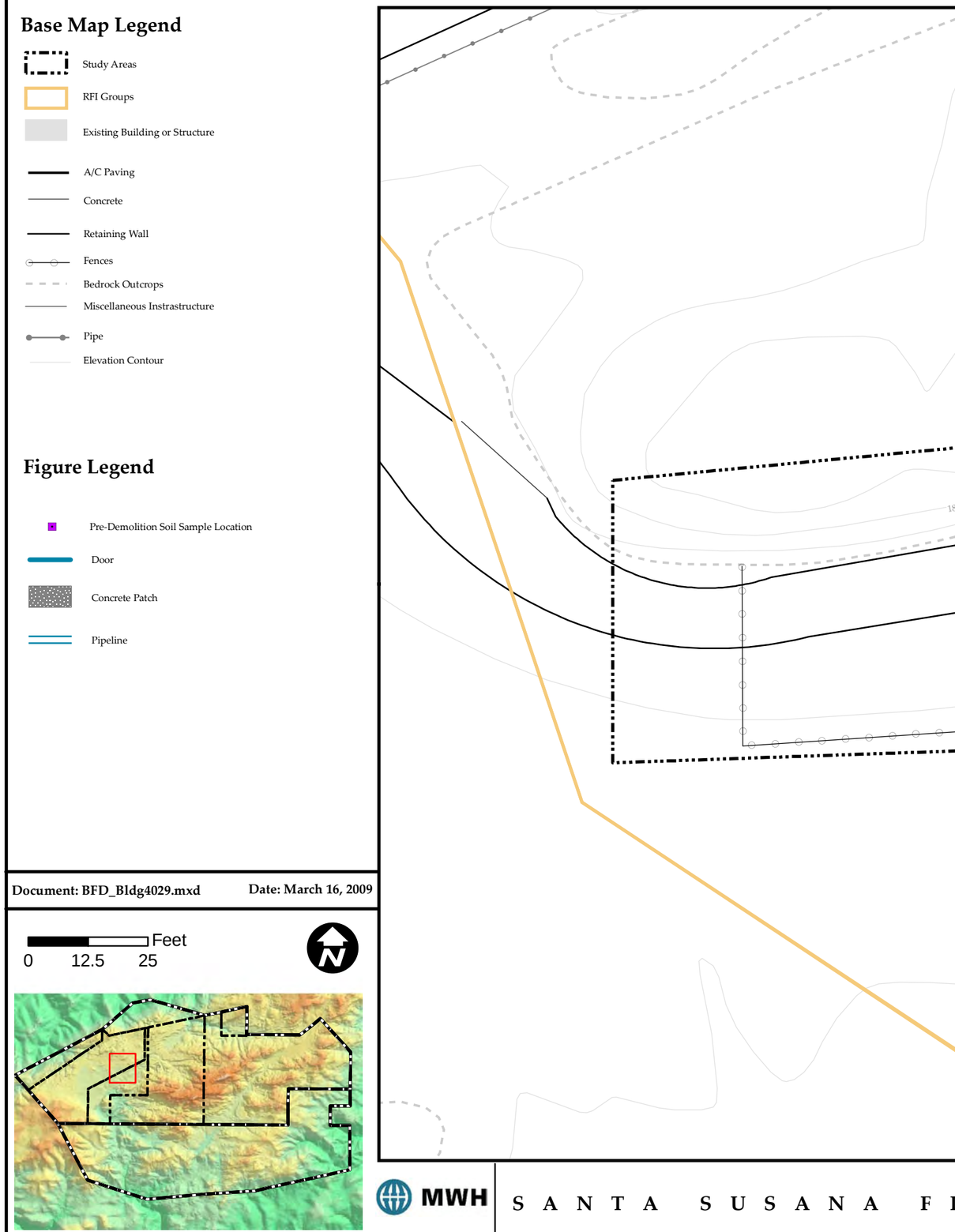
FIGURE A-4A

Base Map Legend

- Study Areas
- RFI Groups
- Existing Building or Structure
- A/C Paving
- Concrete
- Retaining Wall
- Fences
- Bedrock Outcrops
- Miscellaneous Instrastructure
- Pipe
- Elevation Contour

Figure Legend

- Pre-Demolition Soil Sample Location
- Door
- Concrete Patch
- Pipeline



Document: BFD_Bldg4029.mxd Date: March 16, 2009

Feet
0 12.5 25

MWH

SANTA SUSANA FIELD LABORATORY

Internal Building Features
Building 4029
Group 7

FIGURE A-4B

TABLE A-4A
B4029 RFI SITE BUILDING FEATURE COORDINATES
(Page 1 of 1)

Group Number	RFI Site	Building Number	Feature ID	Easting	Northing
7	4029	4029	4029-001	1787011.057	267482.951
7	4029	4029	4029-002	1787013.547	267496.944
7	4029	4029	4029-003	1786994.591	267488.393
7	4029	4029	4029-004	1787011.224	267476.137

MWH

Photographic Log - Reactive Metals Storage Yard

Customer:	**Boeing**	**Project Name:**	
Site Name:	**Reactive Metals Storage Yard**	**Site Location:**	**Building 4029**

Photograph ID: 001

Date: Apr 14, 2009

Location / Direction:
Building 4029/
Looking East

Comments:

Photograph ID: 002

Date: Apr 14, 2009

Location / Direction:
Building 4029/
Looking Northeast

Comments:

MWH

Photographic Log - Reactive Metals Storage Yard

Customer:	**Boeing**	**Project Name:**	
Site Name:	**Reactive Metals Storage Yard**	**Site Location:**	**Building 4029**

Photograph ID: 003

Date: Apr 14, 2009

Location / Direction:
Building 4029 - Interior/
Looking East

Comments:

Building Feature Documentation Log
Feature Number: 4029-001
Santa Susana Field Laboratory, Ventura County, California

Feature Location:
RFI Site: **Building 4029** RFI Reporting Group: **7**
Building Number: **4029**
Building Owner: **DOE**
Building Name: **Hazardous Waste Storage Facility**
Building Use: **Radioactive measurement, equipment calibration, storage of alkali metals.**

Feature Description:
Feature Type: **Concrete Patch**
Operational Use / Process: **Former Co-60 source cell**
Associated Chemicals: **Radionuclides**
Discharge: **No**
Size: **Area (LxW in inches): 103 x 88**
Construction Material: **Concrete**
Status: **Removed**

Feature Condition:
General Condition: **Intact**
Debris: **No**
Staining: **No**
Odor: **No**
PID Reading: **N/A**
Likelihood of Impact from Feature: **Potential**

Additional Information:
Proximity to Nearest Chemical Use Area: **Inside Chemical Use Area 1**
Likelihood of Impact from Other Source: **Potential impact due to use of area for storage of hazardous waste metals after this feature's removal.**
Comments: **The radioactive source material was removed from this feature in 1974 and the feature was removed in 1988.**
GPS Coordinates:

Sampling Information:
Sampling Warranted?: **Yes, inspect and sample, if warranted**
Sampling Description/Notes: **Sample if staining/impact is detected.**
Sampling Type: **Soil**
Sample ID Number(s):

Photo 1-Looking East

Photo 2 -Looking South

MWH

Inspector: J. Wright
Date: Feb 24, 2009

Building Feature Documentation Log
Feature Number: 4029-001
Santa Susana Field Laboratory, Ventura County, California

Analyses: **VOCs, TPH, metals, pH**

Inspector: J. Wright
Date: Feb 24, 2009

Building Feature Documentation Log
Feature Number: 4029-002
Santa Susana Field Laboratory, Ventura County, California

Feature Location:
RFI Site: **Building 4029** RFI Reporting Group: **7**
Building Number: **4029**
Building Owner: **DOE**
Building Name: **Hazardous Waste Storage Facility**
Building Use: **Radioactive measurement, equipment calibration, storage of alkali metals.**

Feature Description:
Feature Type: **Concrete Patch**
Operational Use / Process: **Former Pit (PoBe and PuBe source storage)**
Associated Chemicals: **Radionuclides**
Discharge: **No**
Size: **Area (LxW in inches): 58 x 58**
Construction Material: **Concrete**
Status: **Removed**

Feature Condition:
General Condition: **Intact**
Debris: **No**
Staining: **No**
Odor: **No**
PID Reading: **N/A**
Likelihood of Impact from Feature: **Potential**

Additional Information:
Proximity to Nearest Chemical Use Area: **Inside Chemical Use Area 1**
Likelihood of Impact from Other Source: **Potential impact due to use of area for storage of hazardous waste metals after this feature's removal.**
Comments: **The radioactive source material was removed from this feature in 1974 and the feature was removed in 1988.**
GPS Coordinates:

Sampling Information:
Sampling Warranted?: **No**
Sampling Description/Notes: **Area targeted for sampling as part of the data gaps sampling event. The sample was not collected due to refusal by bedrock**
Sampling Type: **Soil**

Photo 1-Looking East

Photo 2 -Looking North

MWH

Inspector: J. Wright
Date: Feb 24, 2009

Building Feature Documentation Log
Feature Number: 4029-002
Santa Susana Field Laboratory, Ventura County, California

Sample ID Number(s): **SFBS0002**
Analyses: **N/A**

Inspector: J. Wright
Date: Feb 24, 2009

Building Feature Documentation Log
Feature Number: 4029-003
Santa Susana Field Laboratory, Ventura County, California

Feature Location:
RFI Site: **Building 4029** RFI Reporting Group: **7**
Building Number: **4029**
Building Owner: **DOE**
Building Name: **Hazardous Waste Storage Facility**
Building Use: **Radioactive measurement, equipment calibration, storage of alkali metals.**

Feature Description:
Feature Type: **Concrete Patch**
Operational Use / Process: **Former Ra-226 and Cs-137 storage well and calibrator table**
Associated Chemicals: **Radionuclides**
Discharge: **No**
Size: **Area (LxW in inches): approx. 200 x 68**
Construction Material: **Concrete**
Status: **Removed**

Feature Condition:
General Condition: **Intact**
Debris: **No**
Staining: **No**
Odor: **No**
PID Reading: **N/A**
Likelihood of Impact from Feature: **Potential**

Additional Information:
Proximity to Nearest Chemical Use Area: **Inside Chemical Use Area 1**
Likelihood of Impact from Other Source: **Potential impact due to use of area for storage of hazardous waste metals after this feature's removal.**
Comments: **The radioactive source material was removed from this feature in 1974 and the feature was removed in 1988.**
GPS Coordinates:

Sampling Information:
Sampling Warranted?: **No**
Sampling Description/Notes: **Area targeted for sampling as part of the data gaps sampling event**

Photo 1-Looking East

Photo 2 -Looking East

MWH

Inspector: J. Wright
Date: Feb 24, 2009

Building Feature Documentation Log
Feature Number: 4029-003
Santa Susana Field Laboratory, Ventura County, California

Sampling Type: **Soil**
Sample ID Number(s): **SFBS0005**
Analyses: **VOCs, TPH, metals, pH**

Inspector: J. Wright
Date: Feb 24, 2009

Building Feature Documentation Log
Feature Number: 4029-004
Santa Susana Field Laboratory, Ventura County, California

Feature Location:
RFI Site: **Building 4029** RFI Reporting Group: **7**
Building Number: **4029**
Building Owner: **DOE**
Building Name: **Hazardous Waste Storage Facility**
Building Use: **Radioactive measurement, equipment calibration, storage of alkali metals.**

Feature Description:
Feature Type: **Pipeline: Storm Water**
Operational Use / Process: **Conveyed storm water runoff from a lowpoint at the southeast corner of Building 4029 to a south facing slope approximately 6 feet to the southeast.**
Associated Chemicals: **None**
Discharge: **Yes**
Size: **Pipe Diameter (inches): 4**
Construction Material: **Polyvinyl chloride**
Status: **Active**

Feature Condition:
General Condition: **Intact**
Debris: **No**
Staining: **No**
Odor: **No**
PID Reading: **N/A**
Likelihood of Impact from Feature: **Unlikely**

Additional Information:
Proximity to Nearest Chemical Use Area: **Southeast of Chemical Use Area 1**
Likelihood of Impact from Other Source: **Unlikely**
Comments:
GPS Coordinates:

Sampling Information:
Sampling Warranted?: **No**
Sampling Description/Notes: **Locations near the entrance and discharge areas of the storm water pipe were sampled as part of the data gaps sampling event**
Sampling Type: **Soil**
Sample ID Number(s): **SFBS0003 and SFBS0004**

Photo 1-Looking Down and Southwest

Inspector: J. Wright
Date: Feb 24, 2009

Building Feature Documentation Log
Feature Number: 4029-004
Santa Susana Field Laboratory, Ventura County, California

Analyses: **VOCs, SVOCs, TPH, metals, pH**

Inspector: J. Wright
Date: Feb 24, 2009