Sampling and Analysis Plan for Systems Test Laboratory-IV RFI Site, Group 5, Santa Susana Field Laboratory

PREPARED FOR: Boeing and DOE

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Working Draft

This technical memorandum presents the sampling and analysis plan (SAP) for the Systems Test Laboratory-IV (STL-IV) Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Site in Group 5 at the Santa Susana Field Laboratory (SSFL) in Ventura County, California. The purpose of this SAP is to describe the scope and rationale for the field investigation to address the data gaps presented in the *Integration and Synthesis Package for RFI Group 5, Santa Susana Field Laboratory, California* (I&S Package) (CH2M HILL, 2008) for the STL-IV Site. The I&S Package identified gaps where additional data are needed to support the RFI, risk assessments, and corrective measures studies following a comprehensive review of historical information and reports containing chemical use information, chemical data, and physical data for the RFI site.

The data gaps identified in the I&S Package for STL-IV are summarized in Table 1. Data gaps were generally identified for chemical use areas within each RFI site. As presented in Table 1, chemical data gaps were identified for the 13 chemical use areas identified for STL-IV. Data gaps were also identified based on elevated detection limits of previous samples and lack of soil and soil gas data in the 2- to 10-foot-depth interval. In addition, data gaps were identified based on the need for documentation related to regulatory closure of ponds located at the site, to determine the source of semivolatile organic compounds (SVOCs) and polycyclic aromatic hydrocarbons (PAHs) in the central and southern portions of the site, and to confirm the location of the explosive bunkers and locations of transformers possibly used in STL-IV.

To address these data gaps, CH2M HILL is proposing to collect 190 soil samples and 48 soil vapor samples. These samples will be collected from a total of 88 locations across the site (Table 1). The specific samples proposed for collection at each chemical use area are summarized in Table 2. For each sample location at each chemical use area, Table 2 describes the matrix to be sampled, the depth from which samples are to be collected, analytical methods to be used, and the rationale for sample collection. As presented in Table 2, more than one sample might be necessary to address the data gaps identified for each chemical use area.

The locations of samples proposed in Table 2 are presented in Figure 1. In addition, Figures 2 through 7 present the locations of the proposed samples relative to the locations of previous samples analyzed for volatile organic compounds (VOCs) in soil and soil vapor, metals in soil, petroleum hydrocarbons in soil, dioxins in soil, and PCBs in soil. The

previous sample location symbols in Figures 2 through 7 are color coded to indicate if the previous sample results (at any depth) were detected, were detected below risk based screening levels (RBSLs) or background concentrations (for metals and dioxins), or were detected above RBSLs and/or background concentrations.

TABLE 1

Data Gaps

Sampling and Analysis Plan for STL-IV RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area Number	Data Gap	Chemical Data Gap	Physical Data Gap	Documentation Data Gap	Number Sample Locations to Address Data Gaps
1	Module 3. Determine the lateral and vertical extent of elevated metals in soil and VOCs in soil and soil gas. Evaluate the source and extent of SVOCs and PAHs exceedances and evaluate potential hydrazine fuel releases.	X			8
2	Fuel Storage Area/ Monomethyl Hydrazine (MMH) Ozonator Tank. Determine the lateral and vertical extents of elevated metals in soil and VOCs in soil and soil gas. Evaluate the source and extents of SVOC/PAH exceedances and evaluate potential hydrazine fuel releases.	X			7
3	Engine Test Stand No. 1. Determine the lateral and vertical extents of elevated metals in soil and VOCs in soil and soil gas. Evaluate the source and extent of SVOC/PAH exceedances and evaluate potential hydrazine fuel releases.	X			3
4	STL-IV Impoundments 1 and 2 and Associated Channels. Evaluate extent of VOCs, SVOCs, metals, PAHs, total petroleum hydrocarbon (TPH), and others in channels and impoundment areas. Reconcile ponds RCRA closure with need to close to unrestricted use.	X		X	21
5	Engine Test Stand No. 2 and Module 2. Determine the lateral and vertical extents of elevated metals in soil and VOCs in soil and soil gas. Evaluate the source and extent of SVOC/PAH exceedances and evaluate potential hydrazine fuel releases.	X			4
6	Building 3794, Hot Water Boiler Shelter, and Building 3780, Assembly Decontamination. Screen for potential VOC releases.	X			5
7	Engine Test Stand No. 3 and Module 1. Determine the lateral and vertical extents of elevated metals in soil and VOCs in soil and soil gas. Evaluate the source and extent of SVOC/PAH exceedances and evaluate potential hydrazine fuel releases.	X			4
8	Building 3254. Determine the lateral and vertical extent of elevated metals in soil and VOCs in soil and soil gas. Evaluate the source and extent of SVOC/PAH exceedances and evaluate potential hydrazine fuel releases.	X			2

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TABLE 1

Data Gaps

Sampling and Analysis Plan for STL-IV RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area Number	Data Gap	Chemical Data Gap	Physical Data Gap	Documentation Data Gap	Number Sample Locations to Address Data Gaps
9	Building 3318/Workshop/Instrumentation Shop/Tool Crib. Evaluate the extents of solvents in soil and soil gas and metals soil in the central portion of the site.	X			3
10	Hazardous Waste Storage Locker, VOC Storage and Use, General Storage and Use. Evaluate potential release from this storage area.	X			2
11	Explosive Use/Storage. Evaluate potential release from this storage area.	X			1
12	Engine Test Stand No. 4. Determine the lateral and vertical extents of elevated metals in soil and VOCs in soil and soil gas. Evaluate the source and extent of SVOC/PAH exceedances and evaluate potential hydrazine fuel releases. Evaluate the use of kerosene-based fuels. Evaluate potential releases from MMH/titanium	X			8
13	Suspect Pond. Check for releases related to proximity to southern test stand.	X			4
14	Operations Trailer/Clean Room Trailer/Lunch Room. Evaluate potential release from this storage area (VOCs used in clean room).	X			4
15	Nitro Tetroxide (NTO) Storage Area. Evaluate potential release from this storage area.	X			9
16	Leach Field. Check for releases related to proximity of test stands.	X			3
				Total	**88**

Notes:
Sitewide = Data Gap applies to the entire STL-IV RFI Site
N/A = Not Applicable

Samples for which the need for laboratory analysis is contingent on the results of other samples are indicated in Table 2 with an "H," signifying they will be place on "Hold." These samples will be collected, but the laboratory will not analyze these samples until CH2M HILL has evaluated the need for lab analysis and provided direction to the lab to analyze the sample. The need for lab analysis will be contingent on the results of samples above or below the proposed sample.

Additional samples will be collected, if necessary, based on the results of the samples proposed in Table 2. Step-out and step-down samples will be collected, if necessary, as described in the Group 5 SAP (general text). In addition, quality assurance/quality control samples will be collected as described in the general text of the Group 5 SAP.

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Schedule

This investigation is scheduled for March and April 2008. Prior to commencing the fieldwork, a Field Implementation Plan (FIP) will be prepared and submitted for Boeing and DOE review. The contents of the FIP are described in more detail in the Group 5 General Text. The FIP is scheduled to be submitted to Boeing and DOE in February 2008.

References

CH2M HILL. 2008. *Integration & Synthesis Package for RFI Group 5, Santa Susana Field Laboratory, California*. January 3.

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TABLE 2

Proposed Samples for STL-IV RFI Site

Sampling and Analysis Plan for STL-IV RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Soil Grain Size (ASTM D422)	Chromium VI (EPA 7196A)	
1	SLBS1000	Soil	1		X				X	X									Module Control Center operating surrounding engine test stands; hydrazine and VOCs stored and used. Metals detected in SLSS08 in surface soil; vertical delineation of metals. VOCs not adequately studied. Screening assessment.
		Soil	6		X				X										
		Soil	10		H				H										
		Soil	20		H				H										Tag bedrock
1	SLBS1001	Soil	1		X				X	X									Module Control Center operating surrounding engine test stands; hydrazine and VOCs stored and used. VOCs and metals not investigated around the sump area. Screening assessment.
		Soil	6		X				X										
		Soil	10		H				H										
		Soil	20		H				H										Tag bedrock
1	SLBS1002	Soil	1		X				X	X									Module Control Center operating surrounding engine test stands; hydrazine and VOCs stored and used. VOCs and metals not investigated west of bldg. 3255. Screening assessment.
		Soil	6		X				X										
		Soil	10		H				H										
1	SLBS1003	Soil	1		X				X	X									Module Control Center operating surrounding engine test stands; hydrazine and VOCs stored and used. VOCs and metals not investigated in the footprint of bldg. 3255; Screening assessment.
		Soil	6		X				X										
		Soil	10		H				X										
1	SLBS1004	Soil	1		X				X	X			X						VOCs and metals not investigated. Screening assessment.
		Soil	6		X				X				H						
		Soil	10		H				H				H						
1	SLBS1005	Soil	1		X				X	X									This area included a workshop, instrumentation shop (grinding, sawing metal/gasket cutting), and tool crib. Metals VOCs, and TPH not studied. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs. Screening assessment.
		Soil	6		X				X										
		Soil	10		H				H										
1	SLSV1000	Soil Vapor	5			X													VOCs in soil vapor not adequately characterized in this area
		Soil Vapor	10			X													
1	SLSV1001	Soil Vapor	5			X													VOCs in soil vapor not adequately characterized in this area
		Soil Vapor	10			X													
2	SLBS1006	Soil	1						X	X			X						SVOCs detected at 0.5 feet bgs in SLBS11; vertical delineation of SVOCs. Metals and propellants other than NDMA not adequately studied
		Soil	6					X	X				H						
		Soil	10					H	H				H						
2	SLBS1007	Soil	1	X	X		H		X	X									Hydrazine, fuels, VOCs storage and use; VOCs and metals not studied; Screening assessment.
		Soil	6	X	X		H		X										
		Soil	10	H	H		H		H										Tag bedrock
		Soil	20	H	H		H		H										
2	SLBS1008	Soil	1	X	X		X		X	X									Hydrazine, fuels, VOCs storage and use; VOCs and metals not studied; Screening assessment.
		Soil	6	X	X		X		X										
		Soil	10	H	H		H		H										
2	SLBX1000	Soil	1								X								Collect soil from 3 locations (~5 feet around pole location). Composite into 1 sample.

TABLE 2

Proposed Samples for STL-IV RFI Site

Sampling and Analysis Plan for STL-IV RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Soil Grain Size (ASTM D422)	Chromium VI (EPA 7196A)	
2	SLSV1002	Soil Vapor	5			X													Hydrazine and fuel storage; VOCs in soil vapor not adequately characterized; Screening assessment.
		Soil Vapor	10			X													
2	SLSV1003	Soil Vapor	5			X													Hydrazine and fuel storage; VOCs in soil vapor not adequately characterized; Screening assessment.
		Soil Vapor	10			X													
2	SLSV1004	Soil Vapor	5			X													Lateral delineation for VOCs detected at 9.0 feet bgs in SLSP04.
		Soil Vapor	10			X													
3	SLBS1009	Soil	1	X	X		H			X			X			X			Engine Test Stand 1 located in this area. VOCs detected at 3.5 feet bgs in SV-6.5-11; vertical delineation of VOCs. Propellants other than NDMA not studied; screening assessment.
		Soil	6	X	X		H						H			X			
		Soil	10	H	H		H						H			H			Tag bedrock
		Soil	20	H	H		H						H			H			
3	SLBS1010	Soil	1	X	X		H			X						X			Engine Test Stand 1 located in this area. Chemical uses include storage/usage of solvents, hydrazine; Engine test stands used kerosene and VOCs detected down gradient in soil vapor. VOCs not studied; screening assessment.
		Soil	6	X	X		H									X			
		Soil	10	H	H		H									H			
3	SLSV1005	Soil Vapor	5			X													VOCs in soil vapor not studied in the vicinity of former tank area; screening assessment.
		Soil Vapor	10			X													
4	SLBS1011	Soil	1	X	X		H		X	X									STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. VOCs and metals not adequately studied; Screening assessment.
		Soil	6	X	X		H		X										
		Soil	10	H	H		H		H										
4	SLBS1012	Soil	1						X	X									VOCs detected at 2.0 feet bgs in SV in SLSV14; vertical delineation of VOCs. Metals not adequately studied; Screening assessment.
		Soil	6		X				X										
		Soil	10		H				H										
4	SLBS1013	Soil	1						X	X									VOCs detected at 1.0 feet bgs in STL-IV-TM2-5; vertical delineation of VOCs. Metals not adequately studied; Screening assessment.
		Soil	6		X				X										
		Soil	10		H				H										
4	SLBS1014	Soil	1	X	X		H		X	X									STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. VOCs and metals not adequately studied; Screening assessment.
		Soil	6	X	X		H		X										
		Soil	10	H	H		H		H										
4	SLBS1015	Soil	1	X	X		H		X	X									STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. VOCs and metals not adequately studied; Screening assessment.
		Soil	6	X	X		H		X										
		Soil	10	H	H		H		H										
4	SLBS1016	Soil	1						X	X									VOCs detected at 3.0 feet bgs in STL-IV-1-59; vertical delineation of VOCs. Metals not adequately studied; screening assessment.
		Soil	6		X				X										
		Soil	10		H				H										

TABLE 2

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Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Soil Grain Size (ASTM D422)	Chromium VI (EPA 7196A)	
4	SLBS1017	Soil	1		X														STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. Lateral delineation of VOCs to the north of VOCs detected approximately 40 feet and 25 feet in STL-IV-1-59 and STL-IV-1-16, respectively.
		Soil	6		X														
		Soil	10		H														
4	SLBS1018	Soil	6		X														STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. VOCs detected at 2.5 feet bgs in soil vapor in SLSP03; vertical delineation of VOCs
		Soil	10		H														
4	SLBS1019	Soil	1						X	X			X						VOCs detected at 3.0 feet bgsin STL-IV-1-70; vertical delineation of VOCs. Metals and propellants other than NDMA not adequately studied; screening assessment.
		Soil	6		X				X				H						
		Soil	10		H				H				H						
4	SLBS1020	Soil	1	X			H		X	X									VOCs detected in soil vapor at 4.0 feet bgs in SV-6.5-1 and in SLSV09; vertical delineation of VOCs. SVOCs, TPH, and metals not adequately studied; screening assessment.
		Soil	6	X	X		H		X										
		Soil	10	H	H		H		H										
4	SLBS1021	Soil	1						X	X									STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. VOCs detected at 7.0 feet bgs in STL-IV-2-59, VOCs detected at 1.0 feet bgs in SB-STL-IV2-1, and VOCs detected at 7.0 feet bgs in STL-IV-2-42; vertical delineation of VOCs. Metals not adequately studied; screening assessment.
		Soil	6						X										
		Soil	10		X				H										
4	SLBS1022	Soil	6		X														STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. VOCs detected at 2.0 feet bgs in soil vapor in SLSV18; vertical delineation of VOCs
		Soil	10		H														
4	SLBS1023	Soil	1						X	X									STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. VOCs detected at 5.0 feet bgs in STL-IV-2-15; vertical delineation of VOCs. Metals not adequately studied; screening assessment.
		Soil	6						X										
		Soil	10		X				H										
4	SLBS1024	Soil	6																STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. VOCs detected at 5.0 feet bgs in soil vapor in SLSP05; vertical delineation of VOCs.
		Soil	10		X														
4	SLBS1025	Soil	6		X														STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. VOCs detected at 4.0 feet bgs in soil vapor in SLSV22; vertical delineation of VOCs
		Soil	10		H														
4	SLBS1026	Soil	6		X														STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. VOCs detected at 2.0 feet bgs in SLBS30; vertical delineation of VOCs

TABLE 2

Proposed Samples for STL-IV RFI Site

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Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Soil Grain Size (ASTM D422)	Chromium VI (EPA 7196A)	
		Soil	10		H														
4	SLBS1027	Soil	1		X														STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. Lateral delineation of VOCs to the east approximately 30 feet downgradient from VOCs detected in SLBS30.
		Soil	6		X														
		Soil	10		H														
4	SLSV1006	Soil Vapor	5			X													STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. Lateral delineation to the north of VOCs detected in soil vapor approximately 25 feet downgradient in SLSV22.
		Soil Vapor	10			X													
4	SLSV1007	Soil Vapor	5			X													STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. Lateral delineation to the north of VOCs detected in soil vapor approximately 25 feet downgradient in SLSP05
		Soil Vapor	10			X													
4	SLSV1008	Soil Vapor	5			X													STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. Lateral delineation to the north of VOCs detected in soil vapor approximately 25 feet downgradient in SLSV18
		Soil Vapor	10			X													
4	SLSV1009	Soil Vapor	5			X													STL-IV impoundments and associated channels were used to store cooling water for test stands (that used propellants, solvents, and fuel) and was recycled after each use. Lateral delineation to the north of VOCs detected in soil vapor approximately 20 feet downgradient in SLSP03
		Soil Vapor	10			X													
5	SLBS1028	Soil	1	X	X		X		X	X			X			X			Engine Test Stand 2 and Module Control Center operating surrounding engine test stands; hydrazine and VOCs stored and used. Metals, VOCs, SVOCs, TPHg, and propellants not studied; screening assessment.
		Soil	6	X	X		X		X				X			H			
		Soil	10	H	H		H		H				H			H			
5	SLBS1029	Soil	6		X														VOCs detected at 2.0 feet bgs in soil vapor in SLSV02; vertical delineation of VOCs.
		Soil	10		H														
5	SLBS1030	Soil	6		X														VOCs detected at 1.5 and 2.0 feet bgs in soil vapor samples from SLSV03 and SV-6.5-3, respectively; vertical delineation of VOCs.
		Soil	10		H														
5	SLSV1010	Soil Vapor	5			X													VOCs in soil vapor not adequately studied; screening assessment.
		Soil Vapor	10			X													
6	SLBS1031	Soil	1	X			H		X	X									Bldg. 3780 used for cleaning engine components. VOCs detected at 7.5 feet bgs in SV in SLSV04; vertical delineation of VOCs. TPH and Metals not studied in this area. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs.
		Soil	6	X			H		X										
		Soil	10	H	X		H		H										Tag bedrock
		Soil	20	H	H		H		H										
6	SLBS1032	Soil	1	X	X		H		X	X									Bldg. 3794 used as hot water boiler shelter. VOCs, metals, and TPH have not been adequately studied; site assessment. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs.
		Soil	6	X	X		H		X										
		Soil	10	H	H		H		H										

TABLE 2

Proposed Samples for STL-IV RFI Site

Sampling and Analysis Plan for STL-IV RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Soil Grain Size (ASTM D422)	Chromium VI (EPA 7196A)	
6	SLBX1001	Soil	1								X								Collect soil from 3 locations (~5 feet around pole location). Composite into 1 sample.
6	SLSV1011	Soil Vapor	5			X													Bldg. 3780 used for cleaning engine components. Bldg. 3794 used as hot water boiler shelter. Various tanks located in this area; VOCs in soil vapor not adequately studied; screening assessment.
		Soil Vapor	10			X													
6	SLSV1012	Soil Vapor	5			X													Bldg. 3780 used for cleaning engine components. Bldg. 3794 used as hot water boiler shelter. Various tanks located in this area; VOCs in soil vapor not adequately studied, screening assessment.
		Soil Vapor	10			X													
7	SLBS1033	Soil	1	X	X		H		X	X						X			Sump used as solvent catch system for solvents used in clean room (Bldg. 3274). Engine Test Stand 3 and Module Control Center operating surrounding engine test stands; hydrazine and VOCs stored and used. Metals, VOCs, SVOCs, and TPHg not studied; screening assessment.
		Soil	6	X	X		H		X							X			
		Soil	10	H	H		H		H							H			
7	SLBS1034	Soil	1	X	X		X		X	X			X			X			Module Control Center operating surrounding engine test stands; hydrazine and VOCs stored and used. Metals, VOCs, SVOCs, TPH, and propellants not studied; screening assessment.
		Soil	6	X	X		X		X				H			X			
		Soil	10	H	H		H		H				H			H			
7	SLSV1013	Soil Vapor	5			X													Hydrazine and VOCs stored and used. VOCs in soil vapor not adequately studied; screening assessment.
		Soil Vapor	10			X													
7	SLSV1014	Soil Vapor	5			X													Hydrazine and VOCs stored and used. VOCs in soil vapor not adequately studied; screening assessment.
		Soil Vapor	10			X													
8	SLBS1035	Soil	1	X	X		H			X	H					X			Module Control Center operating surrounding engine test stands; hydrazine and VOCs stored and used. Area by bldg. 3254 may have included a transformer. Metals, VOCs, SVOCs, and TPH, not studied; screening assessment.
		Soil	6	X	X		H		X		H					X			
		Soil	10	H	H		H		H		H					H			
8	SLBS1036	Soil	1	X	X		X		X	X			X			X			Module Control Center operating surrounding engine test stands; hydrazine and VOCs stored and used. Metals, VOCs, SVOCs, TPH, and propellants not studied; screening assessment.
		Soil	6	X	X		X		X				H			X			
		Soil	10	H	H		H		H				H			H			
9	SLBS1037	Soil	1	X	X		H		X	X						X			This area included a workshop, instrumentation shop (grinding, sawing metal/gasket cutting), and tool crib. Metals VOCs, and TPH not studied. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs. screening assessment.
		Soil	6	X	X		H		X							X			
		Soil	10	H	H		H		H							H			Tag bedrock
		Soil	20	H	H		H		H							H			
9	SLBS1038	Soil	1	X	X		H		X	X						X			This area included a workshop, instrumentation shop (grinding, sawing metal/gasket cutting), and tool crib. Metals VOCs, and TPH not studied. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs. Screening assessment.
		Soil	6	X	X		H		X							X			
		Soil	10	H	H		H		H							H			
9	SLBS1039	Soil	1	X	X		H		X	X						X			This area included a workshop, instrumentation shop (grinding, sawing metal/gasket cutting), and tool crib. Metals VOCs, and TPH not studied. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs. Screening assessment.

TABLE 2

Proposed Samples for STL-IV RFI Site

Sampling and Analysis Plan for STL-IV RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Soil Grain Size (ASTM D422)	Chromium VI (EPA 7196A)	
		Soil	6	X	X		H		X							X			
		Soil	10	H	H		H		H							H			
10	SLBS1040	Soil	1	X	X		H		X	X									Housed test cell 41. This area was used as general hazardous material storage. Metals, VOCs, and TPH not studied. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs. Screening assessment.
		Soil	6	X	X		H		X										
		Soil	10	H	H		H		H										
10	SLBS1041	Soil	1	X	X		H		X	X									Housed test cell 41. This area was used as general hazardous material storage. Metals, VOCs, and TPH not studied. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs. Screening assessment.
		Soil	6	X	X		H		X										
		Soil	10	H	H		H		H										
11	SLBS1042	Soil	1									X		X					This area was used as general explosives storage area; energetics not studied; screening assessment.
		Soil	6									X		X					
		Soil	10									H		H					
12	SLBS1043	Soil	1	X	X		H		X	X						X			Chemical uses include storage/usage of solvents, hydrazine. Engine test stand 4 used kerosene and VOCs detected down gradient in soil vapor; Upgradient lateral delineation of VOCs. TPH not adequately studied; screening assessment. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs.
		Soil	6	X	X		H		X							X			
		Soil	10	H	H		H		H							H			
		Soil	20	H	H		H		H							H			
12	SLBS1044	Soil	1	X	X		H		X	X			X			X			Chemical uses include storage/usage of solvents, hydrazine. Engine test stand 4 used kerosene and VOCs detected down gradient in soil vapor; Upgradient lateral delineation of VOCs (analysis contingent on SV data). TPH and propellants other than NDMA not adequately studied; screening assessment. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs.
		Soil	6	X	X		H		X				H			X			
		Soil	10	H	H		H		H				H			H			Tag bedrock
		Soil	20	H	H		H		H				H			H			
12	SLBS1045	Soil	1	X	X		H		X	X						X			Lateral delineation of TPH to the west of TPH detected approximately 15 feet in SLBS01. VOCs and metals not adequately studied; screening assessment.
		Soil	6	X	X		H		X							X			
		Soil	10	H	H		H		H							H			
12	SLBS1046	Soil	1		X		H		X	X						X			Chemical uses include storage/usage of solvents, hydrazine; Engine test stands used kerosene and TPHd detected at 1.0 feet bgs in SLBS01; vertical delineation of TPHd. VOCs not studied; screening assessment. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs.
		Soil	6	X	X		H		X							X			
		Soil	10	H	H		H		H							H			
12	SLBS1047	Soil	1	X	X		H		X	X			X			X			Chemical uses include storage/usage of solvents, hydrazine; Engine test stands used kerosene. PAHs detected in surface soil; vertical delineation of PAHs and TPH. VOCs and propellants other than NDMA not studied; screening assessment.
		Soil	6	X	X		H		X				H			X			
		Soil	10	H	H		H		H				H			H			

TABLE 2

Proposed Samples for STL-IV RFI Site

Sampling and Analysis Plan for STL-IV RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Soil Grain Size (ASTM D422)	Chromium VI (EPA 7196A)	
12	SLBS1048	Soil	1	X			H		X	X						X			Chemical uses include storage/usage of solvents, hydrazine; Engine test stands used kerosene and VOCs detected at 4.0 feet bgs in soil vapor in SLSV01; vertical delineation of VOCs. TPH not studied. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs.
		Soil	6	X	X		H		X							X			
		Soil	10	H	H		H		H							H			
12	SLSV1015	Soil Vapor	5			X													VOCs in soil vapor not adequately studied; screening assessment.
		Soil Vapor	10			X													
12	SLSV1016	Soil Vapor	5			X													VOCs in soil vapor not adequately studied; screening assessment.
		Soil Vapor	10			X													
13	SLBS1049	Soil	1						X	X						X			Runoff from upgradient buildings and test stands. VOCs detected at 1.0 feet bgs in SLBS34; Vertical delineation of VOCs. Metals not studied; screening assessment.
		Soil	6		X				X							X			
		Soil	10		H				H							H			
13	SLBS1050	Soil	1					X	X	X						X			Runoff from upgradient buildings and test stands. VOCs detected at 5.0 feet bgs in SLSV16; Vertical delineation of VOCs. Metals not studied; screening assessment.
		Soil	6					X	X							X			
		Soil	10		X			H	H							H			
13	SLBS1051	Soil	1					X		X						X			SVOCs and metals detected at 0.5 feet bgs in SLBS27; Vertical delineation of SVOCs and metals.
		Soil	6					X	X							X			
		Soil	10					H	H							H			
13	SLBS1052	Soil	1	X	X		H		X	X			X		X	X			Lateral delineation to the south, approximately 50 feet downgradient from SVOCs and metals detected above RBSL's and dioxins detected above background but below screening level RBSL's in SLBS27. Propellants other than NDMA not studied; screening assessment.
		Soil	6	X	X		H		X				H		X	X			
		Soil	10	X	H		H		H				H		X	H			
14	SLBS1053	Soil	1	X	X		X		X	X						X			Bldg. 3274 was a Lab/Clean room and bldg. 3265 was an engineering trailer. Tanks in the vicinity stored alcohol and RP-fuel. Solvents and general storage area; TPH, VOCs, and metals have not been investigated; screening assessment.. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs.
		Soil	6	X	X		X		X							X			
		Soil	10	H	H		H		H							H			
14	SLBS1054	Soil	1	X	X		H		X	X						X			Bldg. 3265 was an engineering trailer. Tanks in the vicinity stored alcohol and RP-fuel. Solvents and general storage area; TPH, VOCs, and metals have not been investigated; screening assessment. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs.
		Soil	6	X	X		H		X							X			
		Soil	10	H	H		H		H							H			
14	SLSV1017	Soil Vapor	5			X													Tanks in the vicinity stored alcohol and RP-fuel. VOCs in soil vapor not studied; screening assessment.
		Soil Vapor	10			X													
14	SLSV1018	Soil Vapor	5			X													Sample collected at the doorway of lab trailer. VOCs in soil vapor not studied; screening assessment.
		Soil Vapor	10			X													
15	SLBS1055	Soil	1	X	X		H			X									Miscellaneous storage, NTO storage area; Propellants have not been investigated. Site assessment.
		Soil	6	X	X		H												
		Soil	10	H	H		H												
15	SLBS1056	Soil	1	X	X		X			X			X						Miscellaneous storage, NTO storage area; VOCs and Propellants have not been investigated. Site assessment.
		Soil	6	X	X		X						H						
		Soil	10	H	H		H						H						

TABLE 2

Proposed Samples for STL-IV RFI Site

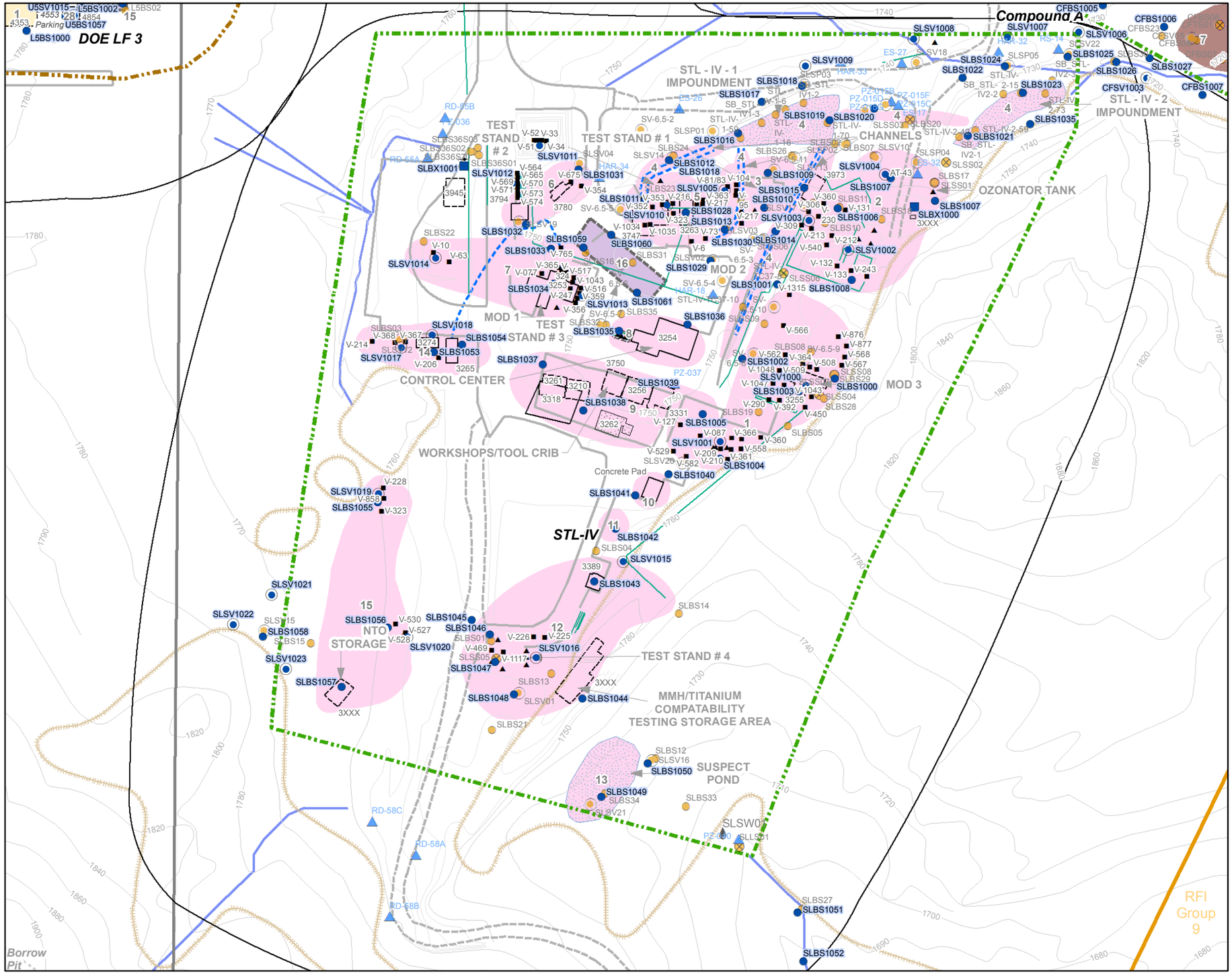
Sampling and Analysis Plan for STL-IV RFI Site, Group 5, Santa Susana Field Laboratory

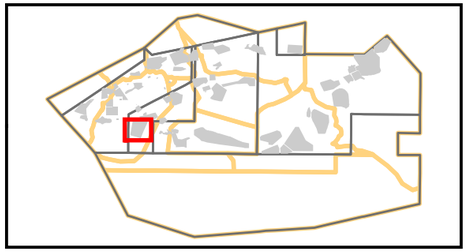
Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Soil Grain Size (ASTM D422)	Chromium VI (EPA 7196A)	
		Soil	20	H	H		H						H						
15	SLBS1057	Soil	1		X														Miscellaneous storage, NTO storage area; VOCs and Propellants have not been investigated. Site assessment.
		Soil	6		X														
		Soil	10		H														
15	SLBS1058	Soil	1	X			H		X	X									Vertical delineation of VOCs detected at 2.5 feet bgs in SV in SLSV15.
		Soil	6	X	X		H		X										
		Soil	10	H	H		H		H										
15	SLSV1019	Soil Vapor	5			X													Misc. tanks storage area. VOCs in SV not studied; screening assessment.
		Soil Vapor	10			X													
15	SLSV1020	Soil Vapor	5			X													Misc. tanks storage area. VOCs in SV not studied; screening assessment.
		Soil Vapor	10			X													
15	SLSV1021	Soil Vapor	5			X													Lateral delineation approximately 50 feet to the north for VOCs detected at 2.5 feet bgs in SV, in SLSV15.
		Soil Vapor	10			X													
15	SLSV1022	Soil Vapor	5			X													Lateral delineation approximately 50 feet to the west for VOCs detected at 2.5 feet bgs in SV, in SLSV15.
		Soil Vapor	10			X													
15	SLSV1023	Soil Vapor	5			X													Lateral delineation approximately 50 feet to the southeast for VOCs detected at 2.5 feet bgs in SV, in SLSV15.
		Soil Vapor	10			X													
16	SLBS1059	Soil	1	X			H		X	X						X			Leach field area; VOCs detected at 0.5 feet bgs in SLBS16; vertical delineation of VOCs. TPH and metals have not been investigated; screening assessment. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs.
		Soil	6	X	X		H		X							X			
		Soil	10	H	H		H		H							H			
16	SLBS1060	Soil	1	X	X		X		X	X			X			X			Leach field area; VOCs, TPH, metals, and propellants have not been investigated. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs. Screening assessment
		Soil	6	X	X		X		X				H			X			
		Soil	10	H	H		H		H				H			H			
16	SLBS1061	Soil	1	X	X		H		X	X						X			Leach field area; VOCs, TPH and metals have not been investigated. Contamination related to heavier motor oil or lubricant oil may contain detectable SVOCs.
		Soil	6	X	X		H		X							X			
		Soil	10	H	H		H		H							H			
Total Soil Samples for Analysis				70	98		14	5	93	51	2	2	13	2	3	49	0	0	
Total Soil Samples on Hold				41	63		98	3	53	0	3	1	26	1	0	30	0	0	
Total Soil Vapor Samples for Analysis				0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	
Total Soil Samples Collected			190																
Total Number of Locations			88																

Note:

X = Analyze sample

H = Hold sample analysis until instructed by PM





Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

Existing Sampling Locations

- Soil
- Soil - Composite
- Soil - Sediment
- Soil - Surface
- Air - Soil Vapor
- Air
- Groundwater
- Groundwater - Lysimeter
- Groundwater - Spring
- Water - Artificial
- Water - Discharge
- Water - Surface
- Water - Surface (Seep)
- Biological
- Other
- Sump

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

Proposed Sampling Locations

STL-IV

Date: February 20, 2008 WORKING DRAFT

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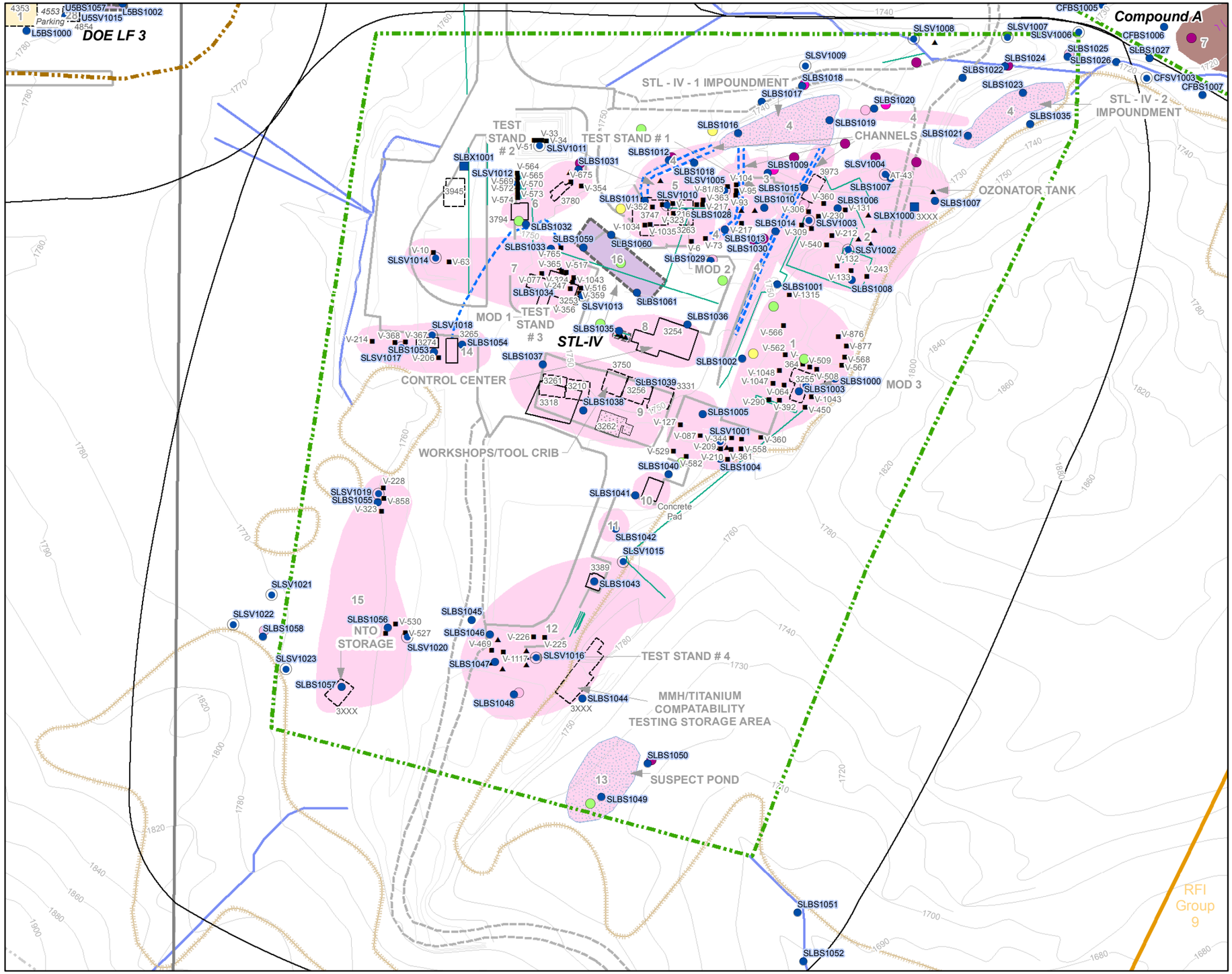
1 inch equals 100 feet

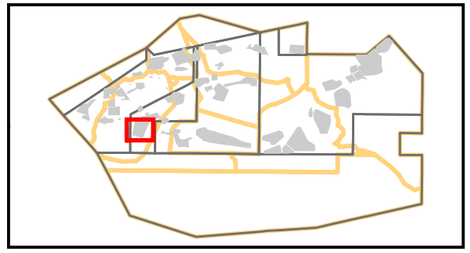
0 100 200 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure 1





Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

VOCs in Soil Vapor

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

VOCs in Soil Vapor and Proposed Sampling Locations

STL-IV

Date: February 21, 2008 WORKING DRAFT

1 inch equals 100 feet

0 100 200 Feet

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SANTA SUSANA FIELD LABORATORY

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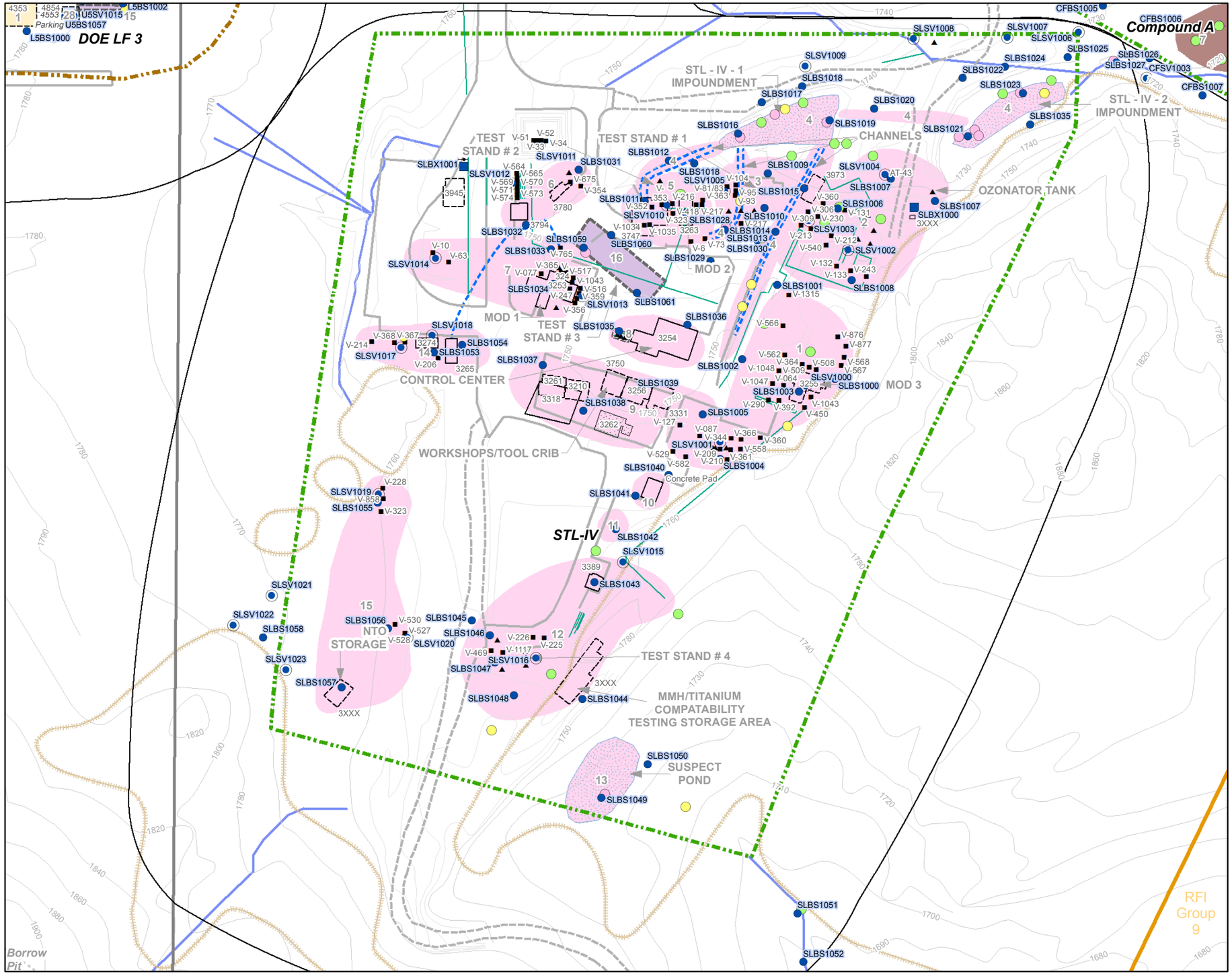
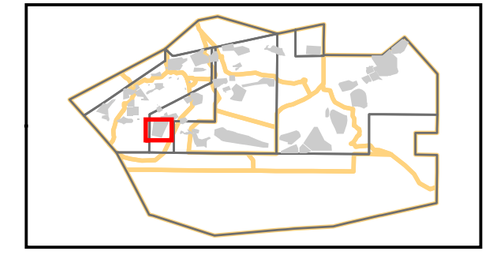
Figure 2





Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

VOCs in Soil

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

VOCs in Soil and Proposed Sampling Locations

STL-IV

Date: February 20, 2008

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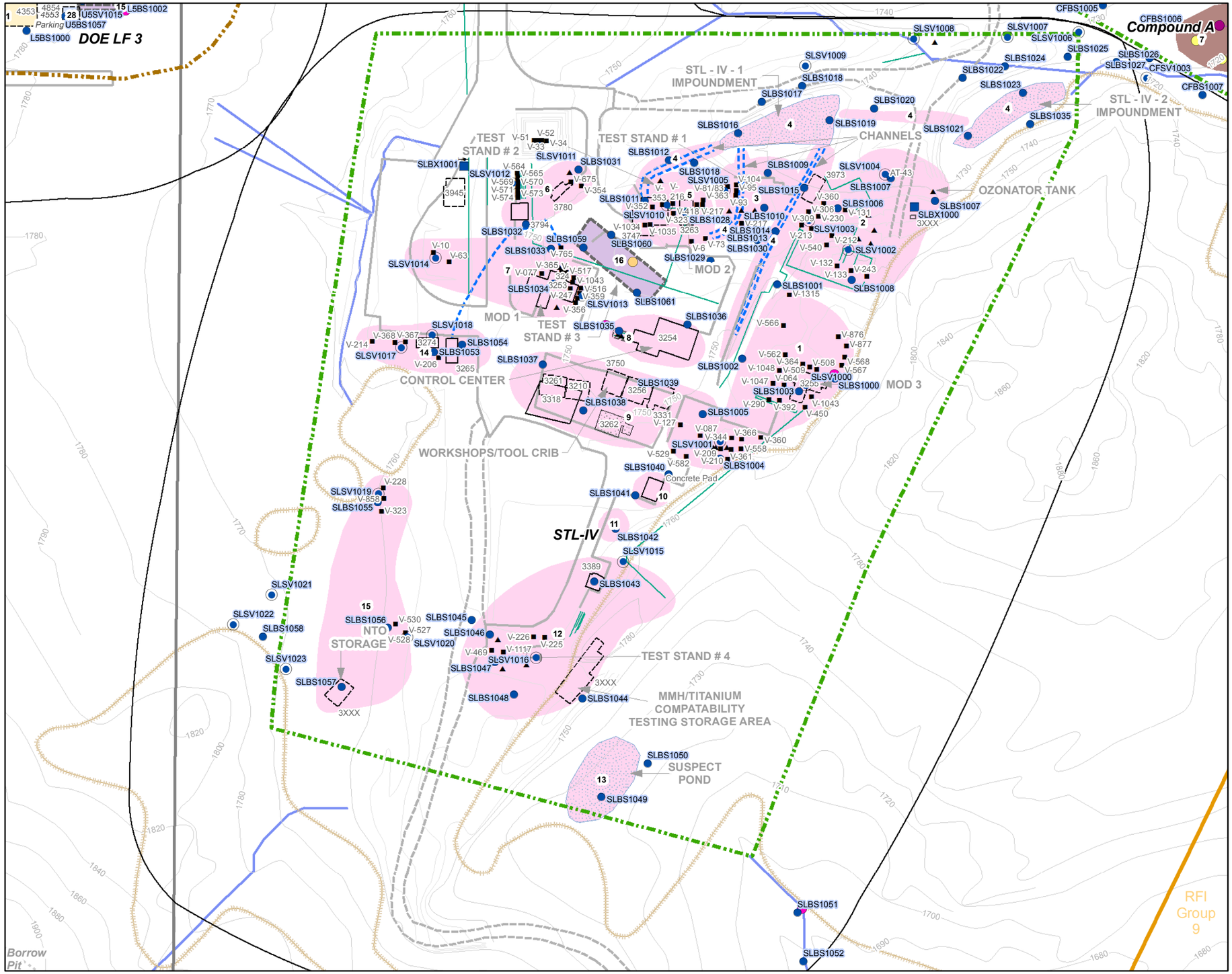
1 inch equals 100 feet

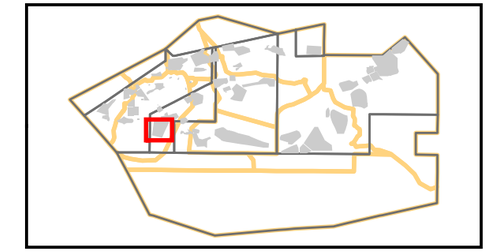
0 100 200 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure 3





Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

Metals in Soil

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

Metals in Soil and Proposed Sampling Locations

STL-IV

Date: February 20, 2008 WORKING DRAFT

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1 inch equals 100 feet

0 100 200 Feet

SANTA SUSANA FIELD LABORATORY

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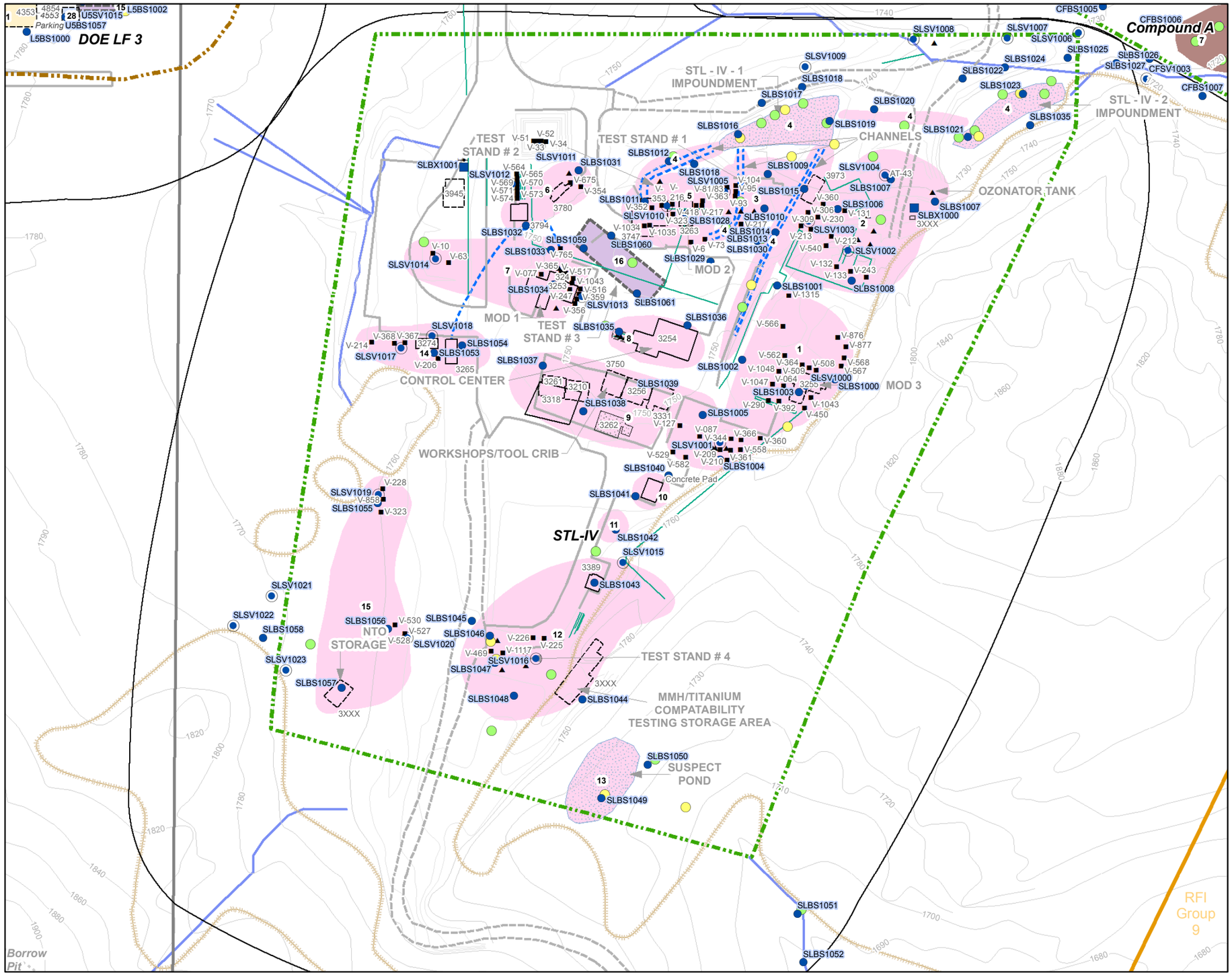
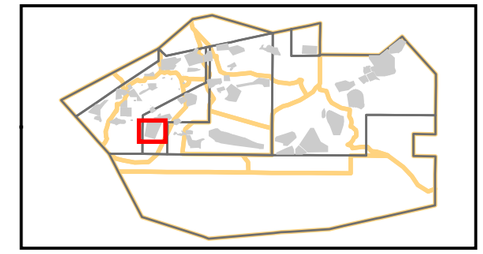
Figure 4





Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

TPH in Soil

- Detect > or equal to 100 mg/kg
- Detect < 100 mg/kg
- Non-detect

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

TPH in Soil and Proposed Sampling Locations

STL-IV

Date: February 20, 2008 WORKING DRAFT

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1 inch equals 100 feet

0 100 200 Feet

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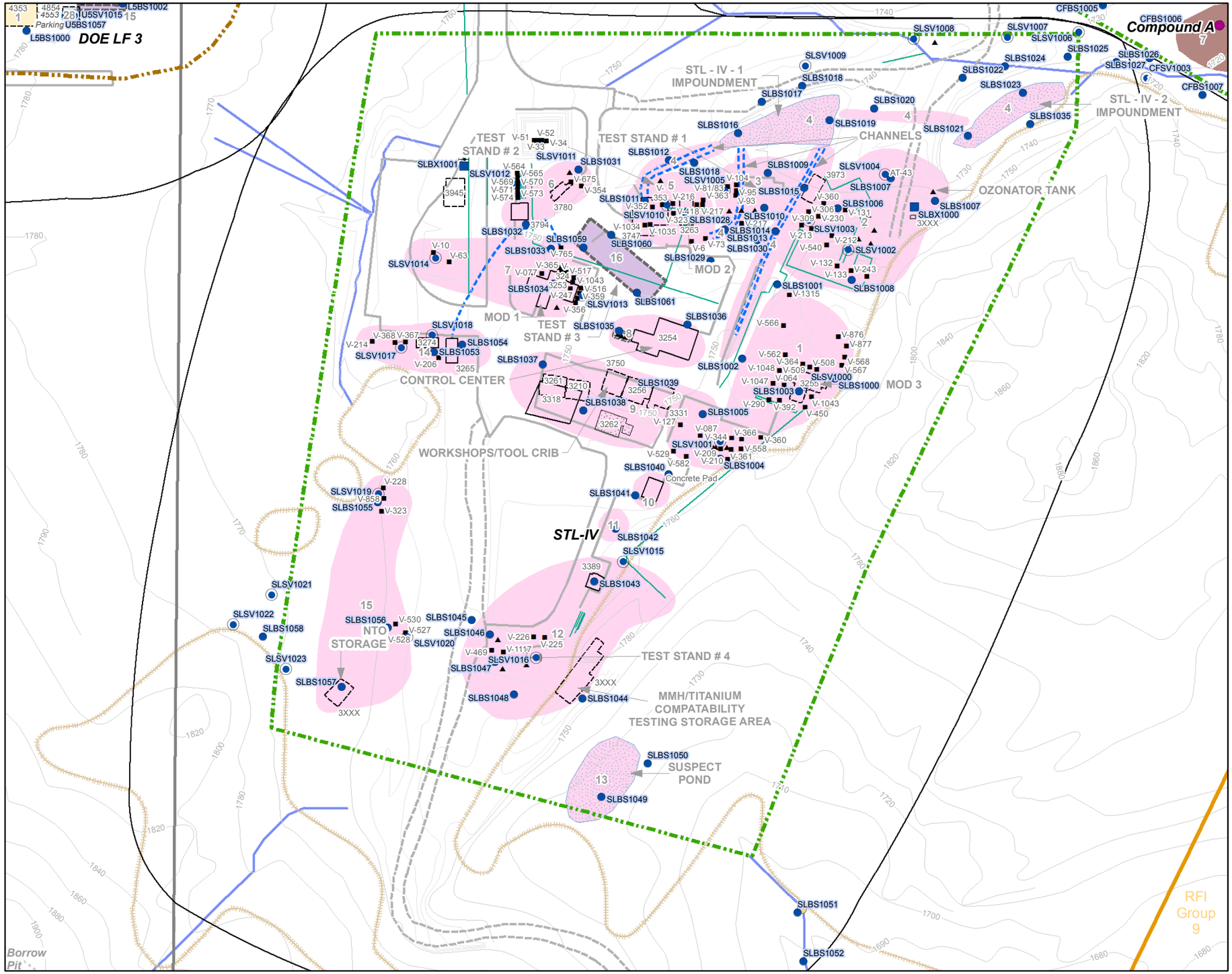
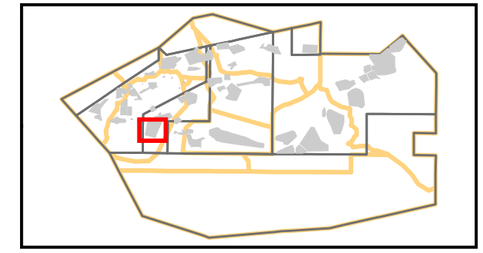
Figure 5





Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

Dioxins in Soil

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

Dioxins in Soil and Proposed Sampling Locations

STL-IV

Date: February 20, 2008 WORKING DRAFT

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1 inch equals 100 feet

0 100 200 Feet

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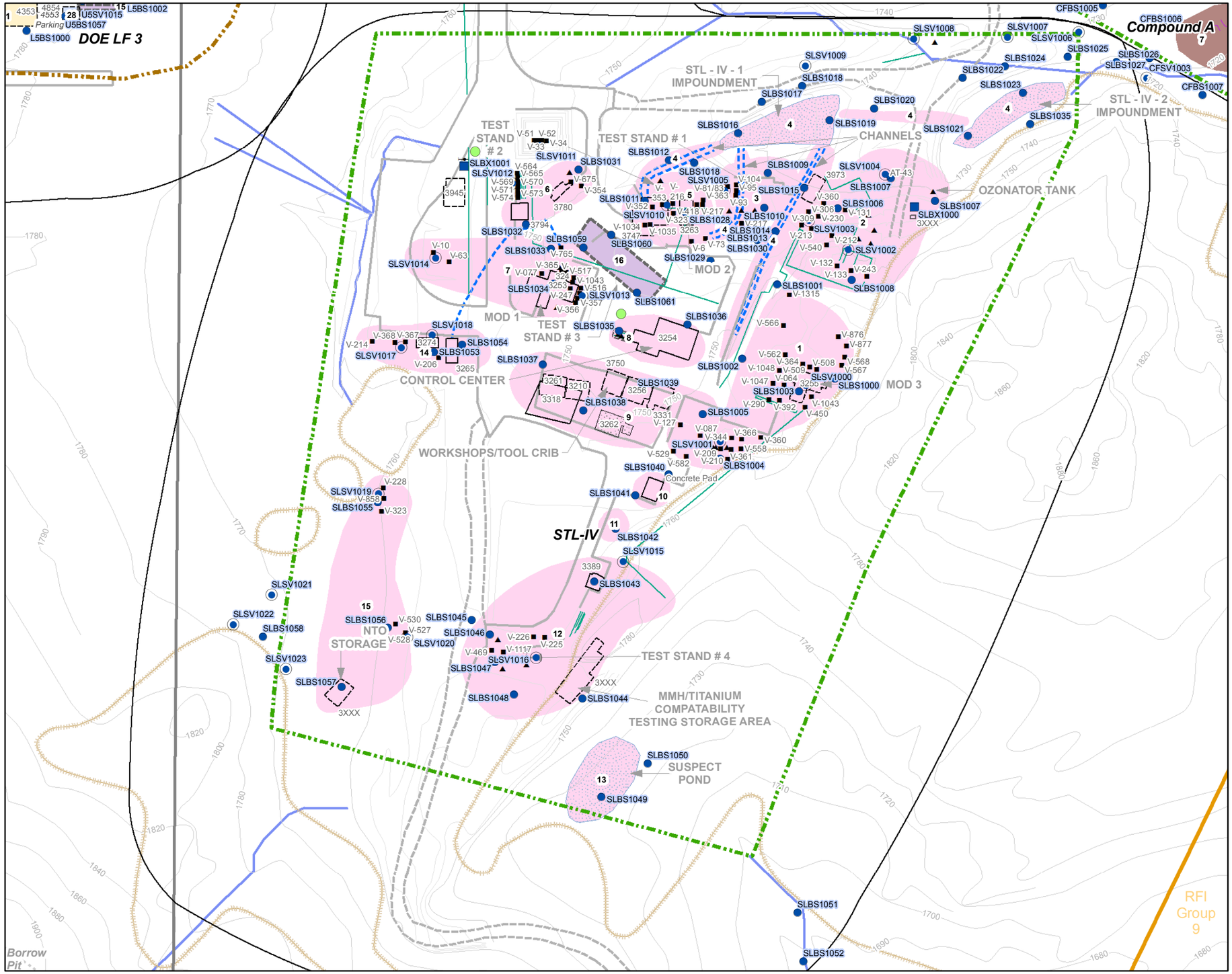
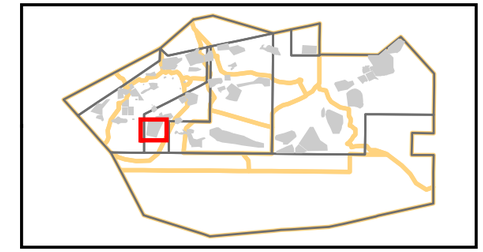
Figure 6





Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

PCBs in Soil

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

PCBs in Soil and Proposed Sampling Locations

STL-IV

Date: February 20, 2008 WORKING DRAFT

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1 inch equals 100 feet

0 100 200 Feet

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Figure 7

Sampling and Analysis Plan for the STL-IV Explosive Bunkers (Unaffiliated Feature), Group 5, Santa Susana Field Laboratory

PREPARED FOR: Boeing and DOE

PREPARED BY: CH2M HILL

DATE: February 22, 2008

Working Draft

This technical memorandum presents the sampling and analysis plan (SAP) for the STL-IV Explosive Bunkers (an unaffiliated feature) in Groups 5 and 9 at the Santa Susana Field Laboratory (SSFL) in Ventura County, California. The STL-IV Explosive Bunkers consist of former Storage Magazines 617, 618, and 619.

The purpose of this SAP is to describe the scope and rationale for the field investigation to address the data gaps presented in the *Integration and Synthesis Package for RFI Group 5, Santa Susana Field Laboratory, California* (I&S Package) (CH2M HILL, 2008) for the Unaffiliated Features in Group 5. This SAP addresses the STL-IV Explosive Bunkers (a Boeing feature) only; other unaffiliated features included in the I&S Package were determined to be Department of Energy (DOE) features and are addressed in a separate SAP (Attachment B-9). The I&S Package identified gaps where additional data are needed to support the RFI, risk assessments, and corrective measures studies following a comprehensive review of historical information and reports containing chemical use information, chemical data, and physical data.

The data gaps identified in the I&S Package for the STL-IV Explosive Bunkers are summarized in Table 1. To address these data gaps, CH2M HILL is proposing to collect nine soil samples. These samples will be collected from three locations (Table 1).

The specific samples proposed for collection are summarized in Table 2. For each sample location, Table 2 describes the matrix to be sampled, the depth from which samples are to be collected, analytical methods to be used, and the rationale for sample collection. The locations of samples proposed in Table 2 are presented in Figure 1.

Samples for which the need for laboratory analysis is contingent on the results of other samples are indicated in Table 2 with an "H," signifying they will be place on "Hold." These samples will be collected, but the laboratory will not analyze these samples until CH2M HILL has evaluated the need for lab analysis and provided direction to the lab to analyze the sample. The need for lab analysis will be contingent on the results of samples above or below the proposed sample.

Additional samples will be collected, if necessary, based on the results of the samples proposed in Table 2. Step-out and step-down samples will be collected, if necessary, as described in the Group 5 SAP (General Text). In addition, quality assurance/quality control samples will be collected as described in the Group 5 SAP (General Text).

TABLE 1

Data Gaps

Sampling and Analysis Plan for Boeing Area IV Leach Fields RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area Number	Data Gap	Chemical Data Gap	Physical Data Gap	Documentation Data Gap	Number Sample Locations to Address Data Gaps
7	STL-IV Explosive Bunkers - Chemical uses include energetics. The STL-IV Explosive Bunkers have not been investigated for the potential release of energetics.	X			3
				Total	**3**

Schedule

This SAP is scheduled for implementation in March and April 2008. In preparation for commencing the fieldwork, a Field Implementation Plan (FIP) was prepared and submitted for Boeing and DOE review on February 22, 2008.

References

CH2M HILL. 2008. *Integration & Synthesis Package for RFI Group 5, Santa Susana Field Laboratory, California*. January 3.

Working Draft

TABLE 2

Proposed Samples for STL-IV Explosive Bunkers (Unaffiliated Feature)

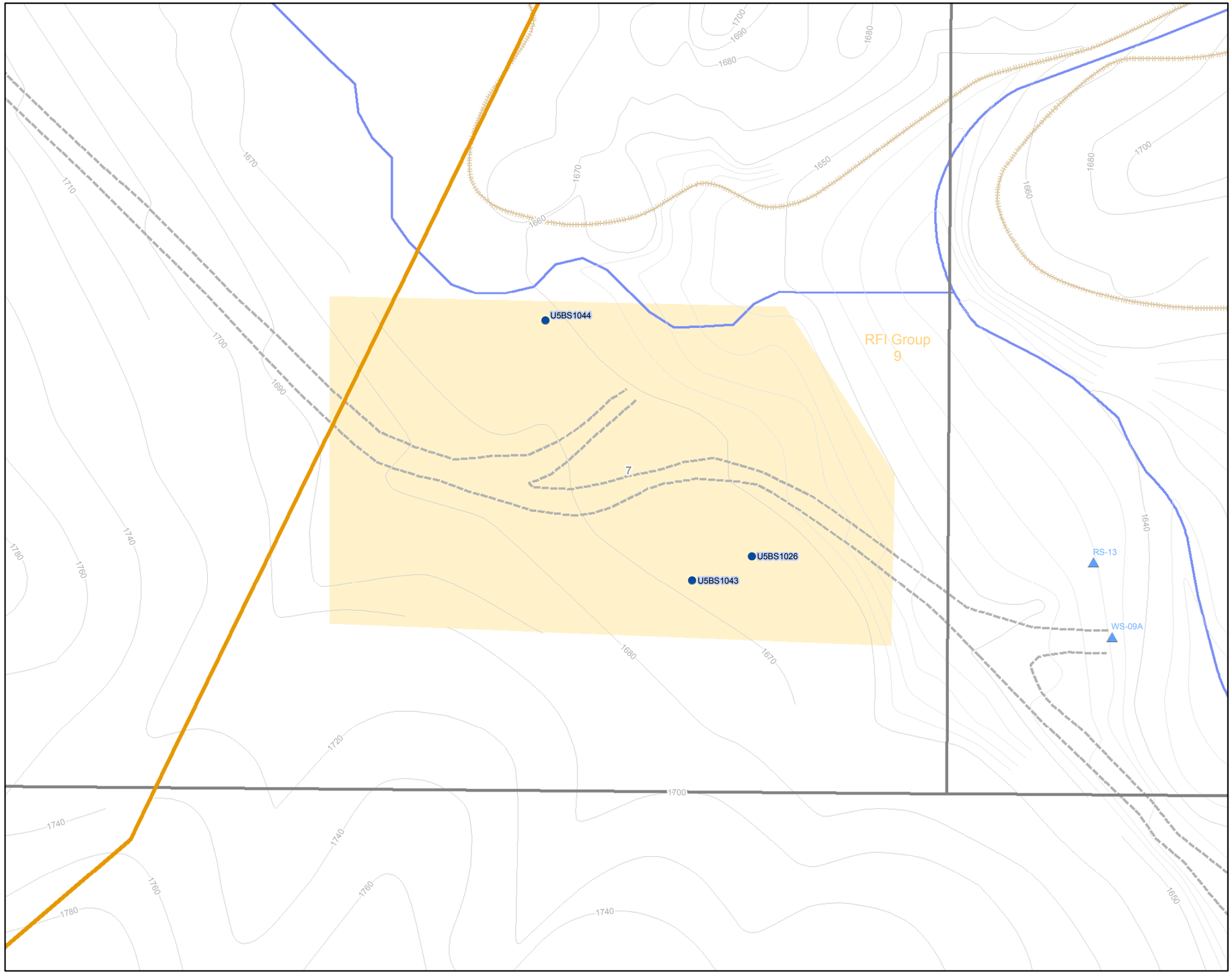
Sampling and Analysis Plan for the STL-IV Explosive Bunkers (Unaffiliated Feature), Group 5, Santa Susana Field Laboratory

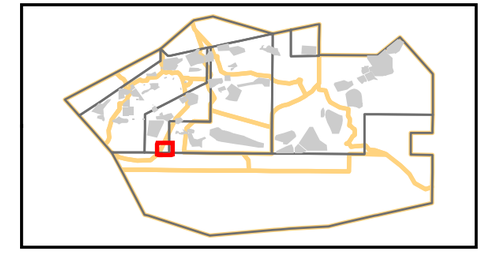
Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Soil Grain Size Analysis (ASTM D422)	Chromium VI (EPA 7196A)	
7	U5BS1043	Soil	1									X		X					The proposed sample location is at the suspected location of former Storage Magazines 618 and 619.
		Soil	6									X		X					
		Soil	10									H		H					Analysis of this sample will be contingent on the results for more shallow samples.
7	U5BS1044	Soil	1									X		X					The proposed sample location is at the suspected location of former Storage Magazine 617.
		Soil	6									X		X					
		Soil	10									H		H					Analysis of this sample will be contingent on the results for more shallow samples.
7	U5BS1026	Soil	1									X		X					The proposed sample location is at the suspected location of former Storage Magazines 618 and 619.
		Soil	6									X		X					
		Soil	10									H		H					Analysis of this sample will be contingent on the results for more shallow samples.
Total Soil Samples for Analysis												6		6					
Total Soil Samples on Hold												3		3					
Total Soil Vapor Samples for Analysis																			
Total Soil Samples Collected			9																
Total Number of Locations			3																

Note:

X = Analyze sample

H = Hold sample analysis until instructed by PM





Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

Existing Sampling Locations

- Soil
- Soil - Composite
- Soil - Sediment
- Soil - Surface
- Air - Soil Vapor
- Air
- Groundwater
- Groundwater - Lysimeter
- Groundwater - Spring
- Water - Artificial
- Water - Discharge
- Water - Surface
- Water - Surface (Seep)
- Biological
- Other
- Sump

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

Proposed Sampling Locations

STL-IV Explosive Bunkers

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1 inch equals 60 feet

0 60 120 Feet

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CH2MHILL

Figure 1

Sampling and Analysis Plan for Building 65 Metals Laboratory Clarifier RFI Site, Group 5, Santa Susana Field Laboratory

PREPARED FOR: Boeing and DOE

PREPARED BY: CH2M HILL

DATE: February 22, 2008

This technical memorandum presents the sampling and analysis plan (SAP) for the Building 65 Metals Laboratory Clarifier Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Site in Group 5 at the Santa Susana Field Laboratory (SSFL) in Ventura County, California. The site consists of Area of Concern (AOC) Building 65 Metals Laboratory Clarifier. The site includes UT-76 (former fuel oil underground storage tank [UST] site), which was located adjacent to the east side of the former clarifier. For the purposes of the RFI, the site also incorporates the following nearby features: Building 4062 (Non-Nuclear Reactor Qualification Test Building), Building 4066 (Instrument Repair and Calibration Building), UT-70 (former fuel oil UST site), and Substation 4762A.

The purpose of this SAP is to describe the scope and rationale for the field investigation to address the data gaps presented in the *Integration and Synthesis Package for RFI Group 5, Santa Susana Field Laboratory, California* (I&S Package) (CH2M HILL, 2008) for the Building 65 Metals Laboratory Clarifier site. The I&S Package identified gaps where additional data are needed to support the RFI, risk assessments, and corrective measures studies following a comprehensive review of historical information and reports containing chemical use information, chemical data, and physical data for the RFI site.

The data gaps identified in the I&S Package for the Building 65 Metals Laboratory Clarifier Site are summarized in Table 1. Data gaps were generally identified for chemical use areas within each RFI site. As presented in Table 1, chemical data gaps were identified for six of the seven chemical use areas identified for the site.

To address these data gaps, CH2M HILL is proposing to collect 30 soil samples and 10 soil vapor samples from a total of 16 locations across the site (Table 1). The specific samples proposed for collection at each chemical use area are summarized in Table 2. For each sample location at each chemical use area, Table 2 describes the matrix to be sampled, the depth from which samples are to be collected, analytical methods to be used, and the rationale for sample collection. As presented in Table 2, more than one sample might be necessary to address the data gaps identified for each chemical use area.

Working Draft

TABLE 1

Data Gaps

Sampling and Analysis Plan for Building 65 Metals Laboratory Clarifier RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area Number	Data Gap	Chemical Data Gap	Physical Data Gap	Documentation Data Gap	Number Sample Locations to Address Data Gaps
1	Building 4065 Clarifier. Mercury was detected in a surface soil sample collected downslope from the former clarifier location at a concentration greater than background and the ecological RBSL. The lateral and vertical extents of mercury in this area require further characterization.	X			5
2	Building 4065. The potential for releases in the Building 65 footprint has not been evaluated fully. Soil vapor sampling was performed at one location in the southeast portion of the building (no VOCs detected). Further investigation is needed to assess whether historical operations in this building resulted in impacts to the environment (evaluate VOCs, total petroleum hydrocarbon [TPH], metals, and pH in soil).	X			3
3	UT-76. The tank has been removed and soil sampling performed. Elevated concentrations of petroleum hydrocarbons were detected in soil samples at the site and, as such, further evaluation for the presence of PAHs in soil is needed. The site also requires further investigation for the presence of VOCs in soil vapor to support site closure. The status of the regulatory closure of the site is unknown.	X		X	2
4	UT-70. The tank has been removed and soil sampling performed; no VOCs or petroleum hydrocarbons detected. The site has not received regulatory closure approval (documentation data gap). Soil vapor sampling for VOCs in soil vapor is required to support site closure (detection limits of previous samples not low enough for risk assessment purposes).	X		X	2
5	Transformer 4762. Soil sampling has been performed and no polychlorinated biphenyls (PCBs) were detected. The use period for this transformer is not known. No other data gaps appear for this chemical use area. This area is considered eligible for No Further Action.			X	0
6	Building 4066. The potential for impacts associated with historical chemical use at this building and the release of battery acid have not been evaluated. Investigation is needed to determine if historical operations in this building have resulted in impacts to the environment (evaluate VOCs, TPH, metals, and pH in soil).	X			2

Working Draft

TABLE 1

Data Gaps

Sampling and Analysis Plan for Building 65 Metals Laboratory Clarifier RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area Number	Data Gap	Chemical Data Gap	Physical Data Gap	Documentation Data Gap	Number Sample Locations to Address Data Gaps
7	Building 4062. Available records do not specify the types of chemicals that could have been used at this building. The potential for releases in the building footprint has not been evaluated. Investigation is needed to determine if historical operations in this building have resulted in impacts to the environment.	X		X	2
				Total	**16**

The locations of samples proposed in Table 2 are presented in Figure 1. In addition, Figures 2 through 7 present the locations of the proposed samples relative to the locations of previous samples analyzed for, as applicable, volatile organic compounds (VOCs) in soil and soil vapor, metals in soil, petroleum hydrocarbons in soil, dioxins in soil, and polychlorinated biphenyls (PCBs) in soil. The previous sample location symbols in Figures 2 through 7 are color coded to indicate if the previous sample results (at any depth) were detected, were detected below risk-based screening levels (RBSLs) or background concentrations (for metals and dioxins), or were detected above RBSLs and/or background concentrations.

Samples for which the need for laboratory analysis is contingent on the results of other samples are indicated in Table 2 with an "H," signifying they will be placed on "Hold." These samples will be collected, but the laboratory will not analyze these samples until CH2M HILL has evaluated the need for lab analysis and provided direction to the lab to analyze the sample. The need for lab analysis will be contingent on the results of samples above or below the proposed sample.

Additional samples will be collected, if necessary, based on the results of the samples proposed in Table 2. Step-out and step-down samples will be collected, if necessary, as described in the Group 5 SAP (general text). In addition, quality assurance/quality control samples will be collected as described in the general text of the Group 5 SAP.

Schedule

This investigation is scheduled for March and April 2008. Prior to commencing the fieldwork, a Field Implementation Plan (FIP) will be prepared and submitted for Boeing and Department of Energy (DOE) review. The contents of the FIP are described in more detail in the general text of the Group 5 SAP. The FIP is scheduled to be submitted to Boeing and DOE in February 2008.

References

CH2M HILL. 2008. *Integration & Synthesis Package for RFI Group 5, Santa Susana Field Laboratory, California*. January 3.

Working Draft

Working Draft

TABLE 2

Proposed Samples for Building 65 Metals Laboratory Clarifier RFI Site

Sampling and Analysis Plan for Building 65 Metals Laboratory Clarifier RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Mercury (EPA 7471A)	Chromium VI (EPA 7196A)	
1	MCBS1001	Soil	6														X		Former Building 65 Metals Laboratory Clarifier. The clarifier received wastewater generated in Building 4065, where chemical uses included VOCs, metals, acids, bases, and kerosene. Proposed soil boring is co-located with previous surface soil sample location MCBS01, which was positioned downslope of the former clarifier to assess potential contaminant migration from the clarifier area. Mercury exceeded background and Eco RBSL in this previous surface soil sample. The first proposed soil sample depth (6 feet bgs) is a step-down sample to assess vertical distribution of mercury at this previous sample location.
		Soil	10														H		Analysis of this sample contingent on results for shallower sample.
1	MCBS1002	Soil	1														X		Step out sample location for previous sample MCBS01. Location is approx. 50 feet east and downslope from previous sample.
		Soil	6														X		
		Soil	10														H		Analysis of this sample contingent on results for shallower sample.
1	MCBS1003	Soil	1														X		Step out sample for previous sample MCBS01. Location is a step out approx. 20 feet to the north from the previous sample.
		Soil	6														X		
		Soil	10														H		Analysis of this sample contingent on results for shallower sample.
1	MCBS1004	Soil	1														X		Step out sample for previous sample MCBS01. Location is a step out approx. 20 feet to the south from the previous sample. Boring is positioned within an existing asphalt-paved street; however, previous sample MCBS01 (elevated mercury) was collected at a location that was underlying pavement during the operational period of the former metals clarifier. Therefore, impacted soil may exist beneath the roadway pavement in this area.
		Soil	6														X		
		Soil	10														H		Analysis of this sample contingent on results for shallower sample.
1	MCBS1005	Soil	1														X		Step out sample for previous sample MCBS01. Location is a step out approx. 20 feet to the west and upslope from the previous sample.
		Soil	6														X		
		Soil	10														H		Analysis of this sample contingent on results for shallower sample.
2	MCBS1000	Soil	1	X	X		X		X	X									Building 4065. Chemical uses at this former building included VOCs, metals, acids, bases, and kerosene. Soil vapor sampling previously performed in the southeast corner of the building (MCVS01), positioned at floor drain pipe outlet to clarifier. Low concentrations of VOCs detected less than RBSLs in soil vapor; therefore, no additional soil vapor sampling proposed at this location at Building 4065 (one additional soil vapor sampling location proposed elsewhere in building, as described below). No soil sampling has been performed to date in the Building 4065 footprint. The proposed soil sample location is co-located with previous soil vapor location MCVS01.
		Soil	6	X	X		X		X										
		Soil	10	H	H		H		H										Analysis of this sample contingent on results for shallower samples.
2	MCBS1007	Soil	1	X	H		X		X	X									See above. Proposed 2nd soil boring at Building 4065 is positioned in the northwest portion of former building footprint based on the presence of previous laboratory operational area.
		Soil	6	X	H		X		X										

TABLE 2

Proposed Samples for Building 65 Metals Laboratory Clarifier RFI Site

Sampling and Analysis Plan for Building 65 Metals Laboratory Clarifier RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Mercury (EPA 7471A)	Chromium VI (EPA 7196A)	
		Soil	10	H	H		H		H										Analysis of this sample contingent on results for shallower samples.
2	MSSV1001	Soil Vapor	5			X													See above. Soil vapor sampling location is co-located with proposed Boring MCBS1007 in northwest corner of former Building 4065 footprint.
		Soil Vapor	10			X													
3	MCBS1006	Soil	6		H		X												Former UST UT-76. PAH analysis in soil proposed to further assess previous elevated TPH-D detect (1,500 mg/kg). Proposed boring is positioned beneath former UST (location with greatest potential for soil impacts; previous TPH-D detect occurred approx. 20 feet west of tank). VOCs to be analyzed in soil if elevated VOCs detected in soil vapor (see below).
		Soil	10		H		H												Analysis of this sample contingent on results for shallower sample.
3	MCSV1000	Soil Vapor	5			X													Former UST UT-76. No VOC sample data previously collected at tank location. Proposed soil vapor location is co-located with former UST location.
		Soil Vapor	10			X													
4	U5SV1202	Soil Vapor	5			X													UST UT-70. This former fuel oil tank has been removed. Previous VOC soil sampling data detection limits do not meet risk assessment criteria. Therefore, soil vapor sampling will be performed at 1 location, co-located with approximate center of previous UST location.
		Soil Vapor	10			X													
4	U5BS1202	Soil	6		H		X												See above. Boring co-located with proposed boring U5BS1202. Initial sample depth is 5 feet bgs (beneath former UST). Soil samples will be held and analyzed for VOCs if VOCs detected in soil vapor.
		Soil	10		H		H												Analysis of this sample contingent on results for shallower sample.
5																			Transformer 4762A. Results for soil sampling performed at this former substation location indicate that no further investigation is needed.
6	U5BS1200	Soil	1	X	X		X		X	X									Building 4066 was used as a non-radiological instrument repair and calibration building (instrument lab). Types of chemical used at this building are unknown. A battery acid release occurred at an unknown location at this building. No soil sampling has occurred within the former building footprint. A large doorway was located at the northeast corner of the building. The proposed soil sampling location is positioned at this location.
		Soil	6	X	X		X		X										
		Soil	10	H	H		H		H										Analysis of this sample contingent on results for shallower samples.
6	U5SV1200	Soil Vapor	5			X													No previous soil vapor sampling performed at Building 4066. Proposed soil vapor sampling location is co-located with proposed soil boring U5BS1200 (see above).
		Soil Vapor	10			X													
7	U5BS1201	Soil	1	X	X		X		X	X									Building 4062 was used as a non-nuclear reactor qualification testing facility. There are no known chemical uses at this building. Access to the building occurred through two doors on the southwest side of the building. At the easternmost door, an photograph shows damaged exterior concrete leading to the doorway. The proposed soil boring positioned at this location.
		Soil	6	X	X		X		X										
		Soil	10	H	H		H		H										Analysis of this sample contingent on results for shallower samples.
7	U5SV1201	Soil Vapor	5			X													No previous soil vapor sampling performed at Building 4062. Proposed soil vapor sampling location is co-located with proposed soil boring U5BS1201 (see above).
		Soil Vapor	10			X													

TABLE 2

Proposed Samples for Building 65 Metals Laboratory Clarifier RFI Site

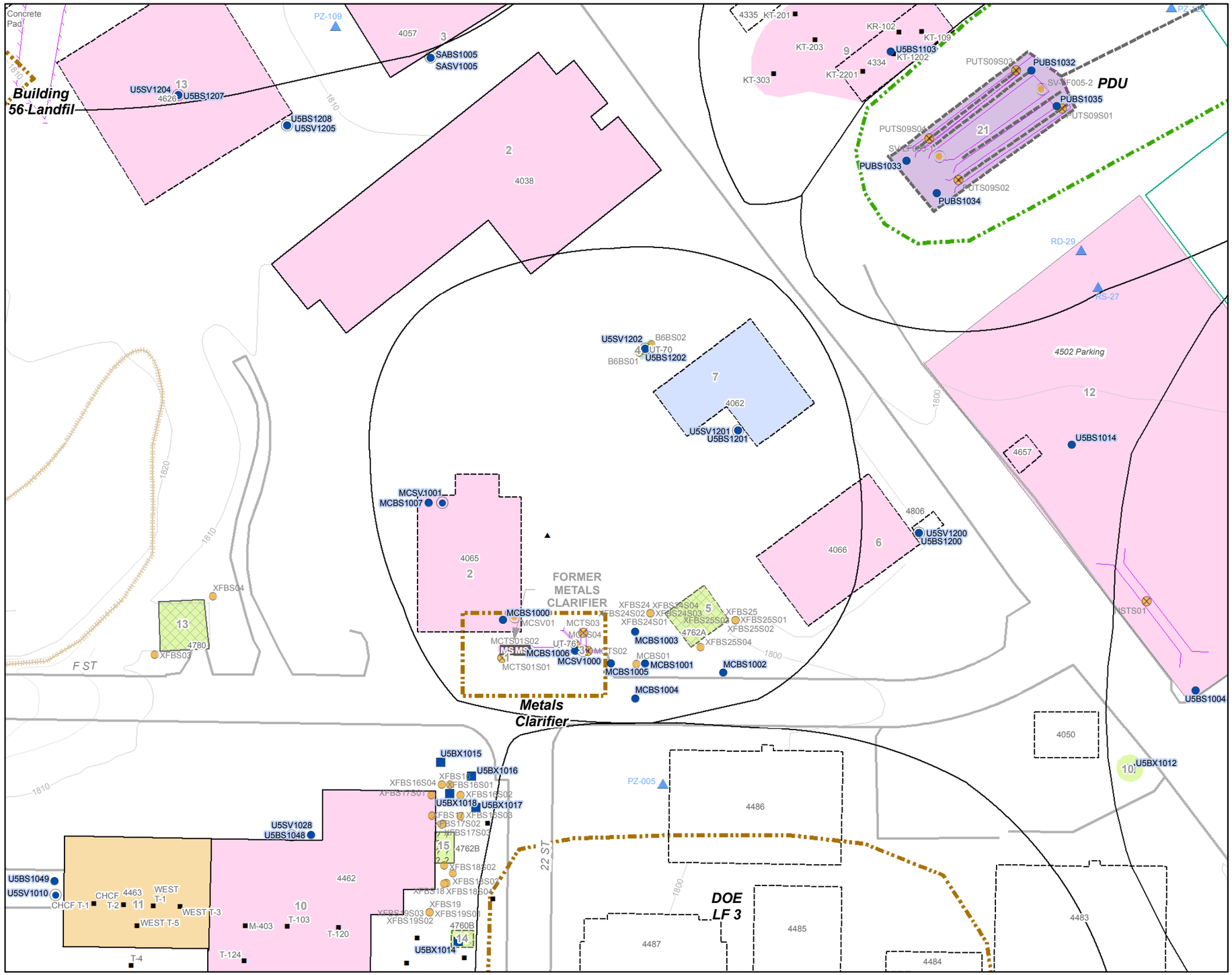
Sampling and Analysis Plan for Building 65 Metals Laboratory Clarifier RFI Site, Group 5, Santa Susana Field Laboratory

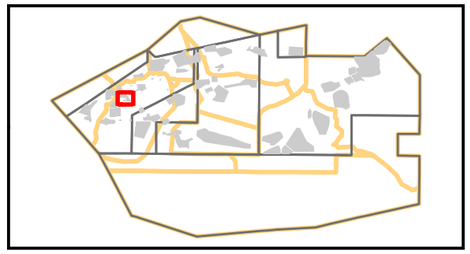
Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Mercury (EPA 7471A)	Chromium VI (EPA 7196A)	
Total Soil Samples for Analysis				8	6		10		8	4							9		
Total Soil Samples on Hold				4	10		6		4								5		
Total Soil Vapor Samples for Analysis						10													
Total Soil Samples Collected			30																
Total Number of Locations			16																

Note:

X = Analyze sample

H = Hold sample analysis until instructed by PM





Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

Existing Sampling Locations

- Soil
- Soil - Composite
- Soil - Sediment
- Soil - Surface
- Air - Soil Vapor
- Air
- Groundwater
- Groundwater - Lysimeter
- Groundwater - Spring
- Water - Artificial
- Water - Discharge
- Water - Surface
- Water - Surface (Seep)
- Biological
- Other
- Sump

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

Proposed Sampling Locations

Metals Clarifier

Date: February 20, 2008 WORKING DRAFT

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1 inch equals 60 feet

0 60 120 Feet

SANTA SUSANA FIELD LABORATORY

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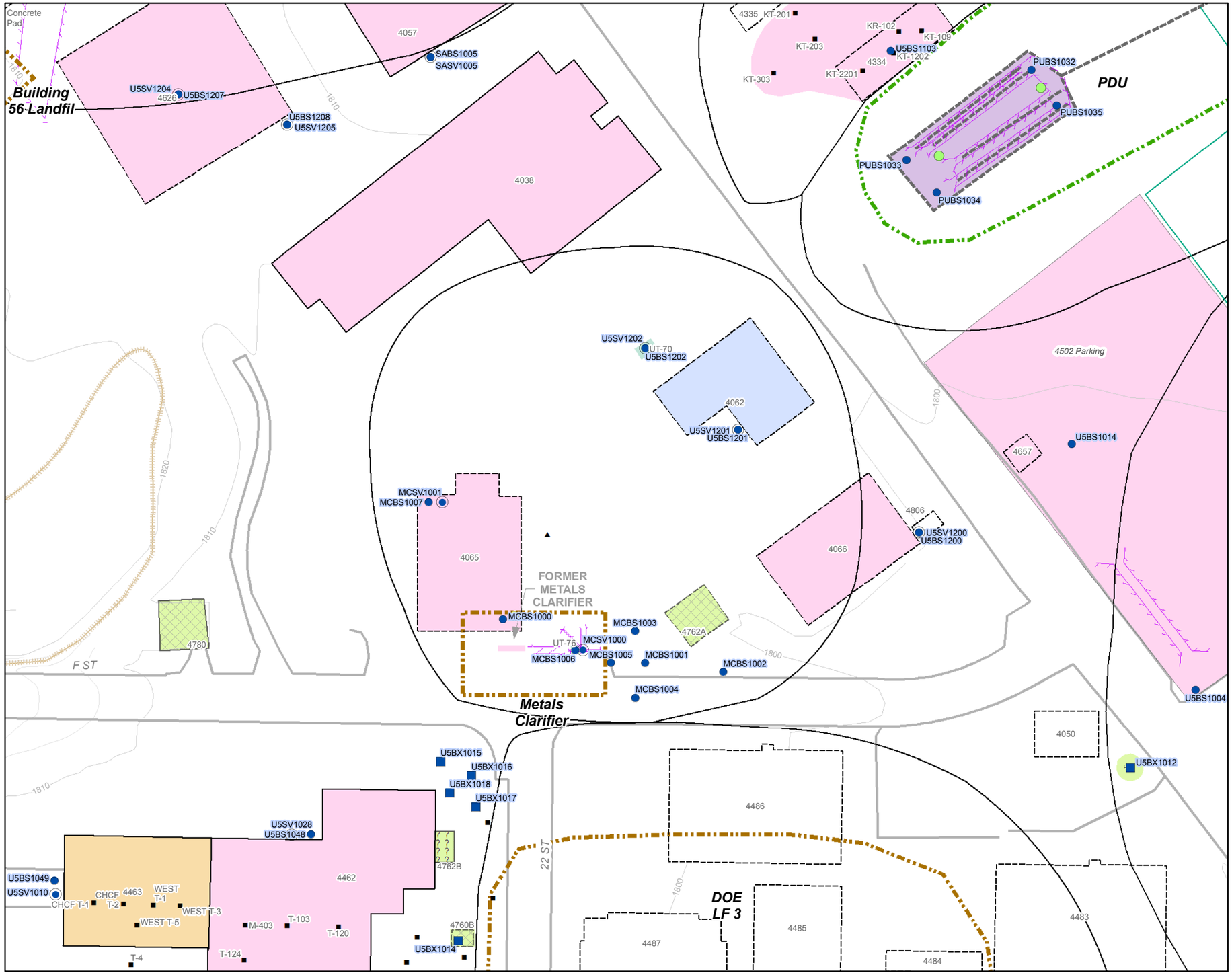
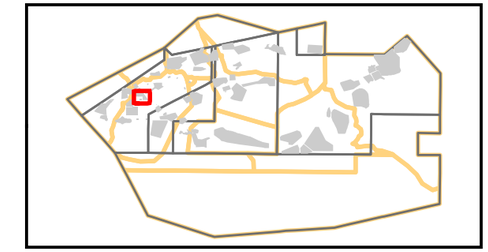
Figure 1





Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

VOCs in Soil Vapor

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

VOCs in Soil Vapor and Proposed Sampling Locations

Metals Clarifier

Date: February 21, 2008 WORKING DRAFT

1 inch equals 60 feet

0 60 120 Feet

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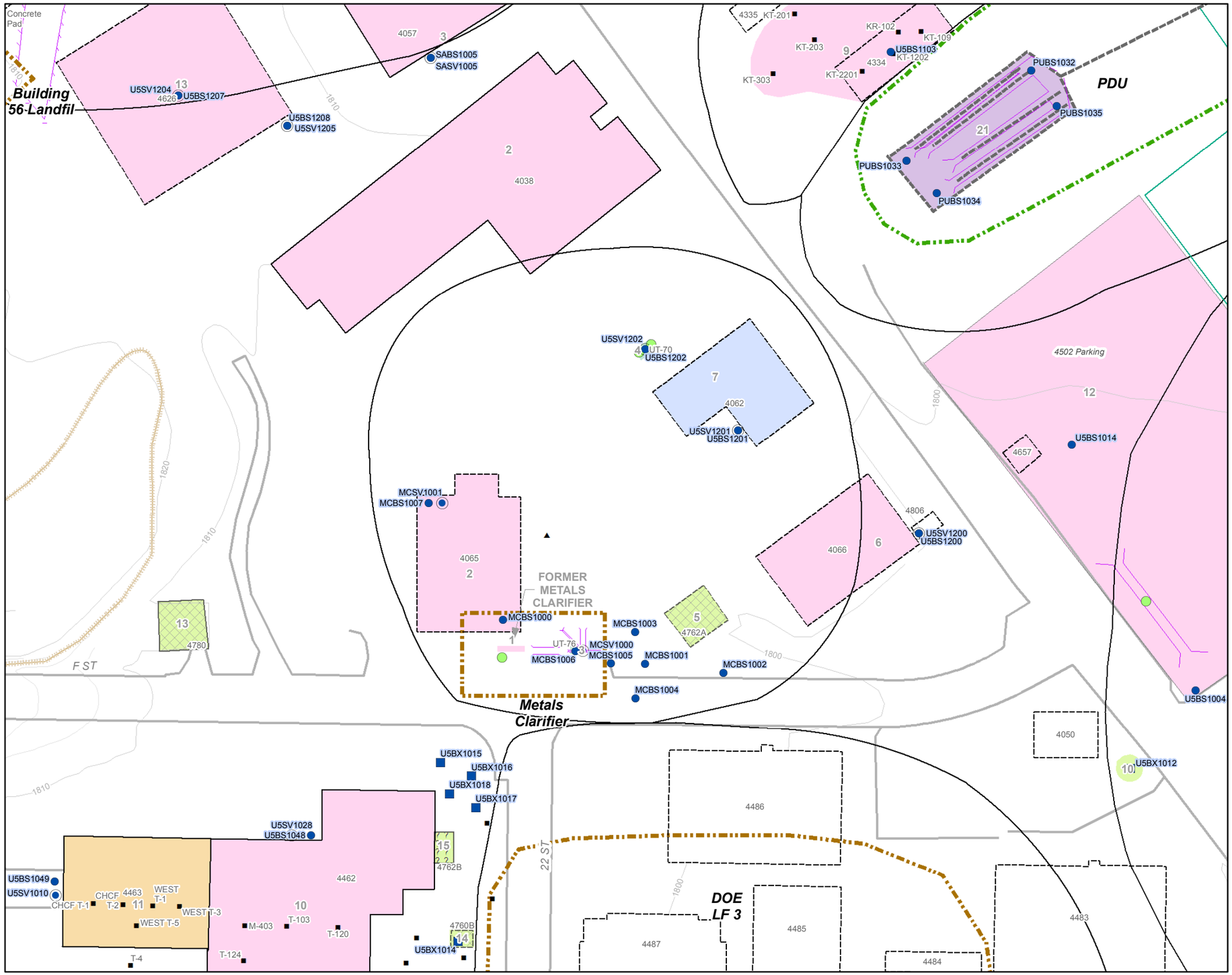
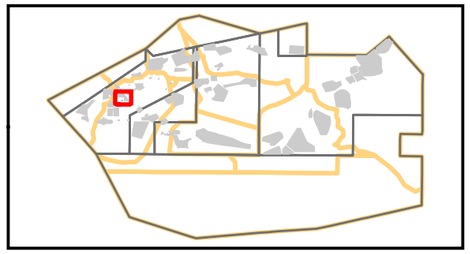
Figure 2





Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

VOCs in Soil

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

VOCs in Soil and Proposed Sampling Locations

Metals Clarifier

Date: February 20, 2008 WORKING DRAFT

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1 inch equals 60 feet

0 60 120 Feet

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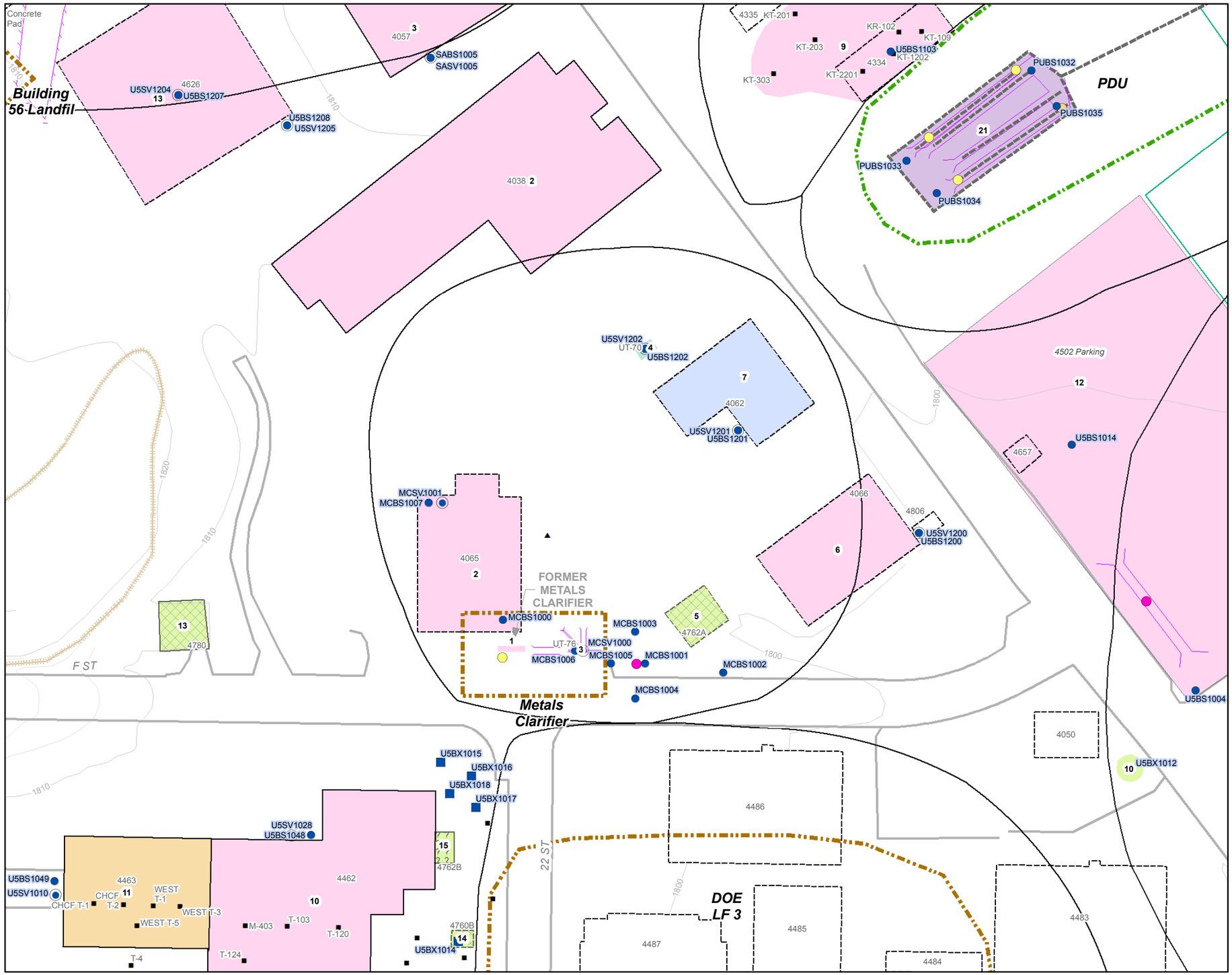
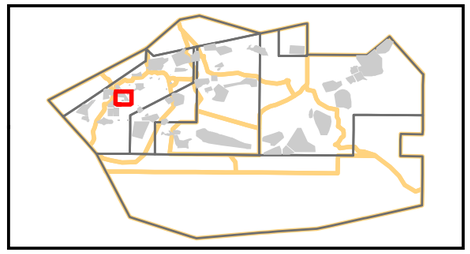
Figure 3





Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

Metals in Soil

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

Metals in Soil and Proposed Sampling Locations

Metals Clarifier

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1 inch equals 60 feet

0 60 120 Feet

SANTA SUSANA FIELD LABORATORY

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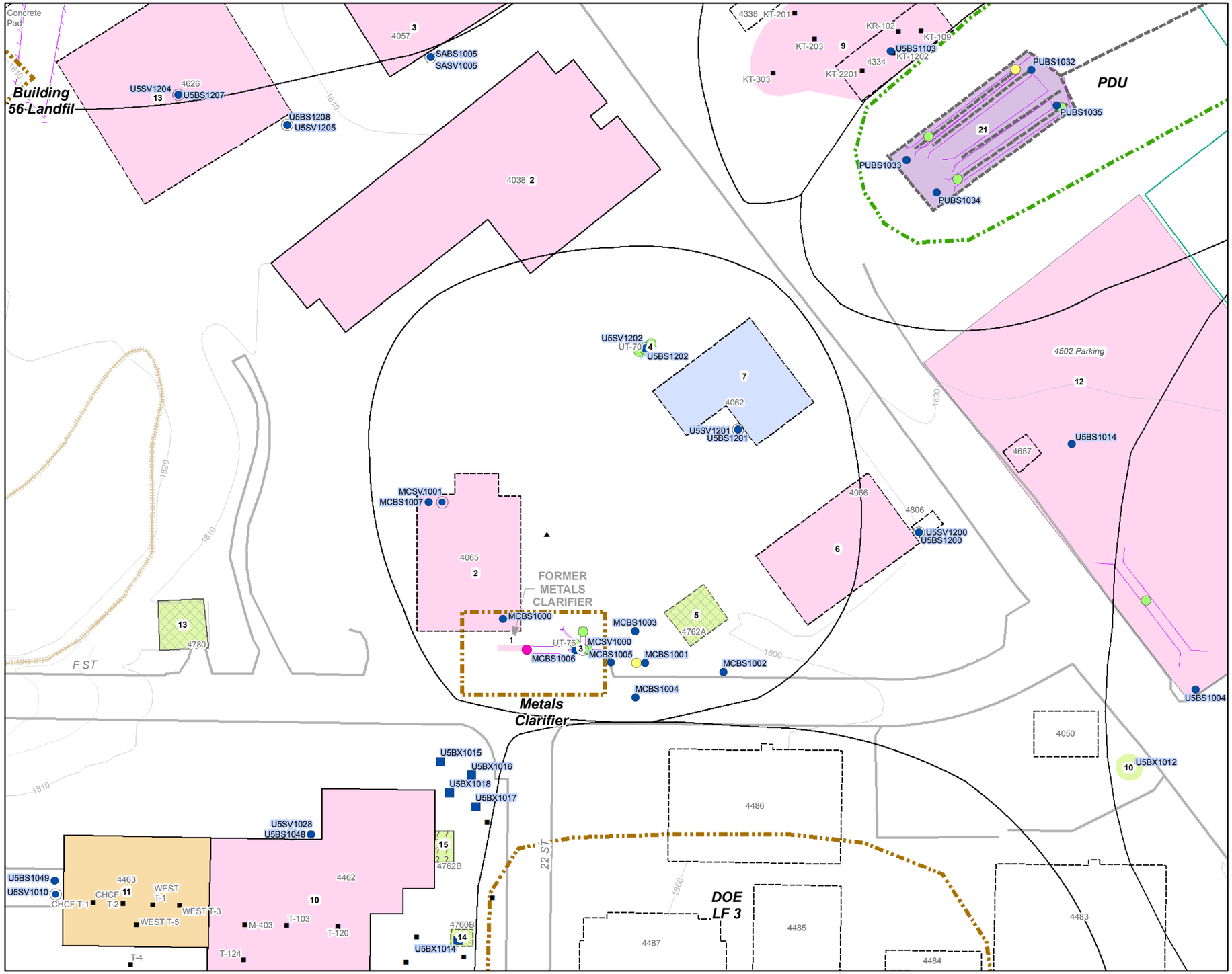
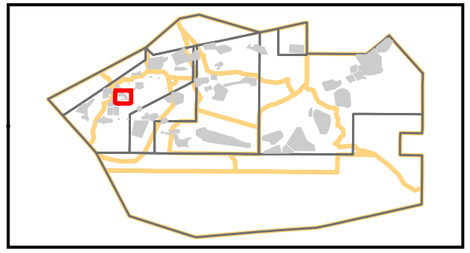
Figure 4





Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

TPH in Soil

- Detect > or equal to 100 mg/kg
- Detect < 100 mg/kg
- Non-detect

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

TPH in Soil and Proposed Sampling Locations

Metals Clarifier

Date: February 20, 2008 WORKING DRAFT

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1 inch equals 60 feet

0 60 120 Feet

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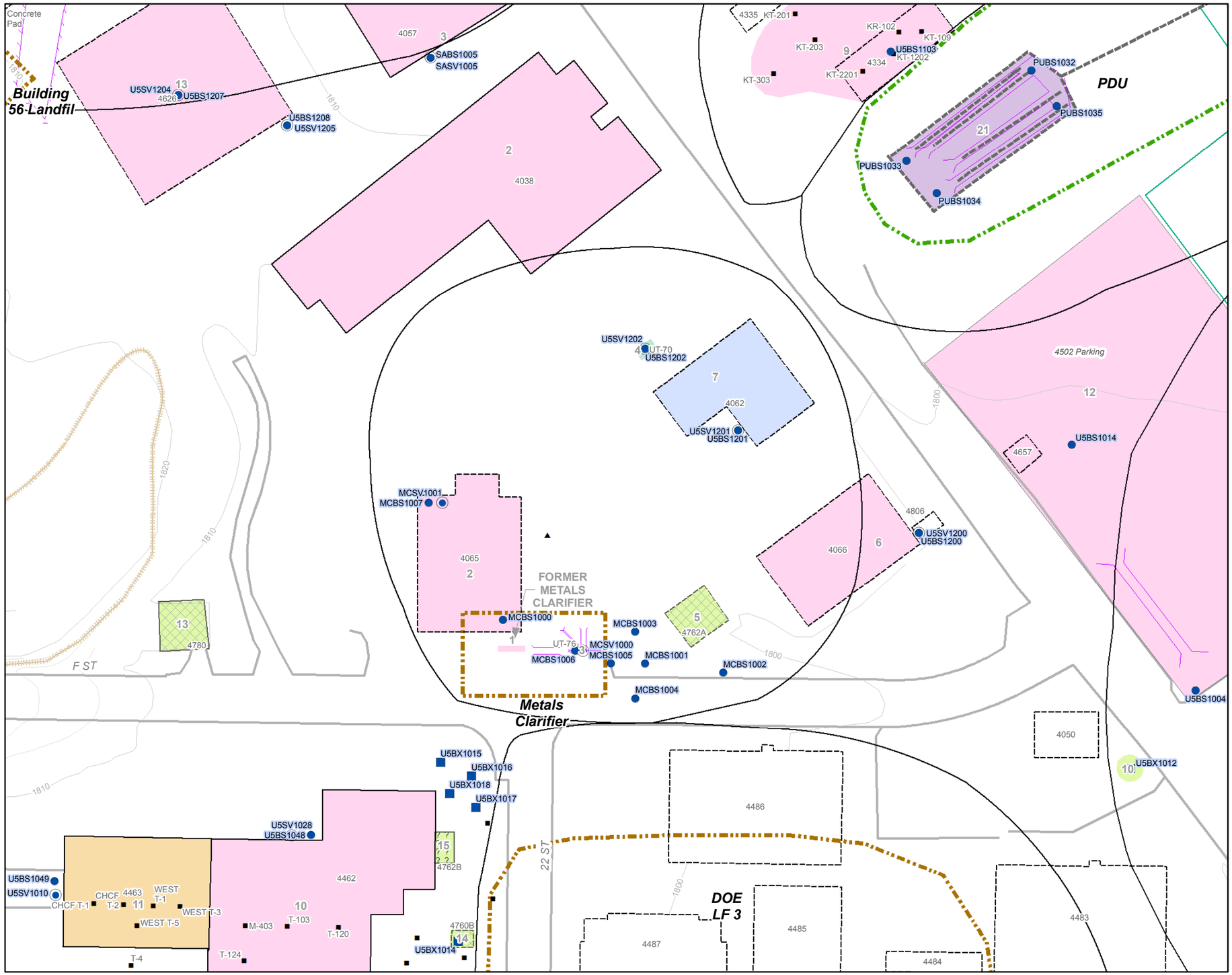
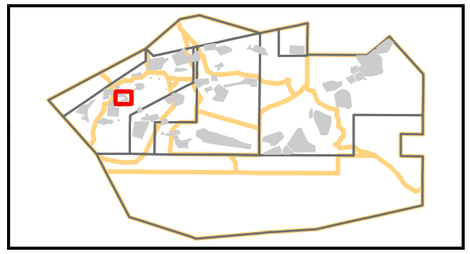
Figure 5





Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

Dioxins in Soil

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

Dioxins in Soil and Proposed Sampling Locations

Metals Clarifier

Date: February 20, 2008 WORKING DRAFT

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1 inch equals 60 feet

0 60 120 Feet

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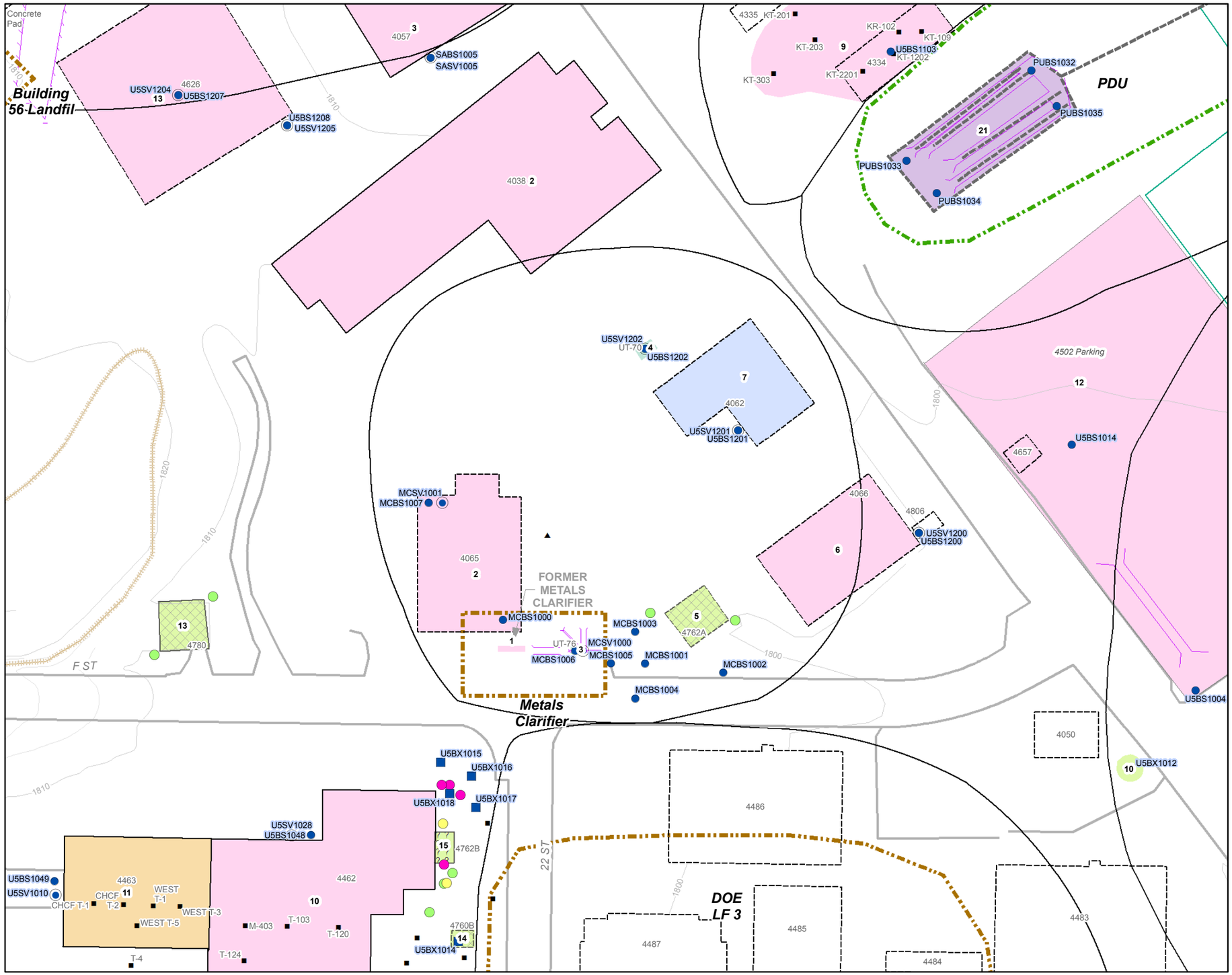
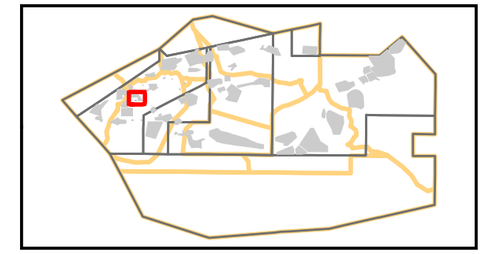
Figure 6





Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

PCBs in Soil

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

PCBs in Soil and Proposed Sampling Locations

Metals Clarifier

Date: February 20, 2008 WORKING DRAFT

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1 inch equals 60 feet

0 60 120 Feet

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Figure 7

Sampling and Analysis Plan for the Building 100 Trench RFI Site, Group 5, Santa Susana Field Laboratory

PREPARED FOR: Boeing and DOE

PREPARED BY: CH2M HILL

DATE: February 22, 2008

This technical memorandum presents the sampling and analysis plan (SAP) for the Building 100 Trench Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Site in Group 5 at the Santa Susana Field Laboratory (SSFL) in Ventura County, California. The Building 100 Trench disposal area is the primary feature onsite (Solid Waste Management Unit [SWMU] 7.5). The Building 100 Trench disposal area consisted of three elongated pits with dimensions of approximately 100 feet by 100 feet. The trenches were used in the 1960s for burning and disposal of construction debris and other materials. For the purposes of the RFI, the site incorporates the following nearby features: Building 100 (including stormwater discharge area), former Building 100 leach field, two areas of "hummocky terrain," and Substation 4800/4710.

The purpose of this SAP is to describe the scope and rationale for the field investigation to address the data gaps presented in the *Integration and Synthesis Package for RFI Group 5, Santa Susana Field Laboratory, California* (I&S Package) (CH2M HILL, 2008) for the Building 100 Trench site. The I&S Package identified gaps where additional data are needed to support the RFI, risk assessments, and corrective measures studies following a comprehensive review of historical information and reports containing chemical use information, chemical data, and physical data for the RFI site.

The data gaps identified in the I&S Package for the Building 100 Trench site are summarized in Table 1. Data gaps were generally identified for chemical use areas within each RFI site. As presented in Table 1, chemical data gaps were identified for 6 of the 8 chemical use areas identified for the site. (Note that one of these chemical use areas with a chemical data gap is being addressed under the Group 5 Unaffiliated SAP.) To address these data gaps, CH2M HILL is proposing to collect 35 soil samples and 4 soil vapor samples. These samples will be collected from a total of 17 locations across the site (Table 1).

The specific samples proposed for collection at each chemical use area are summarized in Table 2. For each sample location at each chemical use area, Table 2 describes the matrix to be sampled, the depth from which samples are to be collected, analytical methods to be used, and the rationale for sample collection. As presented in Table 2, more than one sample might be necessary to address the data gaps identified for each chemical use area.

Working Draft

TABLE 1

Data Gaps

Sampling and Analysis Plan for Building 100 Trench RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area Number	Data Gap	Chemical Data Gap	Physical Data Gap	Documentation Data Gap	Number Sample Locations to Address Data Gaps
1	Building 100 Trench. Metals concentrations exceed background and Eco/HH RBSLs in the western and central excavation trenches, and south of trenches. The lateral extent of metals in these areas require further characterization; it appears that trenching was conducted to bedrock and, therefore, no additional vertical characterization is needed. Also, as identified in the Group 8 RFI Report for the Bldg 56 Landfill, the source of dioxins detected in shallow soil west of Bldg 4100 and in stormwater at nearby NPDES Outfall 007 is unknown. The former Bldg 100 trenches are a potential source due to historic burning activities. Additional evaluation of this potential air deposition pathway is needed.	X			10
2	Building 4100 – Chemical uses at building have included acids and bases. Previous investigations for this building have been limited to soil vapor around the perimeter. Additional evaluation (soil sampling) is needed to assess whether historic operations in the building resulted in impacts to the environment.	X		X	1
3a	Hummocky Area - Western. Metals exceed background levels and Eco RBSLs in southern portion of feature. The lateral and vertical extent of metals in this area require further characterization.	X			3
3b	Hummocky Area - Northern. Only one soil gas sample for VOC analysis has been performed to date. This investigation approach is inconsistent with the analytical suite performed for soil samples collected at the other Hummocky Area (Chemical Use Area 3a) identified at the site. Therefore, additional soil sampling is needed.	X			1
4	Building 100 Leach Field. The leach field was previously removed at an unknown date (documentation data gap). Excavation activities subsequently performed to assess the presence of the leach field did not include soil sample collection in the suspected former leach field location (chemical data gap). Additional investigation is needed to assess the potential presence of impacted soil at the former leach field.	X		X	2

Working Draft

TABLE 1

Data Gaps

Sampling and Analysis Plan for Building 100 Trench RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area Number	Data Gap	Chemical Data Gap	Physical Data Gap	Documentation Data Gap	Number Sample Locations to Address Data Gaps
5	Building 4463 - Sodium Cleaning and Handling Facility. Records indicate that small quantities of solvents were used at the facility. Assess potential solvent releases at Bldg 4463. No investigations have been performed to date. Investigation is needed to evaluate whether historic activities at this building have resulted in impacts to the environment.	X			0 (addressed with Group 5 Unaffiliated Areas SAP)
6	Transformer 4800 (4710). Soil sampling has been performed and no PCBs were detected. The use period for this transformer is not known. There are no other data gaps for this Chemical Use Area. This area is considered eligible for no further action.			X	0
7	Transformer 4780. Soil sampling has been performed and no PCBs were detected. There are no data gaps for this Chemical Use Area. This area is considered eligible for no further action.				0 (addressed with Group 5 Unaffiliated Areas SAP)
Sitewide	Detection limits exceed screening HH and Eco RBSLs for VOCs in soil vapor, and metals and SVOCs in soil.	X			0
				Total:	**17**

The locations of samples proposed in Table 2 are presented in Figure 1. In addition, Figures 2 through 7 present the locations of the proposed samples relative to the locations of previous samples analyzed for volatile organic compounds (VOCs) in soil and soil vapor, metals in soil, petroleum hydrocarbons in soil, dioxins in soil, and polychlorinated biphenyls (PCBs) in soil. The previous sample location symbols in Figures 2 through 5 are color coded to indicate if the previous sample results (at any depth) were detected, were detected below risk-based screening levels (RBSLs) or background concentrations (for metals and dioxins), or were detected above RBSLs and/or background concentrations.

Samples for which the need for laboratory analysis is contingent on the results of other samples are indicated in Table 2 with an "H," signifying they will be placed on "Hold." These samples will be collected, but the laboratory will not analyze these samples until CH2M HILL have evaluated the need for lab analysis and provided direction to the lab to analyze the sample. The need for lab analysis will be contingent on the results of samples above or below the proposed sample.

Additional samples will be collected, if necessary, based on the results of the samples proposed in Table 2. Step-out and step-down samples will be collected, if necessary, as described in the

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Group 5 SAP (general text). In addition, quality assurance/quality control samples will be collected as described in the general text of the Group 5 SAP.

Schedule

This investigation is scheduled for March and April 2008. Prior to commencing the fieldwork, a Field Implementation Plan (FIP) will be prepared and submitted for Boeing and the Department of Energy (DOE) review. The contents of the FIP are described in more detail in the general text of the Group 5 SAP. The FIP is scheduled to be submitted to Boeing and DOE in February 2008.

References

CH2M HILL. 2008. *Integration & Synthesis Package for RFI Group 5, Santa Susana Field Laboratory, California*. January 3.

Working Draft

TABLE 2

Proposed Samples for Bldg. 100 Trench RFI Site

Sampling and Analysis Plan for Bldg. 100 Trench RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Mercury (EPA 7471A)	Chromium VI (EPA 7196A)	
1	BHSV1000	Soil Vapor	5			X													Building 100 Trench. Used in the 1960s for disposal and burning of construction debris and other materials. Wastes were removed during previous investigations; soils were backfilled. For VOCs, only two recent samples have been collected (1999/2000 by DTSC); other soil data for VOCs collected in 1988. One addional soil gas sampling location is proposed in the center of the former trench area to obtain additional soil vapor data for the site.
		Soil Vapor	10			X													
1	BHBS1000	Soil	1						X	X					H				Sample location positioned along eastern edge of previous excavation area. Provides lateral delineation of metals detected at 6.0 feet bgs in sample BHTS50-S03 (note that surface soil sampling proposed because none previously performed). Also note that dioxins will be analyzed if evidence of burned materials area found during drilling/sampling activities.
		Soil	6						X						H				
		Soil	10						H						H				Analysis of this sample will be contingent on the results for shallower samples.
1	BHBS1001	Soil	1						X	X					H				Sample location positioned along western edge of previous excavation area. Provides lateral delineation to the west for elevated metals detected at 4.5 feet bgs in sample BHTS51-S08 (note that surface soil sampling proposed because none previously performed). Also note that dioxins will be analyzed if evidence of burned materials area found during drilling/sampling activities.
		Soil	6						X						H				
		Soil	10						H						H				Analysis of this sample will be contingent on the results for shallower samples.
1	BHBS1002	Soil	1						X	X									Sample location positioned southwest and downslope of former trenches and previous sample location BHTS26, which had an elevated lead concentration.
		Soil	6						X										
		Soil	10						H										Analysis of this sample will be contingent on the results for shallower samples.
1	BHTS1000	Soil	6						X										During previous investigation, elevated lead detected at 2.0 feet bgs in sample BHTS26. An estimated 10 yd^3 of debris reportedly remains in place at this location. Investigative trenching proposed to assess presence/extent of debris, and further evaluate presence and extent of elevated lead concentrations in soil. Following debris removal, 2 soil samples (BHTS1000 and BHTS1001) proposed to verify remaining debris and impacted soil has been removed. Actual sampling depths to be based on field observations. Also, additional analytes (e.g., standard debris area analytical suite) will be added (in addition to metals) if non-metallic debris encountered in the subsurface.
1	BHTS1001	Soil	6						X										See above rationale/objectives for this proposed trench sample.
1	BHBS1003	Soil	1												X				The Group 8 RFI Report identified the presence of dioxins in soil (> background; < RBSLs) in the area west/northwest of Building 100 and upslope of NPDES Outfall #007. The Building 100 Trench may be a source of the dioxins as a result of historic burning activities. Soil sampling proposed: 1) on the two ridges located northwest of the former trench area, and 2) near and upslope of the previous locations with dioxin detects. Note that only surface soil sampling is proposed. If RBSL exceedances are observed in the surface soil samples, deeper sampling and analysis for dioxins will be performed. Boring BHBS1003 is positioned on the ridge located approximately 140 feet northwest of the former trenches.

TABLE 2

Proposed Samples for Bldg. 100 Trench RFI Site

Sampling and Analysis Plan for Bldg. 100 Trench RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Mercury (EPA 7471A)	Chromium VI (EPA 7196A)	
1	BHBS1004	Soil	1												X				Boring is positioned on the ridge located approximately 250 feet northwest of the former trenches (100 feet northwest of Boring BHBS1003 and approximately 240 feet northwest of former trenches). If RBSL exceedances are observed in the surface soil samples, deeper sampling and analysis for dioxins will be performed.
1	BHBS1005	Soil	1												X				Boring is positioned west and downslope from ridgeline samples described above, and east and upslope of previous Boring BHBS007. If RBSL exceedances are observed in the surface soil samples, deeper sampling and analysis for dioxins will be performed.
1	BHBS1006	Soil	1												X				Boring is positioned south and upslope of previous samples BHBS0008. If RBSL exceedances are observed in the surface soil samples, deeper sampling and analysis for dioxins will be performed.
2	BHBS1010	Soil	1	X			X		X	X									Building 4100. Bldg. 4100 was historically used for reactor testing and later for Computer Aided Tomography (CAT) facility. Documented chemical use limited to acids/bases. Proposed sampling location intended as a screening location to evaluated Bldg 4100 for potential past releases. General screening suite of analyses proposed. Sampling location is positioned at doorway on north side of building near eastern corner (laboratories were previously located in the northeast corner of building). Only soil sampling (no VOC analysis) is proposed because soil vapor sampling previously performed at 4 locations around building perimeter (no VOCs detected).
		Soil	6	X			X		X										
		Soil	10	H			H		H										Analysis of this sample will be contingent on the results for shallower samples.
3a	BHTS1002	Soil	1						X	X									Hummocky Area - Western. Stockpiled soil (hummocks) present east of Building 100. Soil source was an excavation for a planned building located southwest of Building 100. No evidence of subsurface debris in previous trenching investigation. Previous soil samples (BHTS20 and 21) had mercury and silver exceedances of background and Eco RBSLs. Trenching location BHTS1002 proposed to further evaluate the presence of mercury at previous soil sample locations BHTS20 and 21. Sampling will be performed at multiple depths to support risk assessment. Note that lateral delineation of mercury previously detected at this location is addressed by proposed soil boring BHBS1007 (positioned to the southwest).
		Soil	6						X										
		Soil	10						H										Analysis of this sample will be contingent on the results for shallower samples. Note that this sample depth likely occurs in native soil beneath the soil hummocks.
3a	BHTS1003	Soil	1						X	X									Trenching location BHTS1003 positioned at the eastern side of hummocky area. Co-located with previous trench BHTS18 where elevated silver detected (may be associated with laboratory error). Sampling at this location intended to collect replicate sample data to further evaluate silver.
		Soil	6						X										
		Soil	10						H										Analysis of this sample will be contingent on the results for shallower samples. Note that this sample depth likely occurs in native soil beneath the soil hummocks.
3a	BHBS1007	Soil	1						X	X									Boring is positioned southwest and downslope from previous sampling locations BHTS20 and 21 to assess potential lateral migration/extent of elevated mercury.
		Soil	6						X										
		Soil	10						H										Analysis of this sample will be contingent on the results for shallower samples. Note that this sample depth likely occurs in native soil beneath the soil hummocks.

TABLE 2

Proposed Samples for Bldg. 100 Trench RFI Site

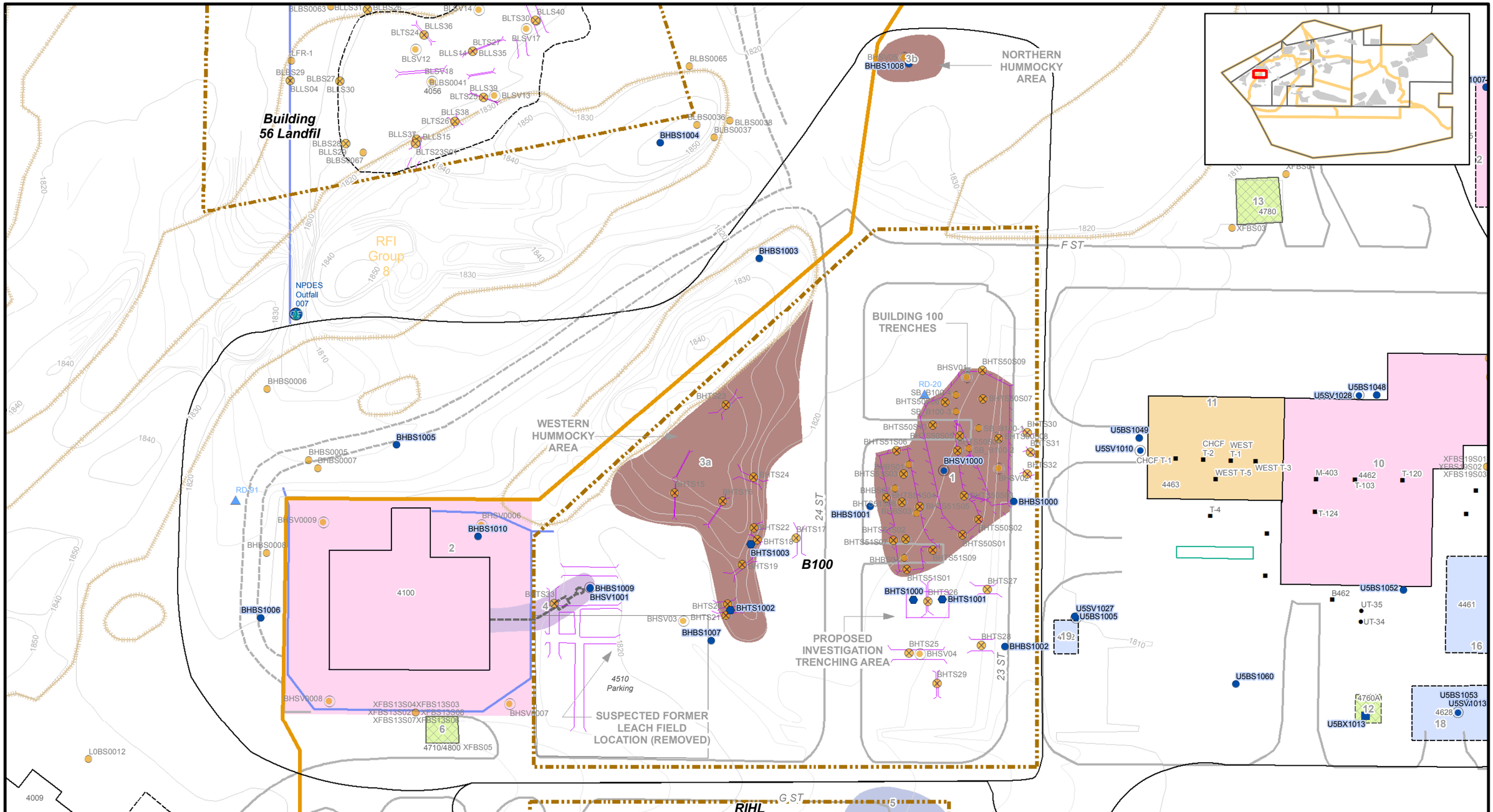
Sampling and Analysis Plan for Bldg. 100 Trench RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Mercury (EPA 7471A)	Chromium VI (EPA 7196A)	
3b	BHBS1008	Soil	1	X			X		X	X									Hummocky Area - Northern. Unknown source of soil that composes "hummocky terrain" northeast of Bldg 4100; no evidence of subsurface debris in previous trenching investigation. Previous sampling limited to soil vapor (VOCs were not detected). Additional soil sampling (1 boring) proposed to evaluate entire suite of standard debris area analytes (except VOCs because no VOCs detected in previous soil vapor sample).
		Soil	6	X			X		X										
		Soil	10	H			H		H										Analysis of this sample will be contingent on the results for shallower samples. Note that this sample depth likely occurs in native soil beneath the soil hummocks.
4	BHBS1009	Soil	1	X	H		X		X	X						X			Former Bldg 4100 Leach Field. Leach field was previously removed at an unknown date. No evidence of leach field observed during subsequent trenching activities. No previous sampling performed, except one soil vapor sampling location near the eastern edge of the suspected leach field area (no VOCs detected).
		Soil	6	X	H		X		X							X			Co-located soil and soil vapor samples will be collected from the suspected former leach field outlet location (based on historic drawing).
		Soil	10	H	H		H		H							H			Analysis of this sample will be contingent on the results for shallower samples. Note that this 3rd sampling depth may need to be adjusted to a shallower depth or not collected based on the depth bedrock occurs.
4	BHSV1001	Soil	5			X													Soil vapor boring is co-located with soil boring BHBS1009.
		Soil	10			X													Analysis of this sample will be contingent on the results for shallower samples.
5																			Building 4463 - Sodium Cleaning and Handling Facility. This feature is addressed in the Group 5 Unaffiliated Areas SAP.
6																			Transformer 4800 (4710). Soil samplng data previously collected at this feature indicate no further action is warranted.
7																			Transformer 4780. This feature is addressed in the Group 5 Unaffiliated Areas SAP.
Total Soil Samples for Analysis				6			6		20	9					4	2			
Total Soil Samples on Hold				3	3		3		9						6	1			
Total Soil Vapor Samples for Analysis						4													
Total Soil Samples Collected			35																
Total Number of Locations			17																
																			Building 4463 - Sodium Cleaning and Handling Facility.

Note:

X = Analyze sample

H = Hold sample analysis until instructed by PM



Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

Existing Sampling Locations

- Soil
- Soil - Composite
- Soil - Sediment
- Soil - Surface
- Air - Soil Vapor
- Air
- Groundwater
- Groundwater - Lysimeter
- Groundwater - Spring
- Water - Artificial
- Water - Discharge
- Water - Surface
- Water - Surface (Seep)
- B Biological
- MO Other
- MS Sump

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

Proposed Sampling Locations

B100

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

0 60 120 Feet

February 21, 2008

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WORKING DRAFT

FIGURE 1

Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

Building 56 Landfil

RFI Group 8

NPDES Outfall 007

NORTHERN HUMMOCKY AREA

WESTERN HUMMOCKY AREA

BUILDING 100 TRENCHES

PROPOSED INVESTIGATION TRENCHING AREA

SUSPECTED FORMER LEACH FIELD LOCATION (REMOVED)

B100

RIHL

F ST

G ST

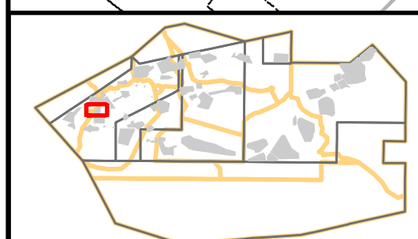
24 ST

23 ST

BHBS1008 3b
BHBS1004
BHBS1003
BHBS1005
BHBS1010
BHBS1006
BHBS1009
BHSV1001
BHTS1002
BHBS1007
BHTS1003
BHSV1000
BHBS1001
BHBS1000
BHTS1000
BHTS1001
BHBS1002
MCBS1007
U5BS1048
U5SV1028
U5BS1049
U5SV1010
U5SV1027
U5BS1005
U5BS1052
U5BS1060
U5BS1053
U5SV1013
U5BX1013

CHCF T-1
CHCF T-2
WEST T-1
WEST T-3
WEST T-5
M-403
4462
T-103
T-120
T-124
T-4
B462
UT-35
UT-34

4056
4065
4780
4100
4710/4800
4510 Parking
4009
4760A
4628
4461
4192



VOCs in Soil Vapor

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

Basemap Legend

Transformer Poles; Tank - UST; Tank - AST; Tank - Not Yet Determined; Excavation; Leachfield; Pipe; Building - Existing; Building - Removed; Building - Not Yet Determined; Transformer - Existing; Transformer - Removed; Transformer - Not Yet Determined; RFI Site - Boeing; RFI Site - DOE; RFI Site - NASA; RFI Site Buffer; RFI Group Boundary; Administrative Area; Property Boundary; Drainage; Road - Asphalt; Roads - Dirt; Rocks; Streams; Pond; Debris; Multiple Use; Solvent; Petroleum; Oil/PCBs; Metals; Energetic Constituents; Propellants; Leach Field; Non-metal Inorganic Constituents; Screening for Potential Impacts

VOCs in Soil Vapor and Proposed Sampling Locations

B100

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

0 60 120 Feet

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WORKING DRAFT

FIGURE 2

Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

Building 56 Landfil

RFI Group 8

NPDES Outfall 007

BHBS1004

BHBS1003

BHBS1005

BHBS1010

BHBS1006

BHBS1009
BHSV1001

BHTS1002

BHBS1007

BHTS1003

BHBS1001

BHSV1000

BHBS1000

BHTS1000

BHTS1001

BHBS1002

BHBS1008

MCBS1007

U5BS1049
U5SV1010

U5BS1048
U5SV1028

U5SV1027
U5BS1005

U5BS1052

U5BS1060

U5BS1053
U5SV1013

U5BX1013

NORTHERN HUMMOCKY AREA

WESTERN HUMMOCKY AREA

BUILDING 100 TRENCHES

PROPOSED INVESTIGATION TRENCHING AREA

SUSPECTED FORMER LEACH FIELD LOCATION (REMOVED)

4510 Parking

B100

RIHL

F ST

G ST

24 ST

23 ST

4100

4056

4065

4780

4710/4800

4009

4463

4462

4461

4760A

4628

419

B462

CHCF T-1
CHCF T-2
WEST T-1
WEST T-3
WEST T-5
T-4
T-124
M-403
T-103
T-120
UT-35
UT-34

1820
1830
1840
1850
1810

VOCs in Soil

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

VOCs in Soil and Proposed Sampling Locations

B100

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

0 60 120 Feet

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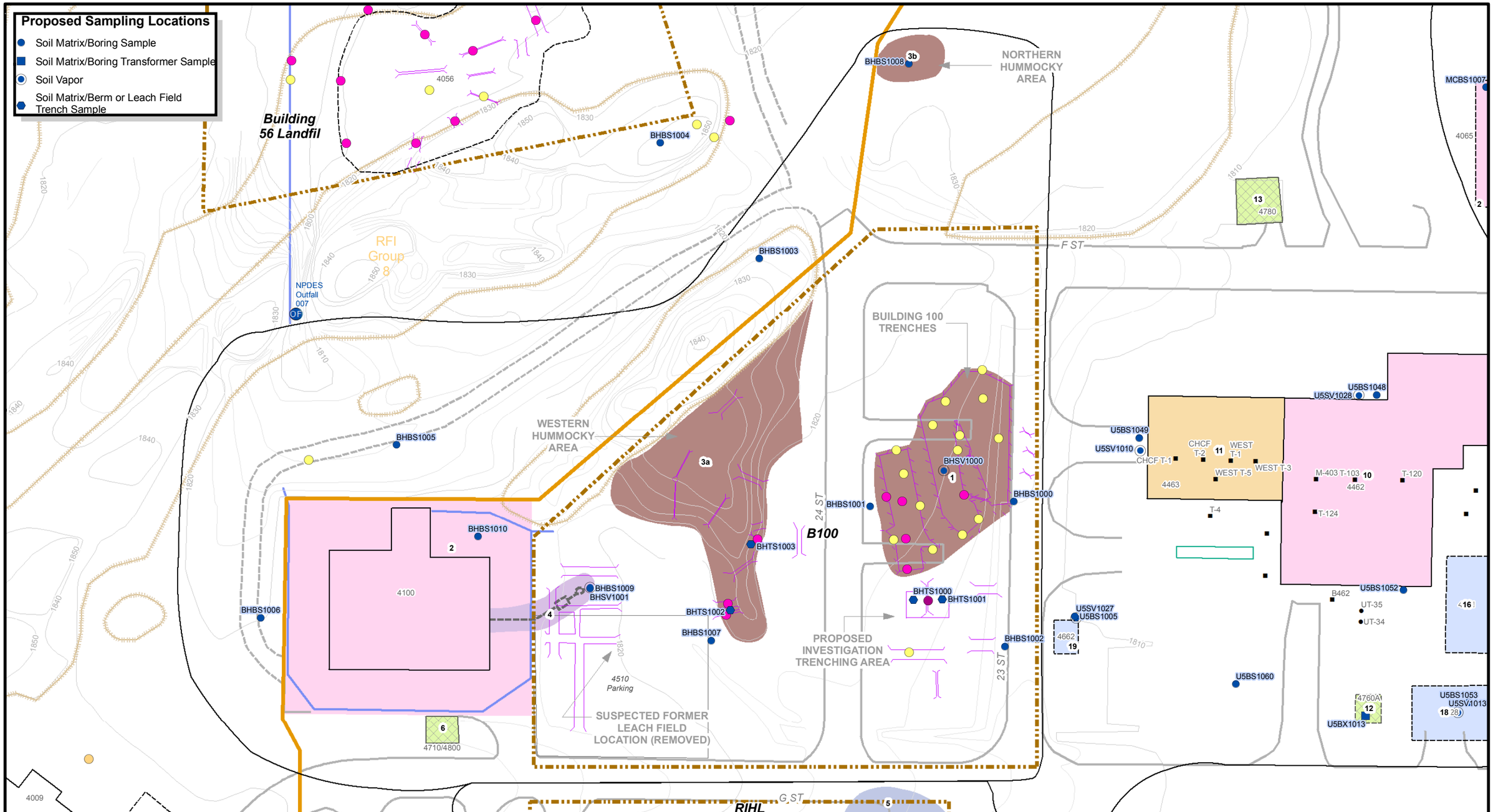
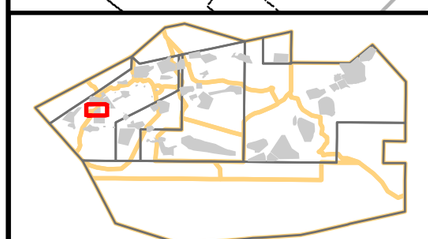
WORKING DRAFT

FIGURE 3





Metals in Soil

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

Metals in Soil and Proposed Sampling Locations

B100

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

0 60 120 Feet

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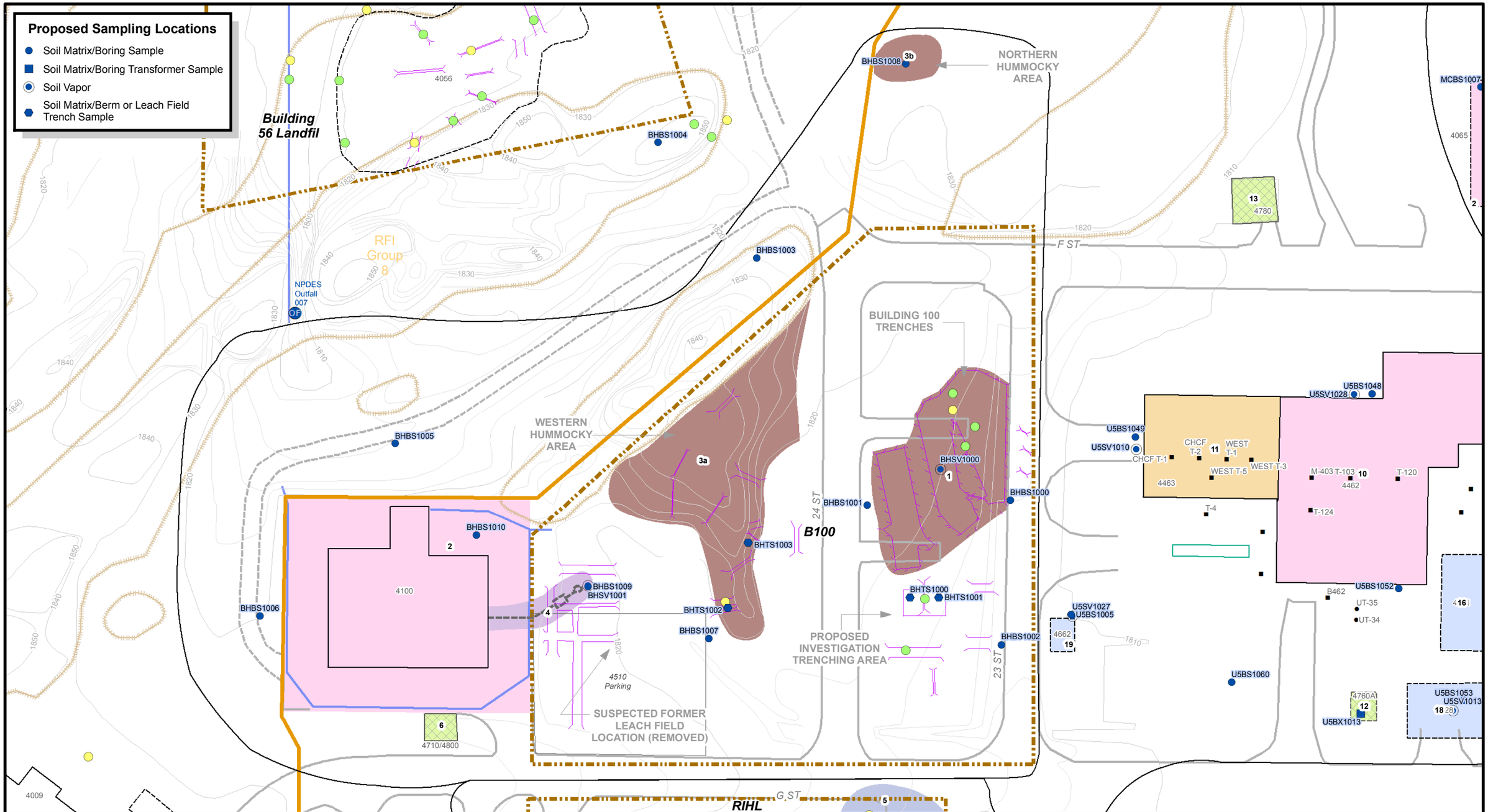
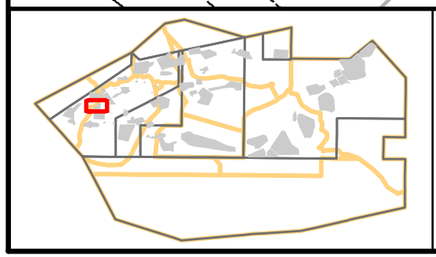
WORKING DRAFT

FIGURE 4





TPH in Soil

- Detect > or equal to 100 mg/kg
- Detect < 100 mg/kg
- Non-detect

Basemap Legend

Transformer Poles
Tank - UST
Tank - AST
Tank - Not Yet Determined
Excavation
Leachfield
Pipe
Building - Existing
Building - Removed
Building - Not Yet Determined
Transformer - Existing
Transformer - Removed
Transformer - Not Yet Determined
RFI Site - Boeing
RFI Site - DOE
RFI Site - NASA
RFI Site Buffer
RFI Group Boundary
Administrative Area
Property Boundary
Drainage
Road - Asphalt
Roads - Dirt
Rocks
Streams
Pond
Debris
Multiple Use
Solvent
Petroleum
Oil/PCBs
Metals
Energetic Constituents
Propellants
Leach Field
Non-metal Inorganic Constituents
Screening for Potential Impacts

TPH in Soil and Proposed Sampling Locations

B100

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

0 60 120 Feet

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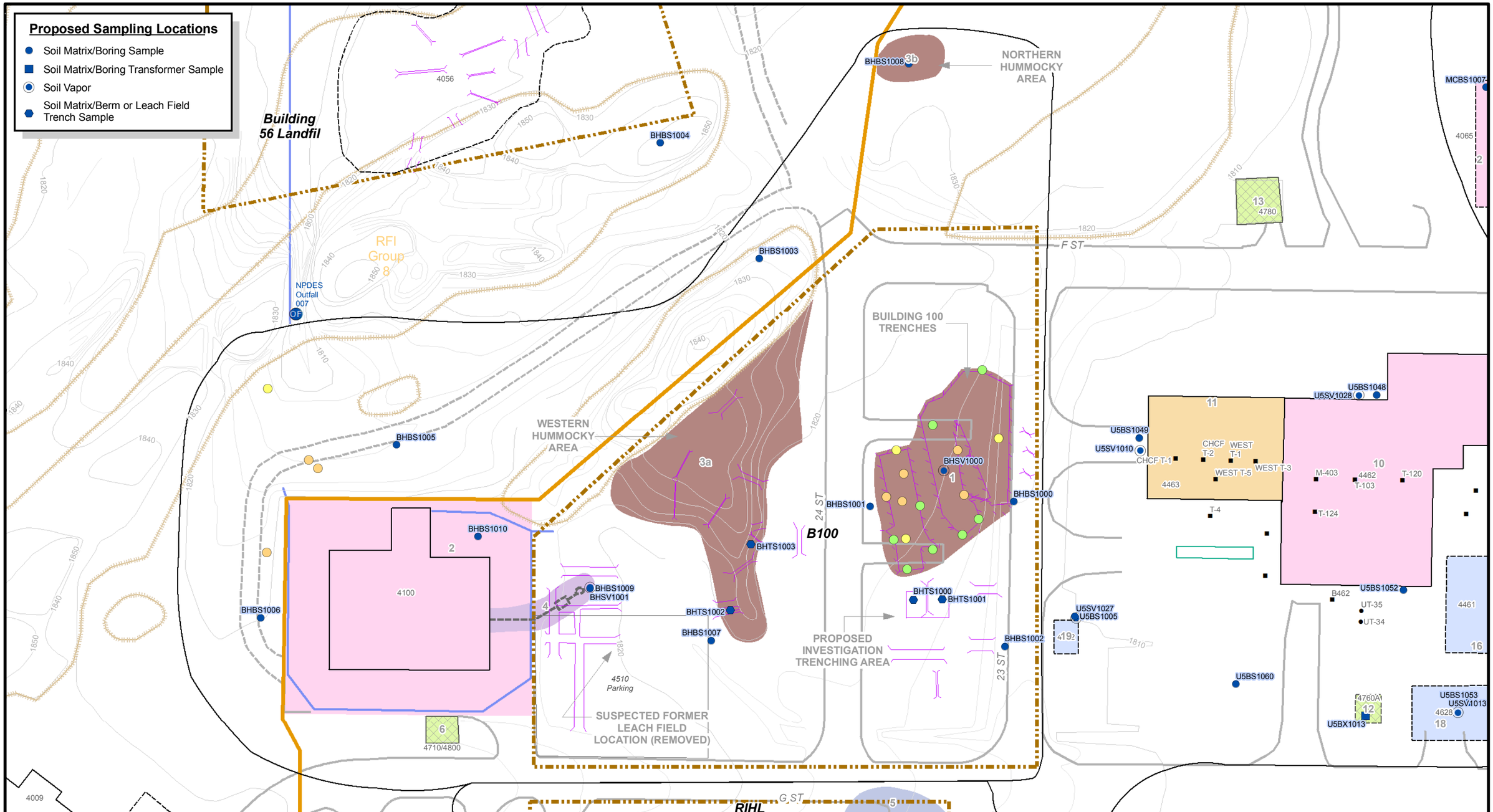
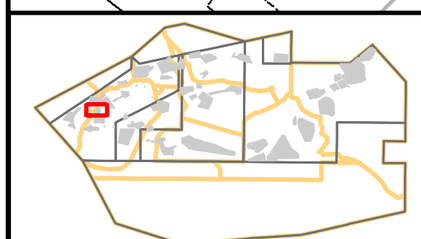
FIGURE 5





Dioxins in Soil

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

Dioxins in Soil and Proposed Sampling Locations

B100

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

0 60 120 Feet

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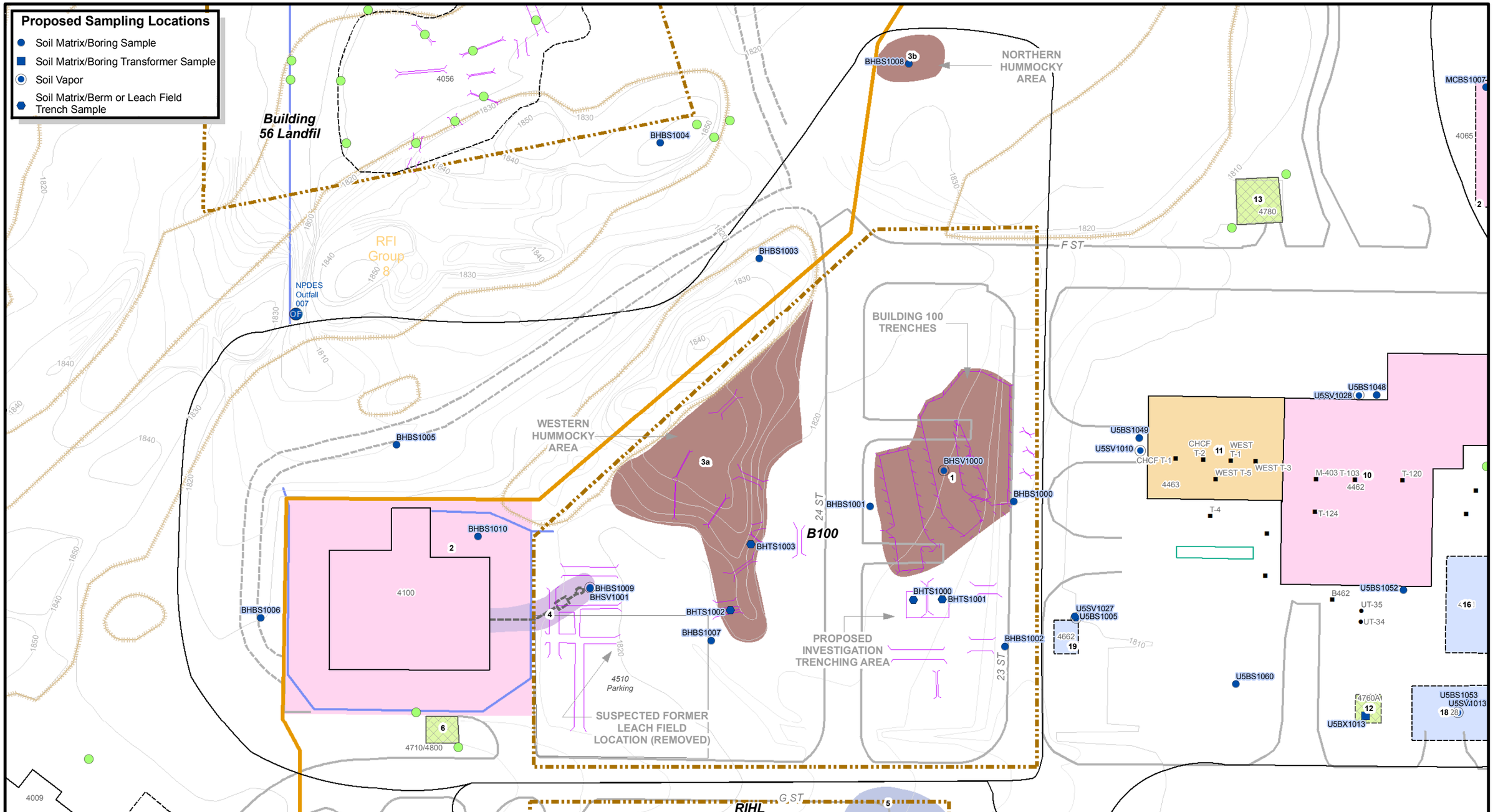
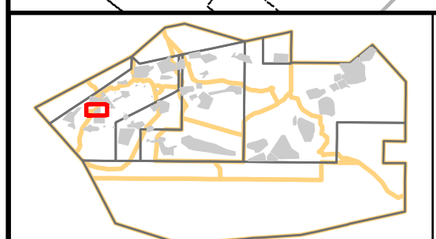
FIGURE 6





PCBs in Soil

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

PCBs in Soil and Proposed Sampling Locations

B100

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1 inch equals 60 feet

0 60 120 Feet

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\\.RFI_05\RFISites\PrpsdSamp_Locs\RFISites_CDotPCBsSoilWPrpsd_BL_PLTS.mxd

WORKING DRAFT

FIGURE 7

Sampling and Analysis Plan for DOE Leach Fields 1 RFI Site, Group 5, Santa Susana Field Laboratory

PREPARED FOR: Boeing and DOE

PREPARED BY: CH2M HILL

DATE: February 22, 2008

This technical memorandum presents the sampling and analysis plan (SAP) for the Department of Energy (DOE) Leach Fields 1 Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Site in Group 5 at the Santa Susana Field Laboratory (SSFL) in Ventura County, California. DOE Leach Fields 1 includes the Area of Concern (AOC) Building 4030 Leach Field and AOC Building 4093 Leach Field. Other chemical use areas evaluated with DOE Leach Fields 1 include Buildings 4023, 4030, 4035, 4074, 4641, 4073, 4083, 4093, 4103, 4123, and 4453, one electrical substation, one transformer pole, and aboveground and underground storage tanks.

The purpose of this SAP is to describe the scope and rationale for the field investigation to address the data gaps presented in the *Integration and Synthesis Package for RFI Group 5, Santa Susana Field Laboratory, California* (I&S Package) (CH2M HILL, 2008) for the DOE Leach Fields 1. The I&S Package identified gaps where additional data are needed to support the RFI, risk assessments, and corrective measures studies following a comprehensive review of historical information and reports containing chemical use information, chemical data, and physical data for the RFI site.

The data gaps identified in the I&S Package for the DOE Leach Fields 1 are summarized in Table 1. Data gaps were generally identified for chemical use areas within each RFI site. As presented in Table 1, chemical data gaps were identified for all 14 of the chemical use areas identified for DOE Leach Fields 1. Data gaps were also identified based on lack of soil data in the 0- to 2-foot-depth interval. In addition, data gaps were identified based on the need for documentation related to the contents/uses of tanks and pipelines at the site and regulatory closure of tank UT-17.

To address these data gaps, CH2M HILL is proposing to collect 47 soil samples and 16 soil vapor samples. These samples will be collected from a total of 25 locations across the site (Table 1).

The specific samples proposed for collection at each chemical use area are summarized in Table 2. For each sample location at each chemical use area, Table 2 describes the matrix to be sampled, the depth from which samples are to be collected, analytical methods to be used, and the rationale for sample collection. As presented in Table 2, more than one sample might be necessary to address the data gaps identified for each chemical use area.

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TABLE 1

Data Gaps

Sampling and Analysis Plan for DOE Leach Fields 1 RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area Number	Data Gap	Chemical Data Gap	Physical Data Gap	Documentation Data Gap	Number Sample Locations to Address Data Gaps
1	The Building 4093 Leach Field has been investigated for metals. Metals were detected in soil at concentrations below screening levels. No further investigation is required for this site.	X			1
2	Building 4030 Leach Field - The Building 4030 Leach Field is assumed to have the same chemical uses as Building 4030/4035. Chemical uses include metals, inorganic compounds, and diesel fuel. These chemicals have not been investigated in soil. In addition, this leach field has not been located in the field.	X	X		1
3	Building 4074 - Chemical uses include metals. Metals have not been investigated in soil.	X			1
4	Building 4023 - Chemical uses include metals and other inorganic compounds. These chemicals have not been analyzed in soil.	X			4
5	Building 4030/4035 - Chemical uses include metals, other inorganic compounds, and diesel fuel. These chemicals have not been investigated in soil.	X			2
6	Electrical Substation located north of Building 4641 - Chemical uses include polychlorinated biphenyls (PCBs). PCBs have not been investigated in soil.	X			1 (Composite)
7	Transformer Pole - Chemical uses include PCBs. PCBs have not been investigated in soil.	X			1 (Composite)
8	Building 4641 – This building was added as a chemical use area based on information that solvents were stored temporarily in this building before being delivered to other buildings at SSFL. Solvents were dropped off at the Building 4641 receiving area. Solvents have not been investigated.	X			4
9	Building 4073 was used as the Kinetics Experiment Water Boiler (KEWB) reactor test building. No investigation has been performed. Investigation is required to assess potential impacts to the environment.	X			2
10	Building 4083 was used as the reactor kinetics control building. No investigation has been performed. Investigation is required to assess potential impacts to the environment.	X			2

Working Draft

TABLE 1

Data Gaps

Sampling and Analysis Plan for DOE Leach Fields 1 RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area Number	Data Gap	Chemical Data Gap	Physical Data Gap	Documentation Data Gap	Number Sample Locations to Address Data Gaps
11	Building 4093 was used as a reactor building. No investigation has been performed. Investigation is required to assess potential impacts to the environment.	X			2
12	Building 4103 was used as a Reactor Kinetics Lab and Storage. No investigation has been performed. Investigation is required to assess potential impacts to the environment.	X			1
13	Building 4123 was used for storage of radiological waste. No investigation has been performed. Investigation is required to assess potential impacts to the environment.	X			1
14	Building 4453 was used for Neutron Radiography. No investigation has been performed. Investigation is required to assess potential impacts to the environment.	X			2
N/A	Information regarding the contents of two tanks located inside Building 4023 has not been located.			X	N/A
N/A	Documentation of regulatory closure of tank UT-17 has not been located. UT-17 was a 220-gallon underground storage tank (UST) that contained radioactive water.			X	N/A
N/A	Limited information is available on the pipelines that are shown in site figures. Additional information is needed to evaluate the pipelines as potential sources of contamination and to verify the locations and depths of these pipelines.			X	N/A
Sitewide	Soil samples have not been collected from the 0- to 2-foot-depth interval used to assess human health and ecological risks.	X			Addressed with other Samples
				Total	**25**

Notes:
Sitewide = Data Gap applies to the entire DOE Leach Fields 1 RFI Site
N/A = Not Applicable

The locations of samples proposed in Table 2 are presented in Figure 1. In addition, Figures 2 through 7 present the locations of the proposed samples relative to the locations of previous samples analyzed for volatile organic compounds (VOCs) in soil and soil vapor, metals in soil, petroleum hydrocarbons in soil, dioxins in soil, and PCBs in soil. The previous sample location symbols in Figures 2 through 7 are color coded to indicate if the previous sample results (at any depth) were detected, were detected below risk-based screening levels (RBSLs) or background

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concentrations (for metals and dioxins), or were detected above RBSLs and/or background concentrations.

Samples for which the need for laboratory analysis is contingent on the results of other samples are indicated in Table 2 with an "H," signifying they will be placed on "Hold." These samples will be collected, but the laboratory will not analyze these samples until CH2M HILL has evaluated the need for lab analysis and provided direction to the lab to analyze the sample. The need for lab analysis will be contingent on the results of samples above or below the proposed sample.

Additional samples will be collected, if necessary, based on the results of the samples proposed in Table 2. Step-out and step-down samples will be collected, if necessary, as described in the Group 5 SAP (general text). In addition, quality assurance/quality control samples will be collected as described in the general text of the Group 5 SAP.

Schedule

This investigation is scheduled for March and April 2008. In preparation for commencing the fieldwork, a Field Implementation Plan (FIP) was prepared and submitted for Boeing and DOE review on February 22, 2008.

References

CH2M HILL. 2008. *Integration & Synthesis Package for RFI Group 5, Santa Susana Field Laboratory, California*. January 3.

Working Draft

TABLE 2

Proposed Samples for DOE Leach Fields 1 RFI Site

Sampling and Analysis Plan for DOE Leach Fields 1 RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Mercury (EPA 7471A)	Chromium VI (EPA 7196A)	
1	L9BS1001	Soil	1	X	X		X												TPH, VOCs, and PAHs have not been analyzed at the Building 4093 Leach Field.
		Soil	6	X	X		X												
		Soil	10	H	X		H												Analysis of this sample will be contingent on the results for more shallow samples.
2	L3TS1000	Soil	1	X			X		X	X								X	Chemical uses at Building 4030 include metals (including hexavalent chromium), inorganic compounds, and diesel fuel. These chemical groups have not been investigated in soil. Two trenches will be advanced in an attempt to locate the leach field. Soil samples will be collected from 1 of the trenches (from the trench where the leach field is located, if applicable).
		Soil	6	X			X		X									X	
		Soil	10	H			H		H									H	Analysis of this sample will be contingent on the results for more shallow samples.
3	U5BS1015	Soil	1						X	X									Chemical uses at Building 4074 include metals. Metals have not been investigated in soil. The proposed sample is located near the centroid of former building footprint.
		Soil	6						X										
		Soil	10						H										Analysis of this sample will be contingent on the results for more shallow samples.
4	U5BS1016	Soil	1	X	H		X		X	X						X	X		Chemical uses at Building 4023 include metals (including mercury) and inorganic compounds. A mercury spill has been documented for Building 4023. In addition, the contents of 2 tanks in Building 4023 are unknown (screen for the potential contents of these tanks). No sampling has occurred at Building 4023. Four sample locations are proposed inside the former building footprint. VOCs will be analyzed in soil if VOCs are detected in soil vapor at U5SV1018.
		Soil	6	X	H		X		X							X	X		
		Soil	10	H	H		H		H							H	H		Analysis of this sample will be contingent on the results for more shallow samples.
4	U5BS1041	Soil	1	X	H		X		X	X						X	X		See above. VOCs will be analyzed in soil if VOCs are detected in soil vapor at U5SV1019.
		Soil	6	X	H		X		X							X	X		
		Soil	10	H	H		H		H							H	H		Analysis of this sample will be contingent on the results for more shallow samples.
4	U5SV1018	Soil Vapor	5			X													See above.
		Soil Vapor	10			X													
4	U5SV1019	Soil Vapor	5			X													See above.
		Soil Vapor	10			X													
5	L3BS1000	Soil	1	X			X		X	X						X		X	Chemical uses at Building 4030/4035 include metals (including hexavalent chromium), inorganic compounds, and diesel. Spills of diesel. sodium chromate, and nickel chloride flake are documented. No sampling has occurred at Building 4030/4035 to date. The proposed sample is located at the interface between Buildings 4030 and 4038.
		Soil	6	X			X		X							X		X	
		Soil	10	H			H		H							H		H	Analysis of this sample will be contingent on the results for more shallow samples.
5	L3BS1001	Soil	1	X			X		X	X						X		X	See above. The proposed sample is located outside Building 4035 (nickel flake was released in the Chemical Storage Yard at Building 4035).
		Soil	6	X			X		X							X		X	
		Soil	10	H			H		H							H		H	Analysis of this sample will be contingent on the results for more shallow samples.

TABLE 2

Proposed Samples for DOE Leach Fields 1 RFI Site

Sampling and Analysis Plan for DOE Leach Fields 1 RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method														Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Mercury (EPA 7471A)	Chromium VI (EPA 7196A)	
6	U5BX1001	Soil	0.5								X								The building north of Building 4641 is an electrical substation. PCBs have not been investigated at this substation Discrete samples will be collected at 4 locations around the substation (approximately 5 feet from each side of the substation) and will be composited into 1 sample for laboratory analysis. The discrete samples will be held by the lab. Analysis of the discrete samples will be contingent on the results of the composite sample.
7	U5BX1002	Soil	0.5								X								No sampling has occurred at the pole mounted transformers located at the intersection of G and 11 Streets (A305). There are 3 transformers located at the location of this pole. Discrete samples will be collected at 3 locations around the pole (approximately 5 feet away from the pole) and will be composited into 1 sample for laboratory analysis. The discrete samples will be held by the lab. Analysis of the discrete samples will be contingent on the results of the composite sample.
8	U5BS1017	Soil	1		H														Containers containing solvents were temporarily stored at Building 4641 before being delivered to other buildings at SSFL. The containers were delivered to the Building 4641 receiving area. Solvents have not been investigated at this building. The proposed sample is located on the eastern side of the building, which is suspected of being the receiving area. VOCs will be analyzed in soil if VOCs are detected in soil vapor at U5SV1020.
		Soil	6		H														
		Soil	10		H														Analysis of this sample will be contingent on the results for more shallow samples.
8	U5BS1018	Soil	1		H														See above. The proposed sample is located on the downgradient/downslope side of the building (south side of the building). VOCs will be analyzed in soil if VOCs are detected in soil vapor at U5SV1021.
		Soil	6		H														
		Soil	10		H														Analysis of this sample will be contingent on the results for more shallow samples.
8	U5SV1020	Soil Vapor	5			X													See above. The proposed sample is located on the eastern side of the building, which is suspected of being the receiving area.
		Soil Vapor	10			X													
8	U5SV1021	Soil Vapor	5			X													See above. The proposed sample is located on the downgradient/downslope side of the building (south side of the building).
		Soil Vapor	10			X													
9	U5BS1007	Soil	1	X	H		X		X	X									No investigation has been performed at Building 4073 (KEWB Reactor Test Building). Investigation will be performed to assess potential impacts to the environment. The proposed sample is located near the centroid of the building. VOCs will be analyzed in soil if VOCs are detected in soil vapor at U5SV1022.
		Soil	6	X	H		X		X										
		Soil	10	H	H		H		H										Analysis of this sample will be contingent on the results for more shallow samples.
9	U5SV1022	Soil Vapor	5			X													See above.
		Soil Vapor	10			X													
10	U5BS1008	Soil	1	X	H		X		X	X									No investigation has been performed at Building 4083 (reactor kinetics control building). Investigation will be performed to assess potential impacts to the environment. The proposed sample is located near the centroid of the building. VOCs will be analyzed in soil if VOCs are detected in soil vapor at U5SV1023.
		Soil	6	X	H		X		X										

TABLE 2

Proposed Samples for DOE Leach Fields 1 RFI Site

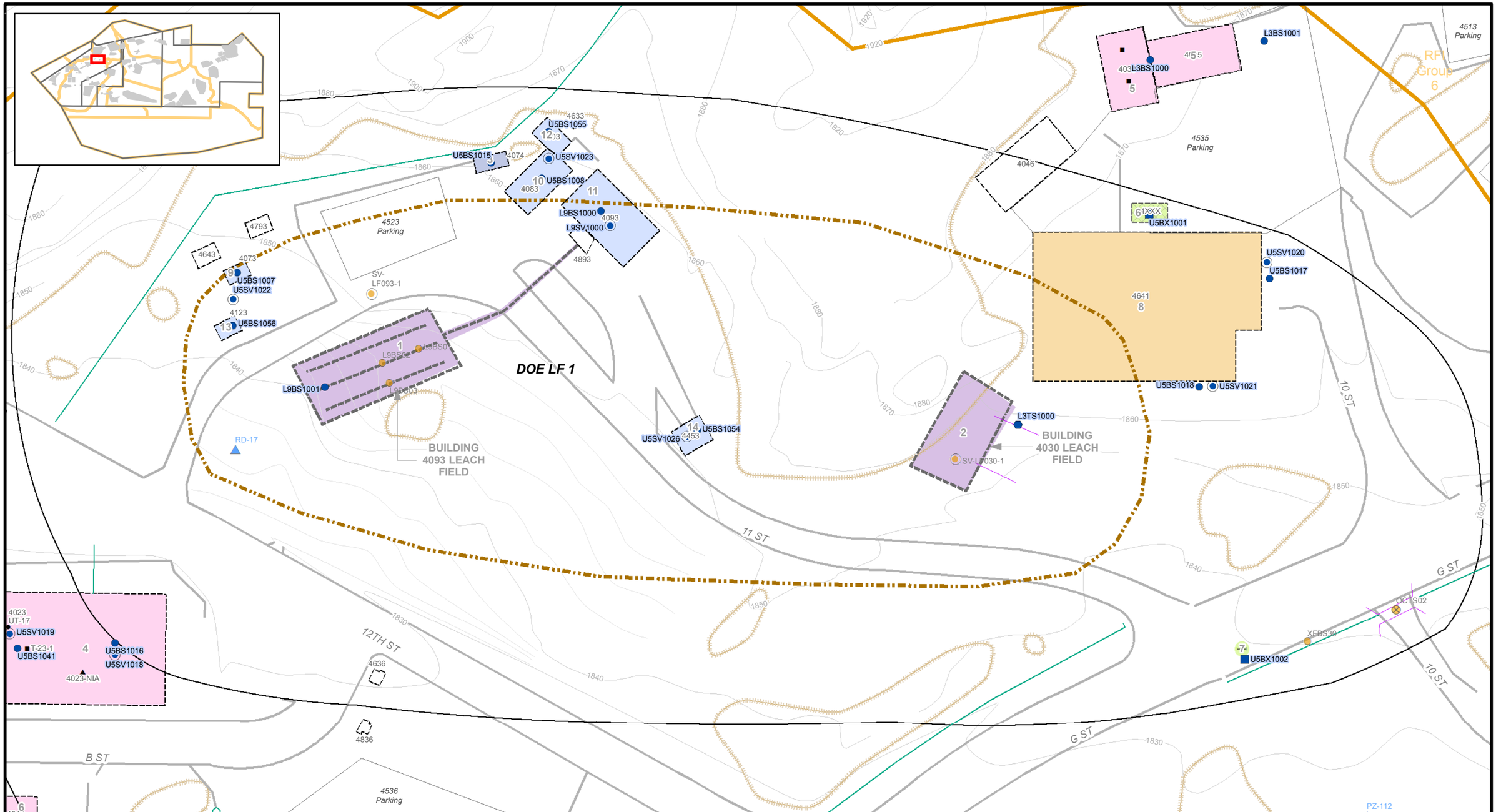
Sampling and Analysis Plan for DOE Leach Fields 1 RFI Site, Group 5, Santa Susana Field Laboratory

Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Mercury (EPA 7471A)	Chromium VI (EPA 7196A)	
		Soil	10	H	H		H		H										Analysis of this sample will be contingent on the results for more shallow samples.
10	U5SV1023	Soil Vapor	5			X													See above.
		Soil Vapor	10			X													
11	L9BS1000	Soil	1	X	H		X		X	X									No investigation has been performed at Building 4093 (Reactor Building). Investigation will be performed to assess potential impacts to the environment. The proposed sample is located near the centroid of the building. VOCs will be analyzed in soil if VOCs are detected in soil vapor at L9SV1000.
		Soil	6	X	H		X		X										
		Soil	10	H	H		H		H										Analysis of this sample will be contingent on the results for more shallow samples.
11	L9SV1000	Soil Vapor	5			X													See above.
		Soil Vapor	10			X													
12	U5BS1055	Soil	1	X	H		X		X	X									No investigation has been performed at Building 4103 (Reactor Kinetics Lab and Storage). Investigation will be performed to assess potential impacts to the environment. The proposed sample is located near the centroid of the building. VOCs will be analyzed in soil if VOCs are detected in soil vapor at U5SV1023.
		Soil	6	X	H		X		X										
		Soil	10	H	H		H		H										Analysis of this sample will be contingent on the results for more shallow samples.
13	U5BS1056	Soil	1	X	H		X		X	X									No investigation has been performed at Building 4123 (storage of radiological waste). Investigation will be performed to assess potential impacts to the environment. The proposed sample is located near the centroid of the building. VOCs will be analyzed in soil if VOCs are detected in soil vapor at U5SV1022.
		Soil	6	X	H		X		X										
		Soil	10	H	H		H		H										Analysis of this sample will be contingent on the results for more shallow samples.
14	U5BS1054	Soil	1	X	H		X		X	X									No investigation has been performed at Building 4453 (Neutron Radiography). Investigation will be performed to assess potential impacts to the environment. The proposed sample is located near the centroid of the building. VOCs will be analyzed in soil if VOCs are detected in soil vapor at U5SV1026.
		Soil	6	X	H		X		X										
		Soil	10	H	H		H		H										Analysis of this sample will be contingent on the results for more shallow samples.
14	U5SV1026	Soil Vapor	5			X													See above.
		Soil Vapor	10			X													
Total Soil Samples for Analysis				24	3		24		24	12	2					8	4	6	
Total Soil Samples on Hold				12	30		12		12							4	2	3	
Total Soil Vapor Samples for Analysis						16													
Total Soil Samples Collected			47																
Total Number of Locations			25																

Note:

X = Analyze sample

H = Hold sample analysis until instructed by PM



Proposed Sampling Locations

- Soil Matrix/Boring Sample
- Soil Matrix/Boring Transformer Sample
- Soil Vapor
- Soil Matrix/Berm or Leach Field Trench Sample

Existing Sampling Locations

- Soil
- Soil - Composite
- Soil - Sediment
- Soil - Surface
- Air - Soil Vapor
- Air
- Groundwater
- Groundwater - Lysimeter
- Groundwater - Spring
- Water - Artificial
- Water - Discharge
- Water - Surface
- Water - Surface (Seep)
- Biological
- Other
- Sump

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

Proposed Sampling Locations

DOE LF1

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1 inch equals 60 feet

0 60 120 Feet

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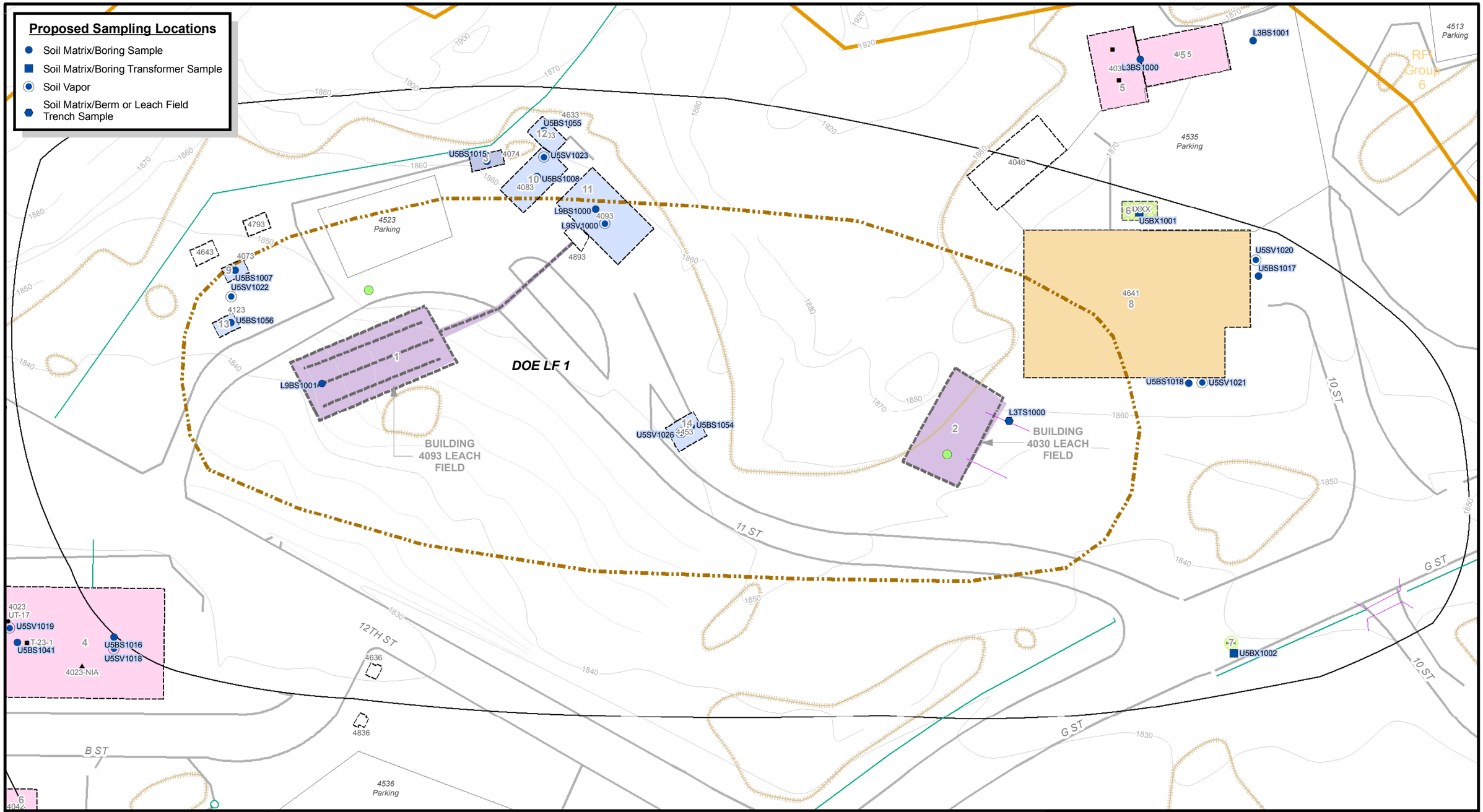
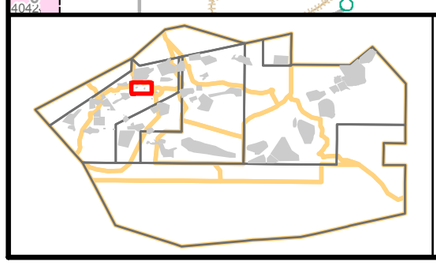
FIGURE 1





VOCs in Soil Vapor

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

Basemap Legend

- Transformer Poles
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- Tank - AST
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- Petroleum
- Oil/PCBs
- Metals
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- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

VOCs in Soil Vapor and Proposed Sampling Locations

DOE LF1

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1 inch equals 60 feet

0 60 120 Feet

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\\..RFIGrp05\RFISites\PrpsdSamp_Locs\RFISites_CDotVOCsSVpr_BLWPrpsd_PLTS_BL.mxd

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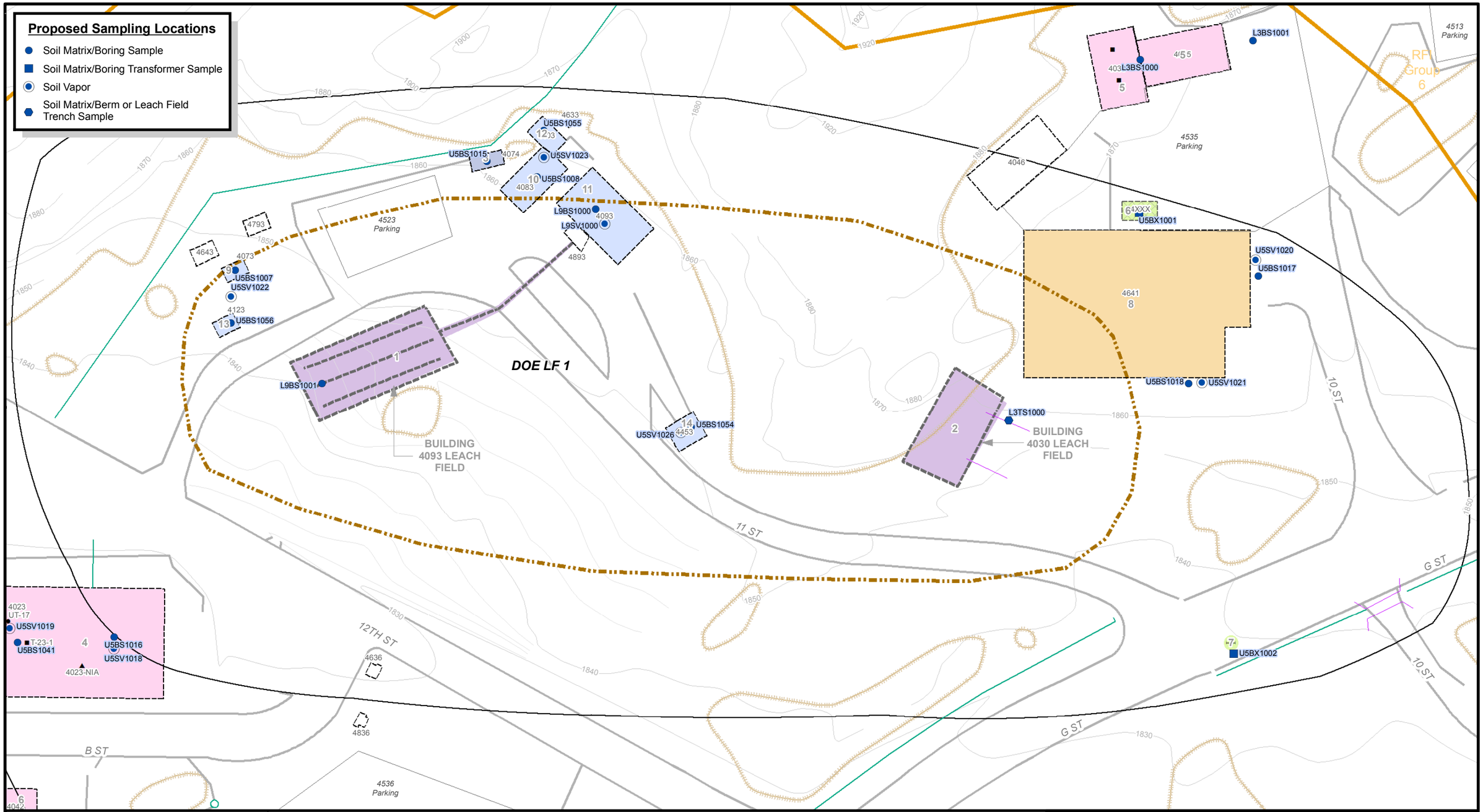
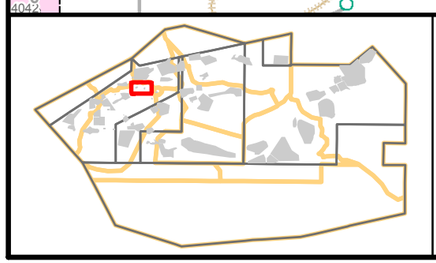
FIGURE 2





VOCs in Soil

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

Basemap Legend

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

VOCs in Soil and Proposed Sampling Locations

DOE LF1

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

0 60 120 Feet

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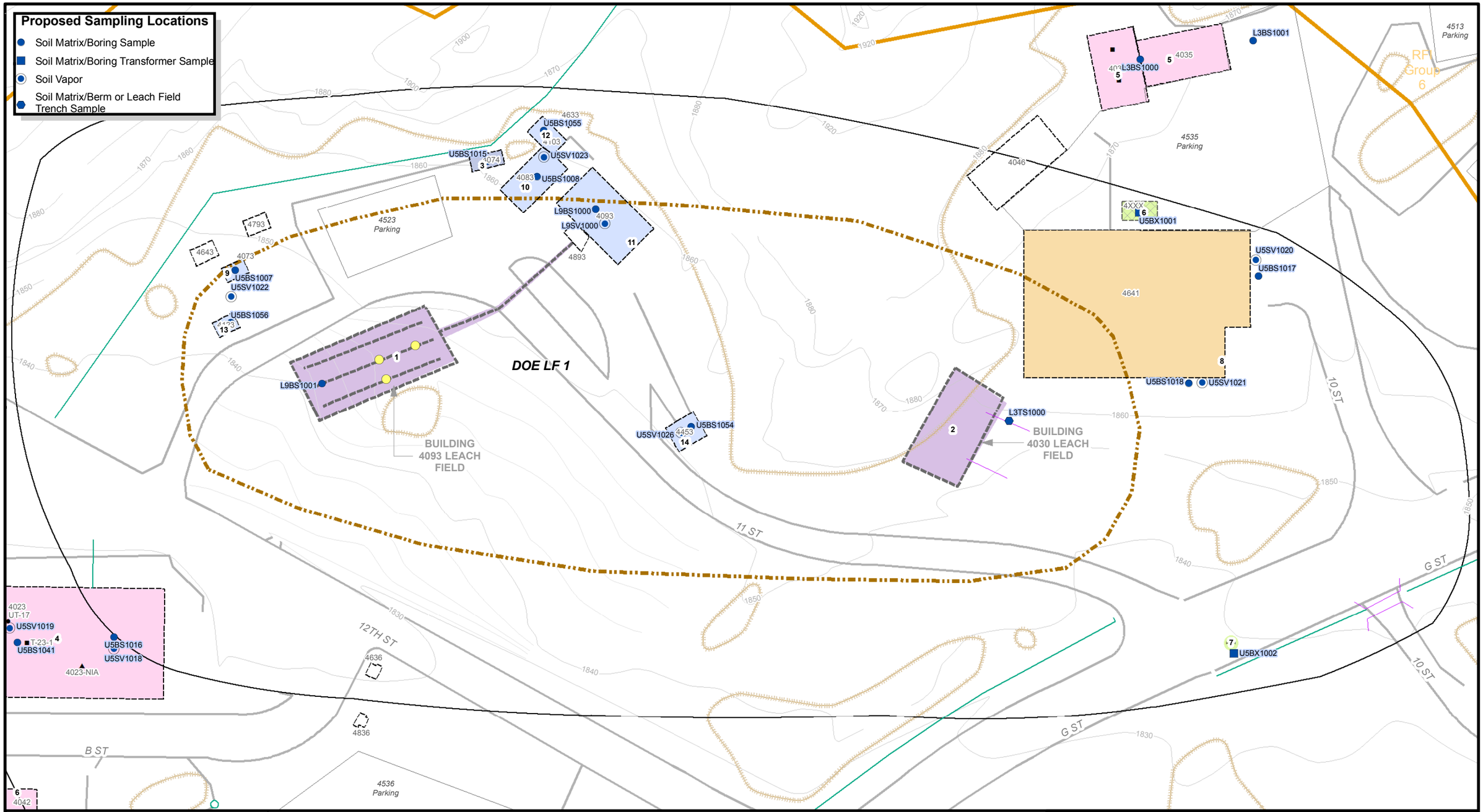
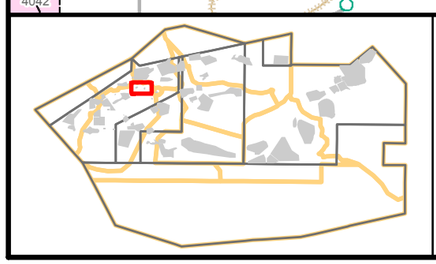
FIGURE 3





Metals in Soil

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

Metals in Soil and Proposed Sampling Locations

DOE LF1

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

0 60 120 Feet

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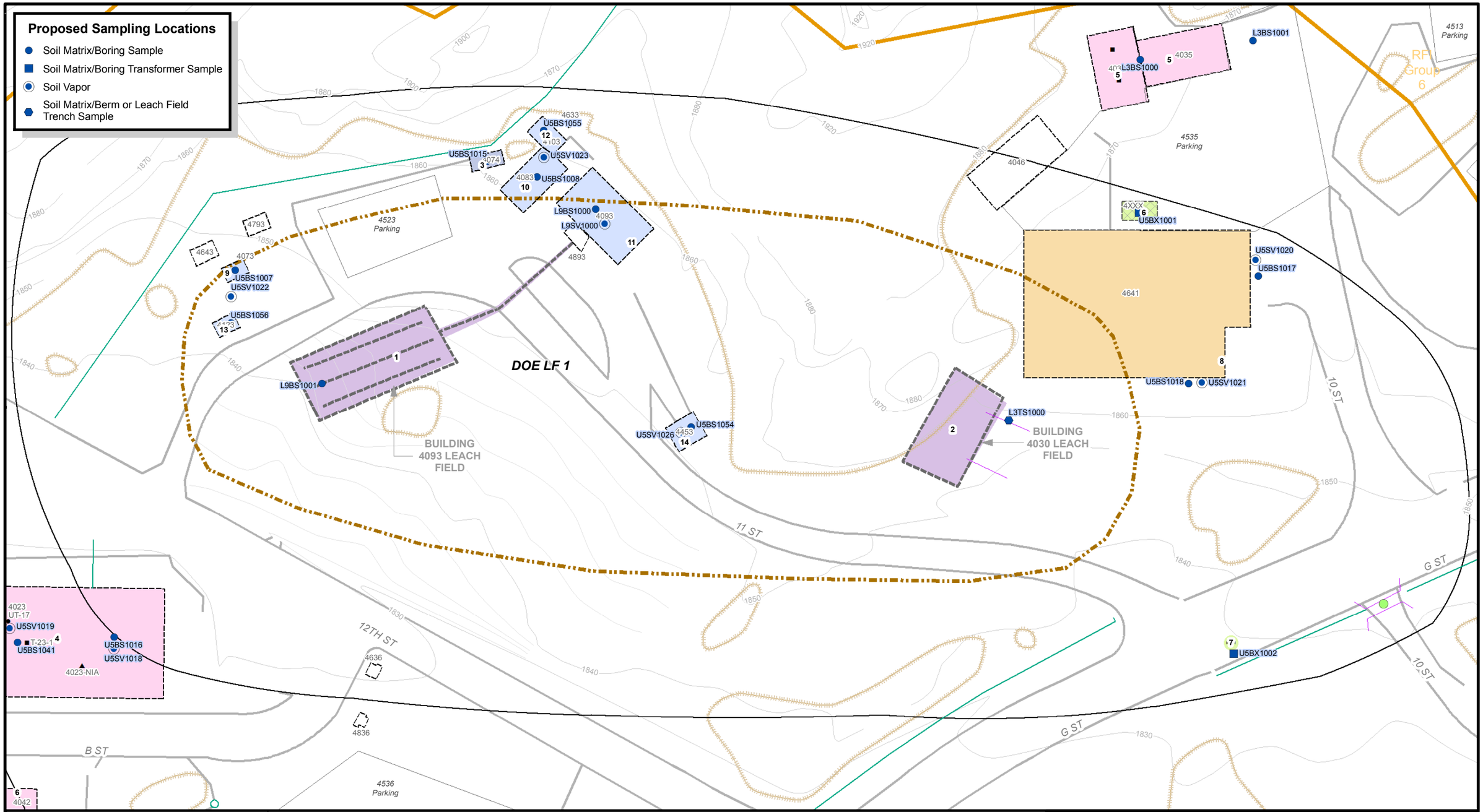
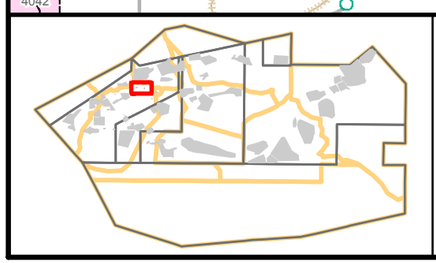
WORKING DRAFT

FIGURE 4





TPH in Soil

- Detect > or equal to 100 mg/kg
- Detect < 100 mg/kg
- Non-detect

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

TPH in Soil and Proposed Sampling Locations

DOE LF1

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

0 60 120 Feet

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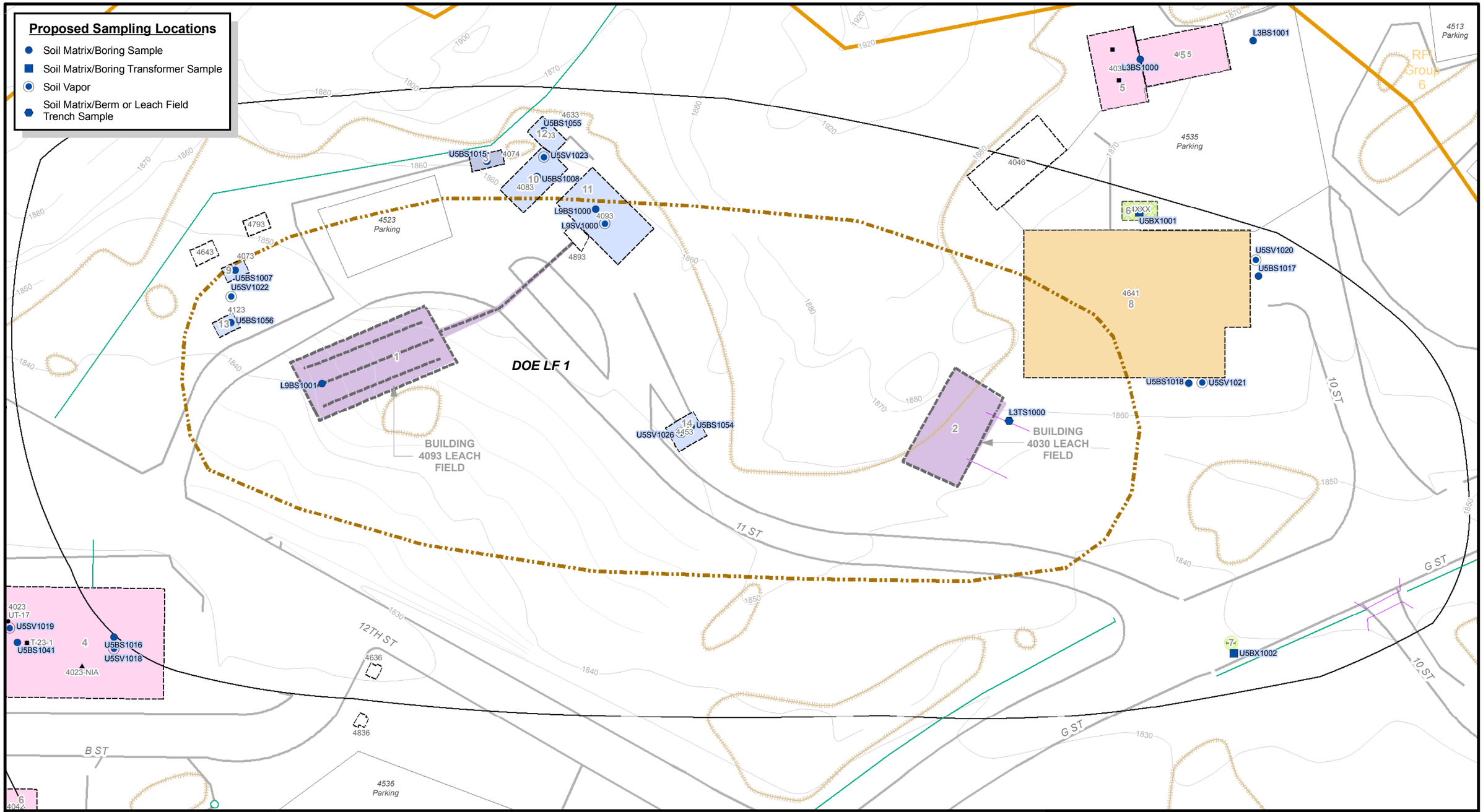
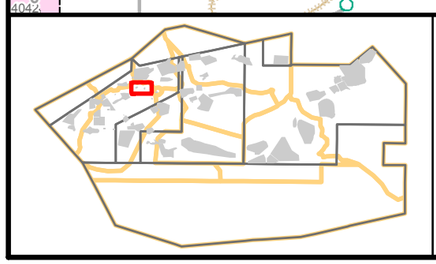
WORKING DRAFT

FIGURE 5





Dioxins in Soil

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

Dioxins in Soil and Proposed Sampling Locations

DOE LF1

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

0 60 120 Feet

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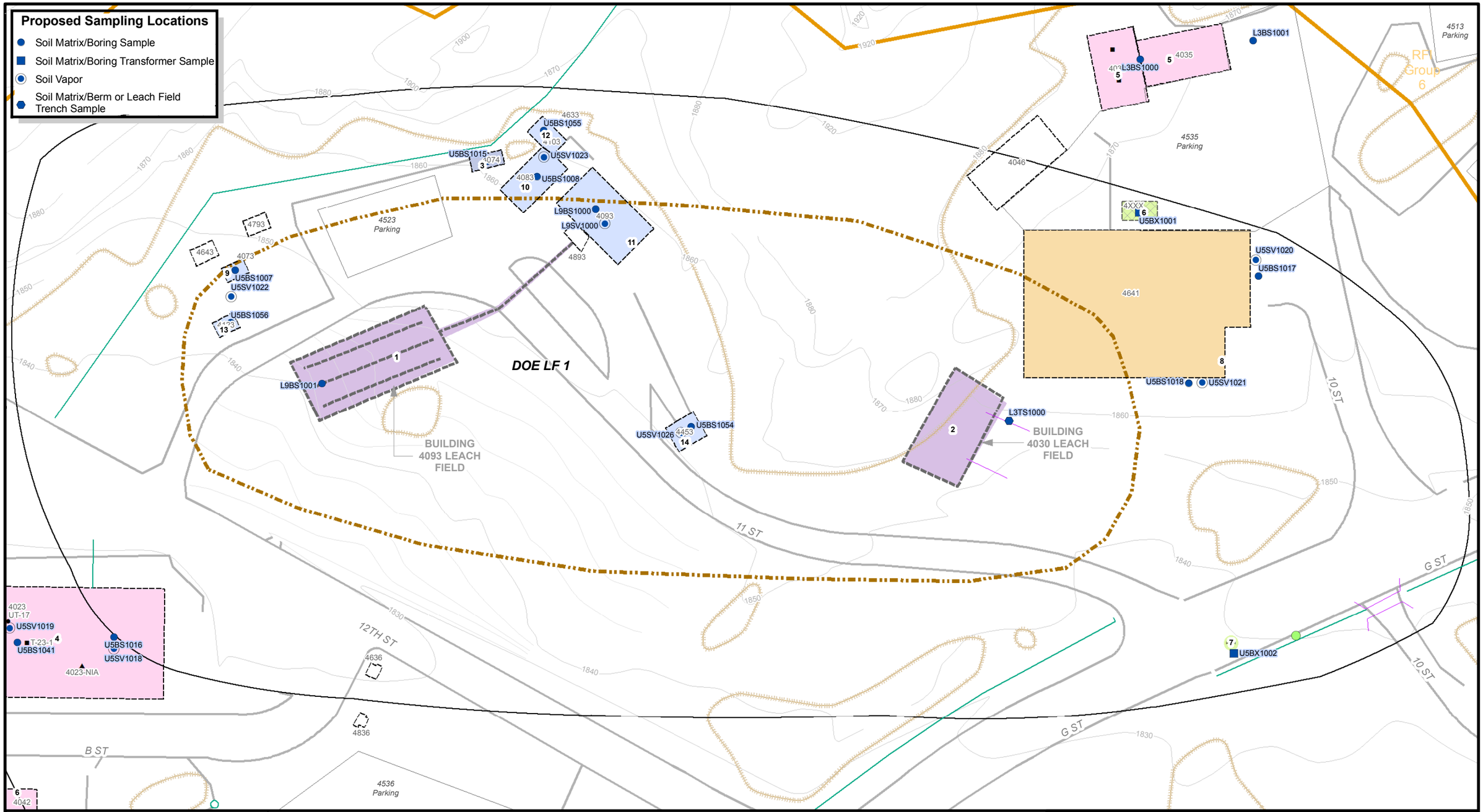
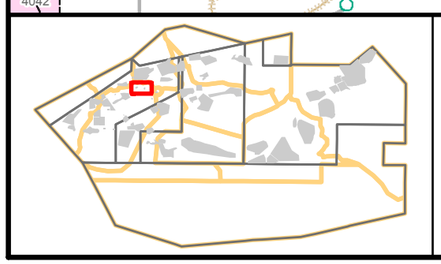
WORKING DRAFT

FIGURE 6





PCBs in Soil

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

Basemap Legend

- Transformer Poles
- Tank - UST
- Tank - AST
- Tank - Not Yet Determined
- Excavation
- Leachfield
- Pipe
- Building - Existing
- Building - Removed
- Building - Not Yet Determined
- Transformer - Existing
- Transformer - Removed
- Transformer - Not Yet Determined
- RFI Site - Boeing
- RFI Site - DOE
- RFI Site - NASA
- RFI Site Buffer
- RFI Group Boundary
- Administrative Area
- Property Boundary
- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
- Pond
- Debris
- Multiple Use
- Solvent
- Petroleum
- Oil/PCBs
- Metals
- Energetic Constituents
- Propellants
- Leach Field
- Non-metal Inorganic Constituents
- Screening for Potential Impacts

PCBs in Soil and Proposed Sampling Locations

DOE LF1

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

0 60 120 Feet

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FIGURE 7