Sampling and Analysis Plan for DOE Leach Fields 2 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 2 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 2 includes the Area of Concern (AOC) Building 4010 Leach Field. Other chemical use areas evaluated with the DOE Leach Fields 2 include Buildings 4010, 4012, and 4013, five electrical substations, an air compressor pad and associated cooling water pipelines, and an underground storage tank (UST).

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 2. 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 2 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 16 chemical use areas identified for DOE Leach Fields 2. In addition, data gaps were identified based on the need for documentation related to the contents of tanks at the site.

To address these data gaps, CH2M HILL is proposing to collect 41 soil samples and 6 soil vapor samples. These samples will be collected from a total of 20 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.

TABLE 1

Data Gaps

Sampling and Analysis Plan for DOE Leach Fields 2 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	Substation 4713 - Chemicals uses include polychlorinated biphenyls (PCBs). PCBs have not been investigated in soil.	X			1
2	Substation 4708A/4708B - Chemicals uses include PCBs. PCBs have not been investigated in soil.	X			1
3	Substation 4756 - Chemicals uses include PCBs. PCBs have not been investigated in soil.	X			1
4	Substation on Western Side of Building 4010 - Chemicals uses include PCBs. PCBs have not been investigated in soil.	X			1
5	Substation on Eastern Side of Building 4010 - Chemicals uses include PCBs. PCBs have not been investigated in soil.	X			1
6	Building 4010 - Chemical uses include metals, trichloroethylene (TCE), and hydrazine. These chemicals have not been investigated in soil or near-surface groundwater (and soil vapor for TCE).	X			3
7	Building 4010 Leach Field - The location of the leach field has not been identified, and consequently the leach field has not been investigated for the constituents of potential concern (COPCs) (metals, hydrazine, and TCE). Further investigation might be required to evaluate the location of the leach field and investigate soil and soil vapor at this location.	X	X		3
8	Building 4012 - Chemical uses include metals. Metals have not been investigated in soil or near-surface groundwater.	X			1
9	Air Compressor Pad/Cooling Water Pipelines - Chemical uses include hydrazine. Hydrazine has not been investigated in soil or near-surface groundwater.	X			1
10	Building 4013 - Chemical uses include total petroleum hydrocarbons (TPHs), PCBs, and metals. These chemicals have not been investigated in soil and near-surface groundwater.	X			4
11	EMGEN - Chemical uses include fuel-oil. Fuel-oil has not been investigated in soil or near-surface groundwater.	X			1
12	T-L01 (Turbine) - Chemical uses include oil. Oil has not been investigated in soil or near-surface groundwater.	X			0 (Investigated with CUA 11)
13	TCF-1 - Chemical uses include hydrazine. Hydrazine has not been investigated in soil or near-surface groundwater.	X			1

TABLE 1

Data Gaps

Sampling and Analysis Plan for DOE Leach Fields 2 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
14	TCF-2 - Chemical uses include morpholine. Morpholine has not been investigated in soil or near-surface groundwater.	X			0
15	TCF-3 - Chemical uses include sulphuric acid. pH has not been investigated in soil or near-surface groundwater.	X			0 (Investigated with CUA 13)
16	EMSTG - Chemical uses include oil. Oil has not been investigated in soil or near-surface groundwater.	X			1
N/A	Information regarding the contents of eight underground and aboveground storage tanks located north of Building 4010 and north of Building 4013 has not been located.			X	N/A
				Total	**20**

Notes:
N/A = Not Applicable

The locations of samples proposed in Table 2 are presented in Figure 1. In addition, Figures 2 through 6 present the locations of the proposed samples relative to the locations of previous samples analyzed for 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.

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.

TABLE 2

Proposed Samples for DOE Leach Fields 2 RFI Site

Sampling and Analysis Plan for DOE Leach Fields 2 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	U5BX1003	Soil	0.5								X								Substation 4713 has not been investigated for PCBs. 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.
2	U5BX1004	Soil	0.5								X								Substation 4708A/4708B has not been investigated for PCBs. 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.
3	U5BX1005	Soil	0.5								X								Substation 4756 has not been investigated for PCBs. 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.
4	L1BX1000	Soil	0.5								X								The substation on the west side of Building 4010 has not been investigated for PCBs. Discrete samples will be collected at 3 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.
5	L1BX1001	Soil	0.5								X								The substation on the east side of Building 4010 has not been investigated for PCBs. Discrete samples will be collected at 3 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.
6	L1BS1000	Soil	1		X			X	X	X			X						Chemical uses at Building 4010 include metals, TCE, and hydrazine. No sampling has occurred at 4010 to date. The proposed sample is located near the former reactor, containment vessel, and primary vault (where hydrazine was used for corrosion protection) inside Building 4010.
		Soil	6		X			X	X				X						
		Soil	10		X			H	H				H						Analysis is contingent on the results of analyses for more shallow samples.
6	L1BS1001	Soil	1		H			X	X	X			X						See above. The proposed sample is located near the former drain system sump located east of Building 4010. VOCs will be analyzed in soil if VOCs are detected in soil vapor collected from L1SV1000.
		Soil	6		H			X	X				X						
		Soil	10		H			H	H				H						Analysis is contingent on the results of analyses for more shallow samples.
6	L1SV1000	Soil Vapor	5			X													Soil vapor samples are proposed near the former drain system sump at Building 4010 due to former uses of TCE inside the building.
		Soil Vapor	10			X													
7	L1BS1002	Soil	1		H				X	X									No sampling has occurred at the Building 4010 leach field. Chemical uses of Building 4010 include metals, TCE, and hydrazine. The proposed sample is located near the northeastern end of the suspected location of the leach field. VOCs will be analyzed in soil if VOCs are detected in the soil vapor sample collected from L1SV1001.
		Soil	6		H				X										

TABLE 2

Proposed Samples for DOE Leach Fields 2 RFI Site

Sampling and Analysis Plan for DOE Leach Fields 2 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									Analysis is contingent on the results of analyses for more shallow samples.
7	L1SV1001	Soil Vapor	5			X												Soil vapor samples are proposed near the centroid of the Building 4010 Leach Field due to former uses of TCE inside Building 4010.
		Soil Vapor	10			X												
7	L1BS1003	Soil	1		H				X	X								See above. The proposed sample is located near the southwestern end of the suspected location of the leach field. VOCs will be analyzed in soil if VOCs are detected in the soil vapor sample collected from L1SV1001.
		Soil	6		H				X									
		Soil	10		H				H									Analysis is contingent on the results of analyses for more shallow samples.
8	U5BS1019	Soil	1						X	X								Chemical uses at Building 4012 include metals. Metals have not been investigated in soil. The proposed sample is located at a door on the western side of the former building.
		Soil	6						X									
		Soil	10						H									Analysis is contingent on the results of analyses for more shallow samples.
9	U5BS1020	Soil	1	X	X			X	X				X					No sampling has occurred at the air compressor pad/cooling water pipelines that previously contained hydrazine. The proposed sample is located at the former air compressor pad.
		Soil	6	X	X			X	X				X					
		Soil	10	H	X			H	H				H					Analysis is contingent on the results of analyses for more shallow samples.
10	U5BS1021	Soil	1	X			X		X	X	H							Chemical uses at Building 4013 include TPH, PCBs, and metals. Sampling has not been performed to date. PAHs will also be analyzed based on the previous use of TPH in the building. The proposed sample is located outside of a large door on the eastern side of the former building.
		Soil	6	X			X		X		H							
		Soil	10	H			H		H		H							Analysis is contingent on the results of analyses for more shallow samples.
10	U5BS1022	Soil	1	X			X		X	X	H							See above. The proposed sample is located near the northwestern corner of the building and near T-EMG1 (an aboveground storage tank containing diesel).
		Soil	6	X			X		X		H							
		Soil	10	H			H		H		H							Analysis is contingent on the results of analyses for more shallow samples.
10	U5BS1058	Soil	1	X			X		X	X	H							See above. The proposed sample is located outside of a large door on the western side of the former building.
		Soil	6	X			X		X		H							
		Soil	10	H			H		H		H							Analysis is contingent on the results of analyses for more shallow samples.
10	U5SV1000	Soil Vapor	5			X												
		Soil Vapor	10			X												
11 and 12	U5BS1023	Soil	1	X			X											No sampling has occurred at aboveground tanks EMGEN and T-L01 (Turbine). These tanks both contained oil. The proposed sample is located between these 2 tanks.
		Soil	6	X			X											
		Soil	10	H			H											Analysis is contingent on the results of analyses for more shallow samples.
	U5BS1024	Soil	1					X		X			X					No sampling has occurred at aboveground tanks TCF-1 and TCF-3. These tanks contained hydrazine and sulfuric acid, respectively. The proposed sample is located between these 2 tanks.
13 and 15		Soil	6					X					X					
		Soil	10					H					H					Analysis is contingent on the results of analyses for more shallow samples.

TABLE 2

Proposed Samples for DOE Leach Fields 2 RFI Site

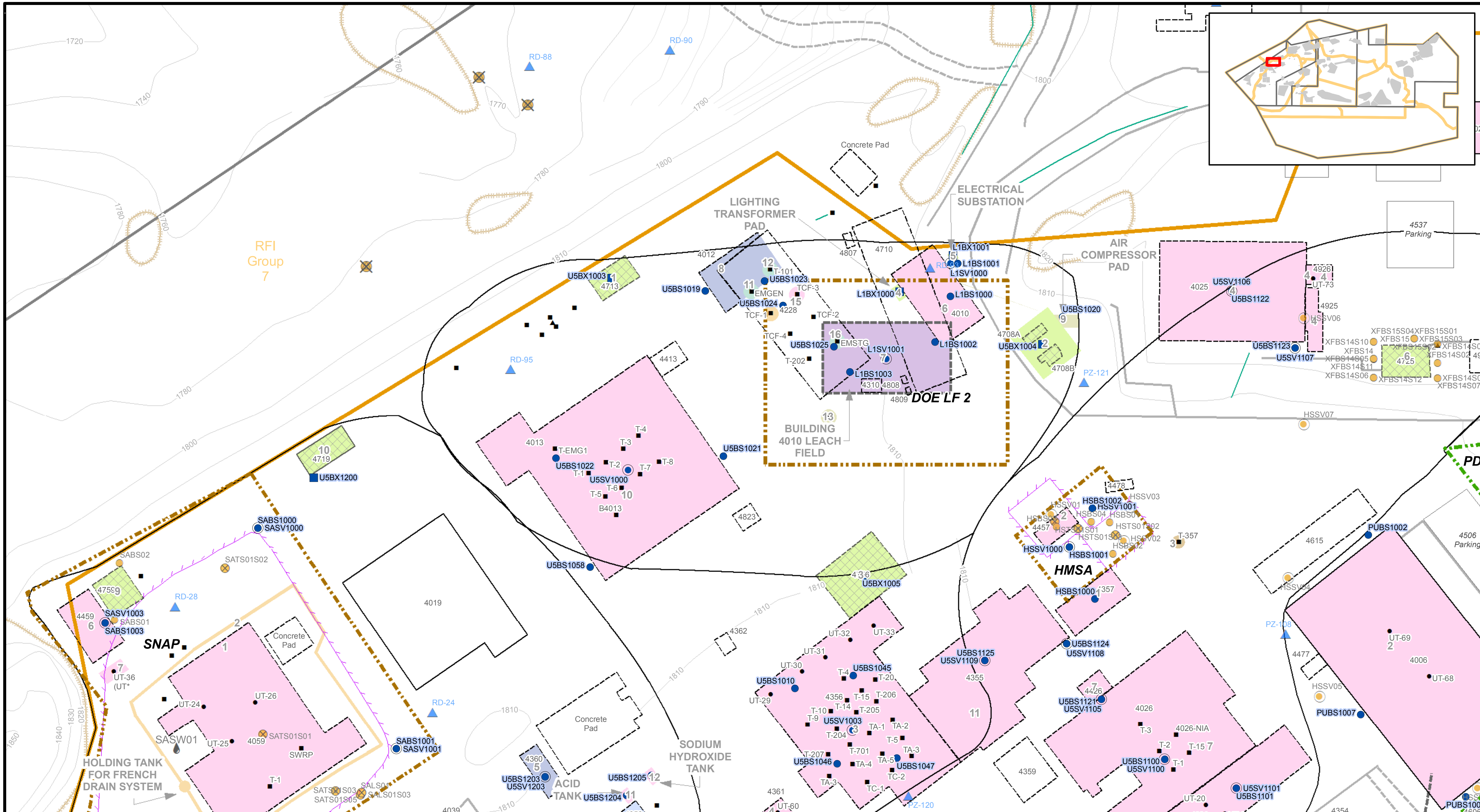
Sampling and Analysis Plan for DOE Leach Fields 2 RFI Site, Group 5, Santa Susana Field Laboratory

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)	
14																		No sampling is required.
16	U5BS1025	Soil	1	X			X											No sampling has occurred at aboveground tank EMSTG. This tank contained oil.
		Soil	6	X			X											
		Soil	10	H			H											Analysis is contingent on the results of analyses for more shallow samples.
Total Soil Samples for Analysis				12	6		10	8	18	9	5		8					
Total Soil Samples on Hold				6	9		5	4	9		9		4					
Total Soil Vapor Samples for Analysis						6												
Total Soil Samples Collected			41															
Total Number of Locations			20															

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

DOE LF2

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

0 60 120 Feet

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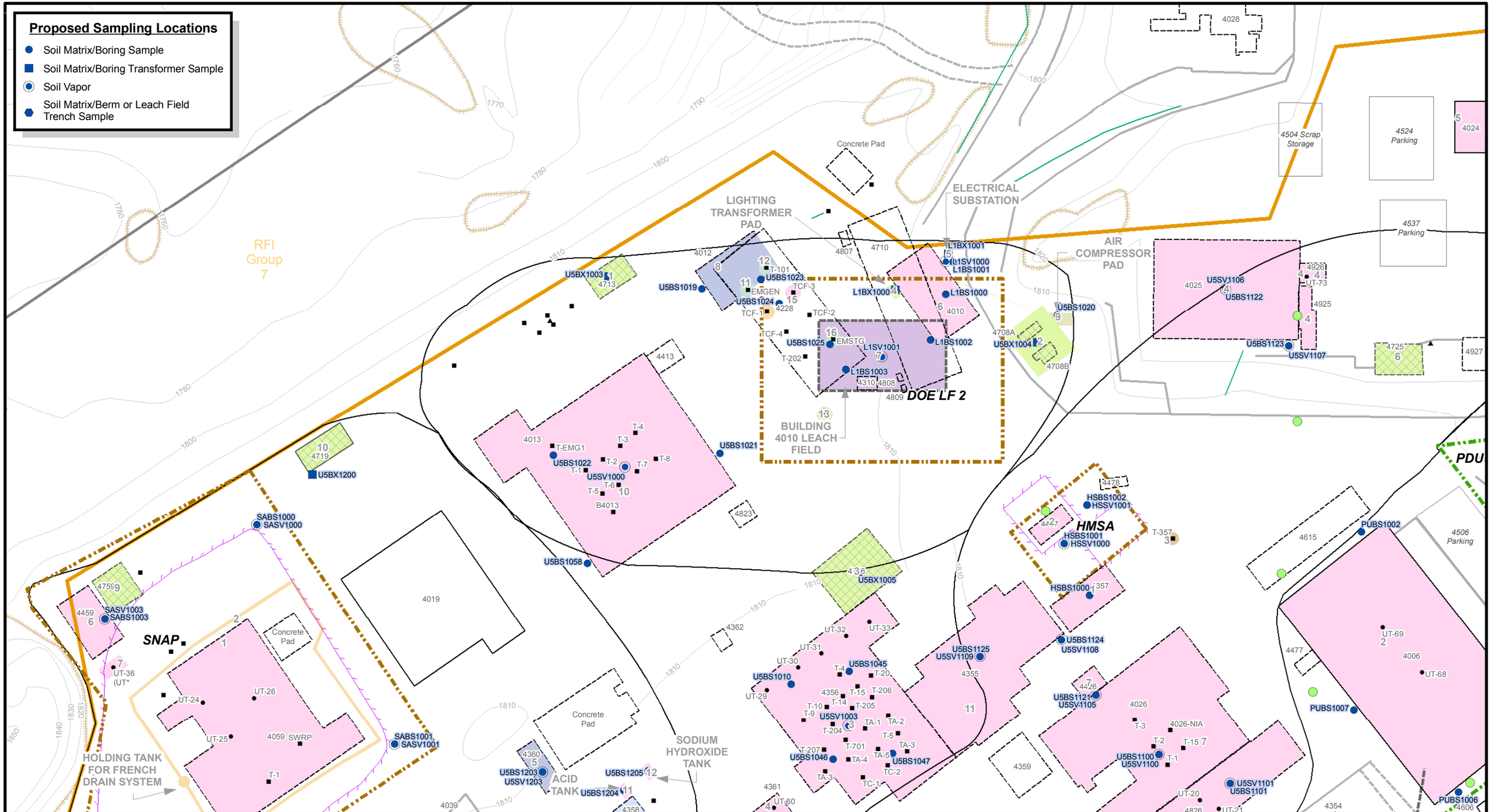
FIGURE 1


Proposed Sampling Locations
Soil Matrix/Boring Sample
Soil Matrix/Boring Transformer Sample
Soil Vapor
Soil Matrix/Berm or Leach Field Trench Sample
RFI Group 7
LIGHTING TRANSFORMER PAD
ELECTRICAL SUBSTATION
AIR COMPRESSOR PAD
Concrete Pad
4504 Scrap Storage
4524 Parking
4537 Parking
4506 Parking
DOE LF 2
BUILDING 4010 LEACH FIELD
HMSA
PDU
SNAP
HOLDING TANK FOR FRENCH DRAIN SYSTEM
SODIUM HYDROXIDE TANK
ACID TANK
SWRP
U5BX1003
U5BS1019
U5BS1023
U5BS1024
U5BS1025
U5BS1046
U5BS1045
U5BS1010
U5BS1021
U5BS1022
U5BS1058
U5BS1205
U5BS1204
U5BS1203
U5SV1203
U5BX1200
SABS1000
SASV1000
SASV1003
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HSBS1002
HSSV1001
HSBS1001
HSSV1000
HSBS1000
PUBS1002
PUBS1007
PUBS1006
U5SV1000
U5SV1003
T-101
TCF-1
TCF-2
TCF-3
TCF-4
EMGEN
EMSTG
T-202
UT-36 (UT*
UT-24
UT-25
UT-26
T-1
UT-32
UT-33
UT-31
UT-30
UT-29
UT-69
UT-68
UT-73
UT-60
UT-20
UT-21
4012
4013
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4228
4010
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4708B
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4807
4710
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4823
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4362
4360
4358
4361
4039
4459
4759
4019
4059
4355
4356
4359
4026
4026-NIA
4477
4354
4606
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
Exceeds Residential RBSL + Eco RBSL
Exceeds Eco RBSL
Exceeds Residential RBSL
Detect, Below All Screening Levels
Non-detect
VOCs in Soil Vapor and Proposed Sampling Locations
DOE LF2
SANTA SUSANA FIELD LABORATORY
1 inch equals 60 feet
Feet
0
60
120
February 21, 2008
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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

RFI Group 7

LIGHTING TRANSFORMER PAD

ELECTRICAL SUBSTATION

Concrete Pad

AIR COMPRESSOR PAD

4504 Scrap Storage

4524 Parking

4537 Parking

4506 Parking

DOE LF 2

BUILDING 4010 LEACH FIELD

HMSA

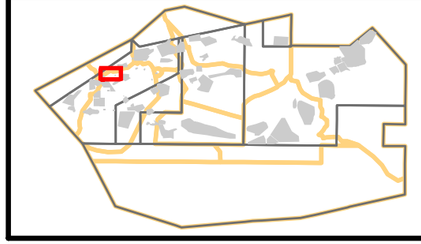
SNAP

HOLDING TANK FOR FRENCH DRAIN SYSTEM

SODIUM HYDROXIDE TANK

ACID TANK

PDU



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

DOE LF2

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

0 60 120 Feet

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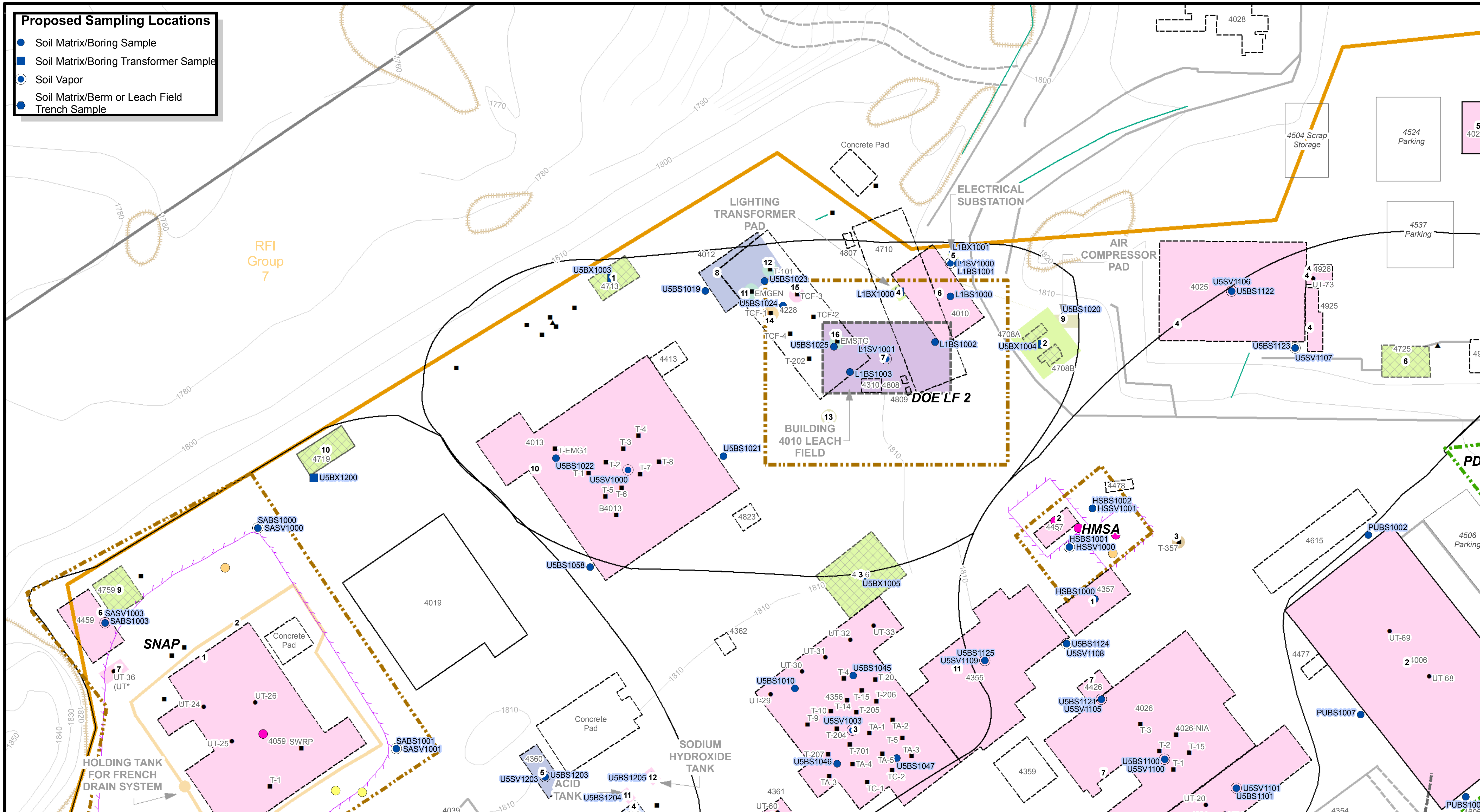
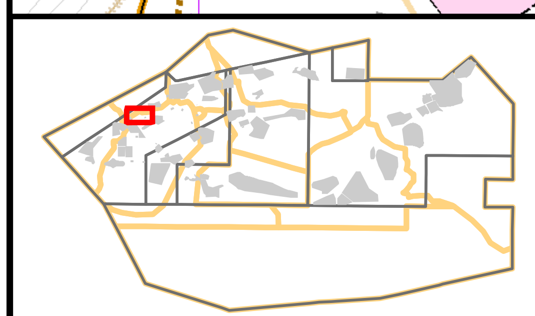
FIGURE 3





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	Building - Existing	RFI Site - Boeing	Drainage	Debris
Tank - UST	Building - Removed	RFI Site - DOE	Road - Asphalt	Multiple Use
Tank - AST	Building - Not Yet Determined	RFI Site - NASA	Roads - Dirt	Solvent
Tank - Not Yet Determined	Transformer - Existing	RFI Site Buffer	Rocks	Petroleum
Excavation	Transformer - Removed	RFI Group Boundary	Streams	Oil/PCBs
Leachfield	Transformer - Not Yet Determined	Administrative Area	Pond	Metals
Pipe		Property Boundary		

Energetic Constituents	Leach Field
Propellants	Non-metal Inorganic Constituents
	Screening for Potential Impacts

Metals in Soil and Proposed Sampling Locations
DOE LF2
SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

0 60 120 Feet

February 21, 2008

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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

RFI Group 7

LIGHTING TRANSFORMER PAD

ELECTRICAL SUBSTATION

Concrete Pad

AIR COMPRESSOR PAD

4504 Scrap Storage

4524 Parking

4537 Parking

4506 Parking

DOE LF 2

BUILDING 4010 LEACH FIELD

SNAP

HMSA

PDU

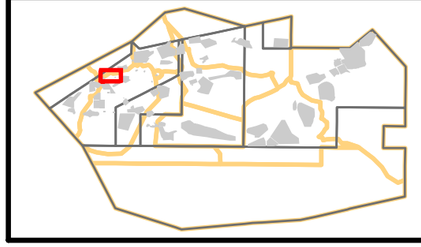
HOLDING TANK FOR FRENCH DRAIN SYSTEM

SODIUM HYDROXIDE TANK

ACID TANK

Concrete Pad

U5BX1003 4713
U5BS1019
U5BS1023
T-101
EMGEN
U5BS1024
TCF-1
4228
TCF-3
TCF-2
TCF-4
U5BS1025
EMSTG
T-202
L1BX1000
L1BX1001
L1SV1000
L1BS1001
L1BS1000
4010
L1SV1001
L1BS1002
L1BS1003
4310
4808
4809
4012
4807
4710
4708A
U5BX1004
4708B
U5BS1020
4025
U5SV1106
U5BS1122
4926
UT-73
4925
U5BS1123
U5SV1107
4725
4927
4413
4013
T-EMG1
U5BS1022
T-1
T-2
T-3
T-4
T-7
T-8
U5SV1000
T-5
T-6
B4013
U5BS1021
U5BX1200 4719
4823
U5BS1058
4019
SABS1000 SASV1000
4759
4459
SASV1003
SABS1003
UT-36 (UT*
UT-24
UT-26
UT-25
4059 SWRP
T-1
SABS1001 SASV1001
4360
U5SV1203
U5BS1203
U5BS1205
U5BS1204
4358
4039
4361
UT-60
4362
U5BX1005
4356
UT-32
UT-33
UT-31
UT-30
U5BS1045
T-4
T-20
U5BS1010
UT-29
T-15
T-206
T-14
T-10
T-205
T-9
U5SV1003
T-204
TA-1
TA-2
T-5
T-207
T-701
TA-3
TA-5
U5BS1046
TA-4
U5BS1047
TC-2
TA-3
TC-1
4355
U5BS1125
U5SV1109
4359
HSBS1002
HSSV1001
4478
4457
HSBS1001
HSSV1000
T-357
HSBS1000
4357
U5BS1124
U5SV1108
4615
PUBS1002
UT-69
4006
UT-68
PUBS1007
4477
4426
U5BS1121
U5SV1105
4026
4026-NIA
T-3
T-2
T-15
T-1
U5BS1100
U5SV1100
U5SV1101
U5BS1101
UT-20
4826
UT-21
4354
PUBS1006
4606
1760
1770
1780
1790
1800
1810
1820
1830
1840
1850



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 LF2

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

0 60 120 Feet

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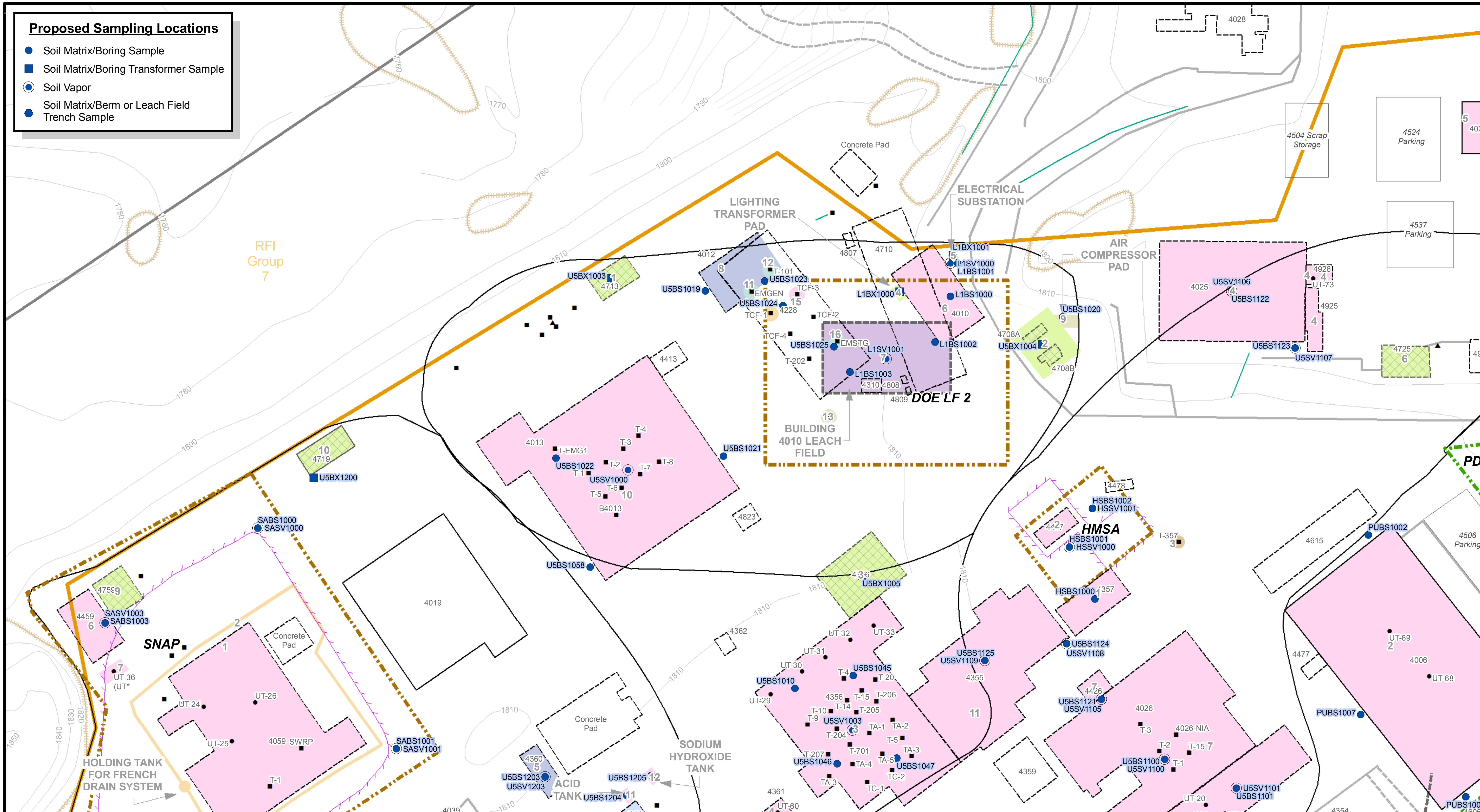
FIGURE 5


Proposed Sampling Locations
Soil Matrix/Boring Sample
Soil Matrix/Boring Transformer Sample
Soil Vapor
Soil Matrix/Berm or Leach Field Trench Sample
RFI Group 7
LIGHTING TRANSFORMER PAD
ELECTRICAL SUBSTATION
AIR COMPRESSOR PAD
Concrete Pad
4504 Scrap Storage
4524 Parking
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DOE LF 2
BUILDING 4010 LEACH FIELD
HMSA
SNAP
PDU
HOLDING TANK FOR FRENCH DRAIN SYSTEM
SODIUM HYDROXIDE TANK
ACID TANK
4013
4019
4010
4025
4026
4006
4059 SWRP
4355
4356
4615
U5BX1003
U5BS1019
U5BS1023
U5BS1024
U5BS1025
L1BX1001
L1SV1000
L1BS1001
L1BX1000
L1BS1000
L1BS1002
L1SV1001
L1BS1003
U5BX1004
U5BS1020
U5SV1106
U5BS1122
U5BS1123
U5SV1107
U5BS1021
U5BS1022
U5SV1000
U5BX1200
SABS1000
SASV1000
SASV1003
SABS1003
SABS1001
SASV1001
U5BS1058
U5BX1005
HSBS1002
HSSV1001
HSBS1001
HSSV1000
HSBS1000
PUBS1002
U5BS1125
U5SV1109
U5BS1124
U5SV1108
U5BS1045
U5BS1010
U5SV1003
U5BS1046
U5BS1047
U5BS1121
U5SV1105
U5BS1100
U5SV1100
U5SV1101
U5BS1101
PUBS1007
PUBS1006
U5BS1203
U5SV1203
U5BS1205
U5BS1204

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 LF2

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

Feet: 0 60 120

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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

RFI Group 7

LIGHTING TRANSFORMER PAD

ELECTRICAL SUBSTATION

Concrete Pad

AIR COMPRESSOR PAD

4504 Scrap Storage

4524 Parking

4537 Parking

4506 Parking

DOE LF 2

BUILDING 4010 LEACH FIELD

SODIUM HYDROXIDE TANK

ACID TANK

HMSA

SNAP

HOLDING TANK FOR FRENCH DRAIN SYSTEM

PDU

U5BX1003 4713

U5BS1019

U5BS1023

U5BS1024

EMGEN

TCF-1

TCF-2

TCF-3

TCF-4

T-101

4228

L1BX1001

L1SV1000

L1BS1001

L1BX1000

L1BS1000

4010

L1BS1002

L1SV1001

U5BS1025

EMSTG

T-202

L1BS1003

4310

4808

4809

4012

4807

4710

4708A

4708B

U5BX1004

U5BS1020

4925

4926

UT-73

U5SV1106

U5BS1122

U5BS1123

U5SV1107

4725

4927

4024

4028

4615

4478

4457

HSBS1002

HSSV1001

HSBS1001

HSSV1000

HSBS1000

4357

T-357

PUBS1002

PUBS1007

PUBS1006

4606

4477

UT-69

UT-68

4006

4426

U5BS1121

U5SV1105

4026

4026-NIA

U5BS1100

U5SV1100

U5SV1101

U5BS1101

4354

4826

UT-20

UT-21

4359

4355

U5BS1125

U5SV1109

U5BS1124

U5SV1108

U5BX1005

4362

4361

4360

4358

4039

U5BS1203

U5BS1205

U5BS1204

U5SV1203

4823

4013

T-EMG1

U5BS1022

U5BS1021

U5SV1000

T-1

T-2

T-3

T-4

T-5

T-6

T-7

T-8

B4013

U5BS1058

4019

4413

4719

U5BX1200

SABS1000

SASV1000

4759

4459

SASV1003

SABS1003

UT-36 (UT*

UT-24

UT-26

UT-25

4059 SWRP

T-1

SABS1001

SASV1001

1760

1770

1780

1790

1800

1810

1820

1830

1840

1850

U5BS1010

U5BS1045

U5BS1046

U5BS1047

UT-29

UT-30

UT-31

UT-32

UT-33

T-4

T-10

T-9

T-14

T-15

T-20

T-205

T-206

T-204

T-207

T-701

TA-1

TA-2

TA-3

TA-4

TA-5

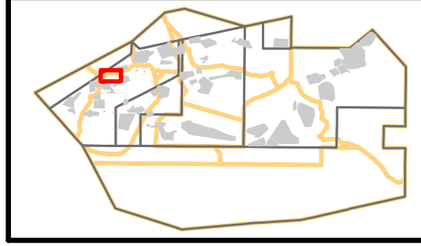
TC-1

TC-2

U5SV1003

4356

UT-60



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
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- RFI Site Buffer
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- Drainage
- Road - Asphalt
- Roads - Dirt
- Rocks
- Streams
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- 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 LF2

SANTA SUSANA FIELD LABORATORY

1 inch equals 60 feet

Feet

0 60 120

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FIGURE 7

Sampling and Analysis Plan for DOE Leach Fields 3 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 3 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 3 consists of AOC Building 4353 Leach Field, Area of Concern (AOC) Building 4363 Leach Field, AOC Building 4373 Leach Field, and AOC Building 4383 Leach Field. Other chemical use areas evaluated with DOE Leach Fields 3 include Buildings 4353, 4363, 4373, 4383, 4874, 4875, 4375, 4374, 4055, and 4462, four underground storage tanks (USTs), one transformer pole, and eight electrical substations.

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 3. 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 3 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 29 of the 30 chemical use areas identified for DOE Leach Fields 3. Chemical data gaps were also identified for the downstream surface water drainage pathways. In addition, documentation data gaps were identified related to the uses of pipelines at the site and regulatory closure approval for underground storage tanks.

To address these data gaps, CH2M HILL is proposing to collect 84 soil samples and 26 soil vapor samples. These samples will be collected from a total of 51 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.

TABLE 1

Data Gaps

Sampling and Analysis Plan for DOE Leach Fields 3 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 4353 - Chemical uses include energetics. Energetics have not been investigated in soil.	X			2
2	Building 4363 - Chemical uses include solvents, kerosene, naphthalene, and metals. Semivolatile organic compounds (SVOCs), total petroleum hydrocarbon (TPH), and metals have not been investigated in soil.	X			3
3	Building 4373 - Chemical uses include TPH, metals, solvents, and propellants. TPH, metals, and propellants have not been investigated in soil.	X			3
4	Building 4383 - Chemical uses include solvents. Volatile organic compounds (VOCs) have not been investigated in soil or soil vapor.	X			2
5	Buildings 4375, 4875, and 4874 were previously used for barrel storage (unknown contents). Soil at the location of these former buildings has not been investigated to evaluate impacts from potential releases from these barrels.	X			4
6	Substation 4707 - Chemical uses include polychlorinated biphenyls (PCBs). PCBs have not been investigated in soil.	X			1
7	Building 4374 - Chemical uses include solvents and metals. VOCs and metals have not been investigated in soil (or soil vapor for VOCs).	X			2
8	Substation 4883 A - Chemical uses include PCBs. PCBs have not been investigated in soil.	X			1
9	Building 4055 - Chemical uses include solvents and metals. VOCs and metals have not been investigated in soil (or soil vapor for VOCs).	X			5
10	Building 4462 - Chemical uses include TPH and metals. TPH and metals have not been investigated in soil.	X			0 (addressed with Unaffiliated SAP)
11	UT-75 - Chemical uses include TPH and VOCs. These chemicals were not detected in soil samples collected following removal of UT-75 in 2001. No further investigation is required.	X			1

TABLE 1

Data Gaps

Sampling and Analysis Plan for DOE Leach Fields 3 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
12	UST (north of Building 4363) - Chemical uses include TPH. TPH has not been investigated in soil.	X			1
13	UT-72 - Chemical uses include TPH and mercury. TPH and mercury have not been investigated in soil.	X			2
14	UT-12 (UT-55) - Chemical uses include TPH. TPH has been investigated, but the lateral extent of TPH contamination has not been defined. Due to the elevated concentrations of TPH that have been detected in soil, SVOCs should be investigated in soil to assess human health and ecological risks. In addition, TPH has been detected at elevated concentrations in soil at 10 feet below ground surface (bgs), but near-surface groundwater has not been investigated for TPH.	X			3
15	Building 4353 Leach Field - Chemical uses at the Building 4353 Leach Field are assumed to be the same as those for Building 4353 (energetics). Energetics have not been investigated. In addition, metals have been detected at elevated concentrations in soil, but the vertical extent of metals in soil has not been defined.	X			2
16	Building 4363 Leach Field - Chemical uses at the Building 4363 Leach Field are assumed to be the same as those for Building 4363 (solvents, kerosene, naphthalene, and metals). Soil has been investigated for these chemical groups, but the vertical extent of metals in soil has not been defined.	X			2
17	Building 4373 Leach Field - Chemical uses at the Building 4373 Leach Field are assumed to be the same as those for Building 4373 (solvents, metals, propellants, and TPH). Soil has been investigated for these chemical groups, but the vertical extent of metals in soil has not been defined.	X			1

TABLE 1

Data Gaps

Sampling and Analysis Plan for DOE Leach Fields 3 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
18	Building 4383 Leach Field - Chemical uses at the Building 4383 Leach Field are assumed to be the same as those for Building 4383 (solvents). Soil vapor has been investigated for VOCs. However, soil has been investigated for metals and the vertical extent of metals in soil has not been defined.	X			2
19	Substation 4760 A - Chemical uses include PCBs. PCBs have not been investigated in soil.	X			0 (addressed with Unaffiliated SAP)
20	Substation 4755 - Chemical uses include PCBs. PCBs have not been investigated in soil.	X			1
21	Transformer Pole X14 - Chemical uses include PCBs. PCBs have not been investigated in soil. However, only one transformer was mounted to the pole. No investigation is required.				N/A
22	Substation 4762 - Chemical uses include PCBs. PCBs have been investigated in soil. However, the lateral and vertical extents of PCBs in soil have not been defined.	X			0 (addressed with Unaffiliated SAP)
23	Substation 4760 B - Chemical uses include PCBs. PCBs have not been investigated in soil.	X			0 (addressed with Unaffiliated SAP)
24	Substation 4883 B - Chemical uses include PCBs. PCBs have not been investigated in soil.	X			1
25	Substation 4853 - Chemical uses include PCBs. PCBs have not been investigated in soil.	X			1
26	Chemical Use Area No. 26 was added to this site based on the presence of three pole-mounted transformers (on pole A324) near the southeastern corner of the Building 4373 Leach Field. Soil at these pole-mounted transformers has not been investigated for PCBs.	X			1

TABLE 1

Data Gaps

Sampling and Analysis Plan for DOE Leach Fields 3 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
27	Building 4473 was used for hydraulic testing of pipes, pumps, and other loop components. No investigation has been performed. Investigation is required to assess potential impacts to the environment.	X			2
28	Building 4854 was used as a radiation fuel gauge test structure. No investigation has been performed. Investigation is required to assess potential impacts to the environment.	X			2
29	Building 4863 was used for hydraulic testing of pipes, pumps, and other loop components. No investigation has been performed. Investigation is required to assess potential impacts to the environment.	X			2
30	Building 4873 was used as a Fuel Rod Test Tower and Hydraulic Test Laboratory. No investigation has been performed. Investigation is required to assess potential impacts to the environment.	X			2
Sitewide	Previous samples had detection limits above risk-based screening levels for VOCs in soil vapor, for select VOCs, SVOCs, and metals in near-surface groundwater, and for VOCs, SVOCs, and metals in soil.	X			Addressed by Other Samples
Sitewide	Sediment and surface water runoff in drainage channels extending from the site have not been analyzed for site constituents of potential concern (COPCs).	X			2
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
N/A	Documentation of regulatory closure of eight underground storage tanks (UT-72, UT-12, UT-13, UT-34, UT-35, UT-56, UT-57, and the UST located northeast of Building 4363) has not been located.			X	N/A
				Total	**51**

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 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.

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.

TABLE 2

Proposed Samples for DOE LF 3 RFI Site

Sampling and Analysis Plan for DOE LF 3 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	L5BS1000	Soil	1									X		X				Building 4353 was used as general storage, including explosives. Energetics and perchlorate have not been investigated in soil. The proposed sample is located at a loading dock to the building.
		Soil	6									X		X				
		Soil	10									H		H				Analysis is contingent on the results of analyses for more shallow samples.
1	L5BS1003	Soil	1									X		X				See above. The proposed sample is located at a door to Building 4353.
		Soil	6									X		X				
		Soil	10									H		H				Analysis is contingent on the results of analyses for more shallow samples.
2	L6BS1000	Soil	1	X	H		X		X	X								Chemical uses in Building 4363 include solvents, kerosene, SVOCs, and metals. SVOCs, TPH, and metals were detected in soil samples collected from the Building 4363 Leach Field but have not been investigated in soil from the building. The proposed sample is located at a bay door on the south side of the building. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from L6SV1000.
		Soil	6	X	H		X		X									
		Soil	10	H	H		H		H									Analysis is contingent on the results of analyses for more shallow samples.
2	L6SV1000	Soil Vapor	5			X												See above.
		Soil Vapor	10			X												
2	L6BS1003	Soil	1	X			X		X	X								See above. The proposed sample is located at a bay door on the north side of the building.
		Soil	6	X			X		X									
		Soil	10	H			H		H									Analysis is contingent on the results of analyses for more shallow samples.
3	L7BS1000	Soil	1	X	H				X	X				X			X	Building 4373 was used to manufacture high-energy rocket fuels and test large rocket engines. Chemical uses include TPH, metals, solvents. TPH, VOCs, and metals have not been investigated in soil from the building. The proposed sample is located at a door on the western side of the building. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from L7SV1000.
		Soil	6	X	H				X					X			X	
		Soil	10	H	H				H					H			H	Analysis is contingent on the results of analyses for more shallow samples.
3	L7BS1002	Soil	1	X	H				X	X				X			X	See above. The proposed sample is located at a door on the eastern side of the building. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from L7SV1000.
		Soil	6	X	H				X					X			X	
		Soil	10	H	H				H					H			H	Analysis is contingent on the results of analyses for more shallow samples.
3	L7SV1000	Soil Vapor	5			X												See above.
		Soil Vapor	10			X												
4	L8BS1000	Soil	1		H				X	X								Chemical uses at Building 4383 include solvents. VOCs have not been investigated in soil or soil vapor. In addition, metals were detected at elevated concentrations in the Building 4383 Leach Field, but have not been investigated in soil at Building 4383. Soil and soil vapor samples will be collected outside of a doorway on the south side of the building. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from L8SV1000.
		Soil	6		H				X									
		Soil	10		H				H									Analysis is contingent on the results of analyses for more shallow samples.

TABLE 2

Proposed Samples for DOE LF 3 RFI Site

Sampling and Analysis Plan for DOE LF 3 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)	
4	L8SV1000	Soil Vapor	5			X													See above.
		Soil Vapor	10			X													
5	U5BS1027	Soil	1	X	H		X		X	X									Buildings 4375, 4874, and 4875 were used for testing SNAP control rod assemblies for the Piqua Organic Moderated Reactor. They were later used for barrel storage with unknown contents. Soil samples will be collected from the centroid of each building and screened for multiple constituents to evaluate potential chemical impacts. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from U5SV1004.
		Soil	6	X	H		X		X										
		Soil	10	H	H		H		H										Analysis is contingent on the results of analyses for more shallow samples.
5	U5BS1028	Soil	1	X	H		X		X	X									See above.
		Soil	6	X	H		X		X										
		Soil	10	H	H		H		H										Analysis is contingent on the results of analyses for more shallow samples.
5	U5BS1029	Soil	1	X	H		X		X	X									See above.
		Soil	6	X	H		X		X										
		Soil	10	H	H		H		H										Analysis is contingent on the results of analyses for more shallow samples.
5	U5SV1004	Soil Vapor	5			X													Soil vapor samples will be collected to evaluate for the presence of VOCs in soil vapor.
		Soil Vapor	10			X													
6	U5BX1006	Soil	0.5								X								Substation 4707 has not been investigated for PCBs. 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	U5BS1030	Soil	1						X	X									Building 4374 was used for non-nuclear liquid metal heat transfer loops testing. Chemical uses include solvents and metals. Metals have not been investigated in soil and VOCs have not been investigated in soil vapor. The proposed sample is located at a doorway on the southern side of the building.
		Soil	6						X										
		Soil	10						H										Analysis is contingent on the results of analyses for more shallow samples.
7	U5SV1006	Soil Vapor	5			X													See above.
		Soil Vapor	10			X													
8	U5BX1007	Soil	0.5								X								Substation 4883A has not been investigated for PCBs. 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.
9	U5BS1031	Soil	1		H				X	X									Building 4055 is an existing building and was used as a Nuclear Materials Development Facility and chemistry laboratory. Chemical use in the building include solvents, adhesives, and metals. VOCs and metals have not been investigated in soil (or VOCs in soil vapor). This proposed sample is located outside the chemistry laboratory. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from U5SV1007.
		Soil	6		H				X										

TABLE 2

Proposed Samples for DOE LF 3 RFI Site

Sampling and Analysis Plan for DOE LF 3 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										Analysis is contingent on the results of analyses for more shallow samples.
9	U5SV1007	Soil Vapor	5			X													See above. This proposed soil vapor sample is located outside the chemistry laboratory.
		Soil Vapor	10			X													
9	U5BS1032	Soil	1		H				X	X									See above. This proposed sample is located in the surface water drainage pathway outside the chemistry laboratory. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from U5SV1007.
		Soil	6		H				X										
		Soil	10		H				H										Analysis is contingent on the results of analyses for more shallow samples.
9	U5BS1033	Soil	1		H				X	X									See above. This proposed sample is located near a doorway on the western side of the building. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from U5SV1008.
		Soil	6		H				X										
		Soil	10		H				H										Analysis is contingent on the results of analyses for more shallow samples.
9	U5SV1008	Soil Vapor	5			X													See above. This proposed soil vapor sample is located near a doorway on the western side of the building.
		Soil Vapor	10			X													
10																			No samples are proposed as part of this SAP. Chemical Use Area No. 10 (Building 4462) is addressed with the Unaffiliated Features SAP for the DOE sites.
11	U5SV1009	Soil Vapor	5			X													UT-75 chemical uses included TPH and VOCs. Those chemicals were not detected in soil samples collected following removal in 2001 (analytical data needs to be loaded into project database). However, VOCs in soil vapor have not been investigated. The proposed sample is at the former location of the UST to assess potential impacts to soil vapor.
		Soil Vapor	10			X													
12	U5BS1035	Soil	6	X				X											An unidentified UST north of Building 4363 contained fuel-oil. TPH and SVOCs have not been investigated in soil. Soil samples will be collected from the approximate locations of the ends of the tank to evaluate for potential impacts.
		Soil	10	X				X											
13	U5BS1037	Soil	8	X				X									X		UT-72 is a former 1,500 gallon fuel-oil underground tank on the eastern side of Building 4373. Mercury was detected at elevated concentrations in surrounding soil during UST removal. Soil samples will be collected from the north and south ends of the former tank.
		Soil	12	X				X									X		
13	U5BS1038	Soil	8	X				X									X		See above.
		Soil	12	X				X									X		
14	U5BS1039	Soil	10	X				X											UT-12 is a 1,000 gallon fuel-oil underground storage tank located at the southwest corner of Building 4055. TPH has been detected at elevated concentrations in soil at 10 feet bgs, but the lateral extent of contamination has not been defined. (The vertical extent of contamination has been defined by samples at 15 feet bgs.) In addition, PAHs have not been investigated in soil. The purpose of this sample is to define the lateral extent of TPH in soil and to investigate for the presence of PAHs in soil.

TABLE 2

Proposed Samples for DOE LF 3 RFI Site

Sampling and Analysis Plan for DOE LF 3 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)	
14	U5BS1040	Soil	10	X			X												The proposed sample is located at the previous location and depth of samples where TPH was detected up to 14,000 mg/kg in 1995. PAHs have not been sampled at this location. In addition, a sample will be collected for analysis of TPH to evaluate if biodegradation has occurred since 1995.
14	U5SV1001	Soil Vapor	5			X													UT-12 has not been investigated for soil vapor. The proposed sample is located at the former location of the UST.
		Soil Vapor	10			X													
15	L5BS1001	Soil	2							X		X		X					Chemical uses at the Building 4353 Leach Field are assumed to be the same as those for Building 4353 (explosives). Energetics and perchlorate have not been investigated. This sample will be collected near the inlet of the leach field.
		Soil	6						X			X		X					See above. In addition to investigating for energetics and perchlorate, metals have been detected at elevated concentrations in a previous soil sample (at 2.5 feet bgs), but the vertical extent of metals in soil has not been defined. This sample will be collected to define the vertical extent of metals and to investigate for energetics and perchlorate.
		Soil	10						H			H		H					
15	L5BS1002	Soil	2							X		X		X					See above. This sample will be collected near the downslope end of the leach field.
		Soil	6						X			X		X					
		Soil	10						H			H		H					
16	L6BS1001	Soil	10						X										Chemical uses at the Building 4363 Leach Field are assumed to be the same as those for Building 4363 (solvents, kerosene, naphthalene, and metals). Soil has been investigated for TPH, SVOCs, and metals, but the vertical extent of metals has not been defined (metals were detected at elevated concentrations at 6 feet bgs).
16	L6BS1002	Soil	10						X										See above. The proposed sample is located near the downslope end of the leach field.
17	L7BS1001	Soil	6						X										Chemical uses at the Building 4373 Leach Field are assumed to be the same as those for Building 4373 (solvents, metals, propellants, and TPH). Soil has been investigated for these chemical groups, but the vertical extent of metals in soil has not been defined. Metals were detected above RBSLs in a sample collected from 3 feet bgs. The proposed sample is located adjacent to this location.
		Soil	10						H										Analysis is contingent on the results of analyses for more shallow samples.
18	L8BS1001	Soil	7						X										Chemical uses at the Building 4383 Leach Field are assumed to be the same as those for Building 4383 (solvents). VOCs have not been detected in soil vapor at the leach field. Metals have been detected at concentrations exceeding RBSLs in soil samples collected from the leach field (at depths of 4 and 5 feet bgs). The vertical extent of metals in soil has not been defined. This proposed sample will be collected near the influent of the leach field to investigate for VOCs and define the vertical extent of metals (at previous sample location L8BS04).
		Soil	10						H										Analysis is contingent on the results of analyses for more shallow samples.
18	L8BS1002	Soil	8						X										See above. This purpose of this proposed sample is to define the vertical extent of metals at former sample location L8BS05 (where metals were previously detected above RBSLs at a depth of 5 feet bgs).

TABLE 2

Proposed Samples for DOE LF 3 RFI Site

Sampling and Analysis Plan for DOE LF 3 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	12						H									Analysis is contingent on the results of analyses for more shallow samples.
19																		No samples are proposed as part of this SAP. Chemical Use Area No. 19 (Substation 4760A) is addressed with the Unaffiliated Features SAP for the DOE sites.
20	U5BX1008	Soil	0.5								X							Substation 4755 at the southwest corner of Building 4055 has not been investigated for PCBs. Discrete samples will be collected at 3 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.
21																		The pole transformer located north of Building 4055 (X14) only has one transformer on it. Based on direction provided by DTSC, investigation is not required for pole-mounted transformers with only 1 transformer. No investigation is required for this chemical use area.
22																		No samples are proposed as part of this SAP. Chemical Use Area No. 22 (Substation 4762) is addressed with the Unaffiliated Features SAP for the DOE sites.
23																		No samples are proposed as part of this SAP. Chemical Use Area No. 23 (Substation 4760B) is addressed with the Unaffiliated Features SAP for the DOE sites.
24	U5BX1009	Soil	0.5								X							Substation 4883B has not been investigated for PCBs. Discrete samples will be collected at 3 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.
25	U5BX1010	Soil	0.5								X							Substation 4853 has not been investigated for PCBs. Discrete samples will be collected at 3 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.
26	U5BX1011	Soil	0.5								X							Chemical Use Area No. 26 was added to this site based on the presence of 3 pole-mounted transformers (on pole A324) near the southeastern corner of the Building 4373 Leach Field. These pole-mounted transformers have not been investigated for PCBs. Discrete samples will be collected at 3 locations around the pole (within 5 feet of 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.
27	U5BS1059	Soil	1	X	H			X			X		X					Building 4473 was used for hydraulic testing of pipes, pumps, and other loop components. The proposed sample is located at the centroid of the building to assess potential impacts to the environment. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from U5SV1014.
		Soil	6	X	H			X			X							
		Soil	10	H	H			H			H							Analysis is contingent on the results of analyses for more shallow samples.
27	U5SV1014	Soil Vapor	5			X												See above.
		Soil Vapor	10			X												

TABLE 2

Proposed Samples for DOE LF 3 RFI Site

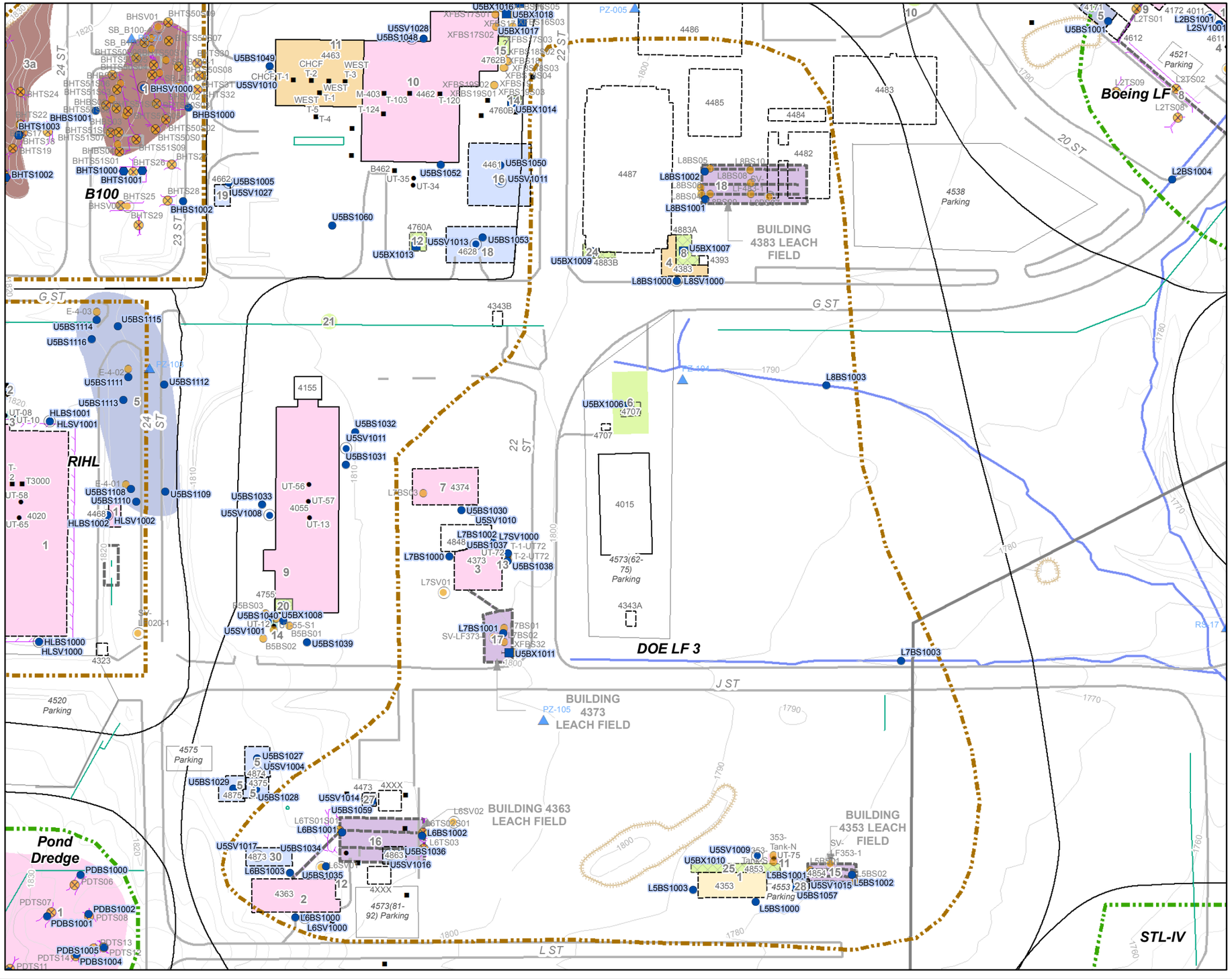
Sampling and Analysis Plan for DOE LF 3 RFI Site, Group 5, Santa Susana Field Laboratory

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)	
28	U5BS1057	Soil	1	X	H		X		X	X									Building 4854 was used as a radiation fuel gauge test structure. The proposed sample is located at the centroid of the building to assess potential impacts to the environment. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from U5SV1015.
		Soil	6	X	H		X		X										
		Soil	10	H	H		H		H										Analysis is contingent on the results of analyses for more shallow samples.
28	U5SV1015	Soil Vapor	5			X													See above.
		Soil Vapor	10			X													
29	U5BS1036	Soil	1	X	H		X		X	X									Building 4863 was used for hydraulic testing of pipes, pumps, and other loop components. The proposed sample is located at the centroid of the building to assess potential impacts to the environment. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from U5SV1016.
		Soil	6	X	H		X		X										
		Soil	10	H	H		H		H										Analysis is contingent on the results of analyses for more shallow samples.
29	U5SV1016	Soil Vapor	5			X													See above.
		Soil Vapor	10			X													
30	U5BS1034	Soil	1	X	H		X		X	X									Building 4873 was used as a Fuel Rod Test Tower and Hydraulic Test Laboratory. The proposed sample is located at the centroid of the building to assess potential impacts to the environment. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from U5SV1017.
		Soil	6	X	H		X		X										
		Soil	10	H	H		H		H										Analysis is contingent on the results of analyses for more shallow samples.
30	U5SV1017	Soil Vapor	5			X													See above.
		Soil Vapor	10			X													
Sitewide	L8BS1003	Soil	1	X	X		X		X	X	X								Evaluate surface soil in the downstream surface drainage channel for potential impacts from DOE Leach Fields 3.
Sitewide	L7BS1003	Soil	1	X	X		X		X	X	X								Evaluate surface soil in the downstream surface drainage channel for potential impacts from DOE Leach Fields 3.
Total Soil Samples for Analysis				32	2		28		41	20	8	8	12		8				
Total Soil Samples on Hold				11	42		9		21			4	6		2				
Total Soil Vapor Samples for Analysis						26													
Total Soil Samples Collected			84																
Total Number of Locations			51																

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

DOE LF 3

Date: February 20, 2008 **WORKING DRAFT**

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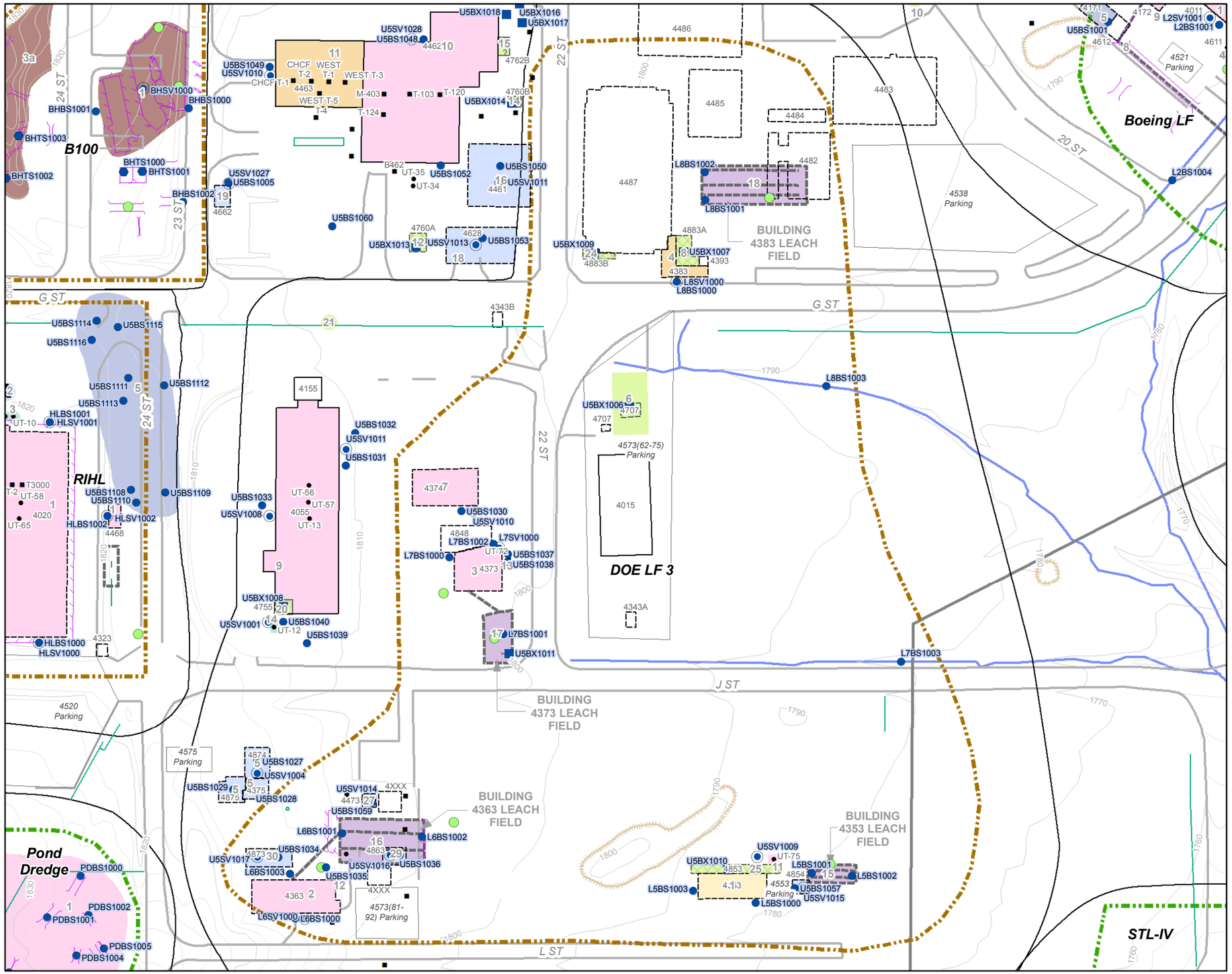
1 inch equals 100 feet

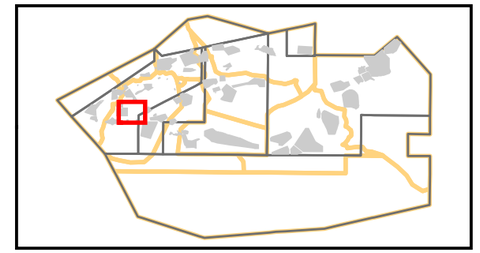
0 100 200 Feet

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

DOE LF3

Date: February 21, 2008 **WORKING DRAFT**

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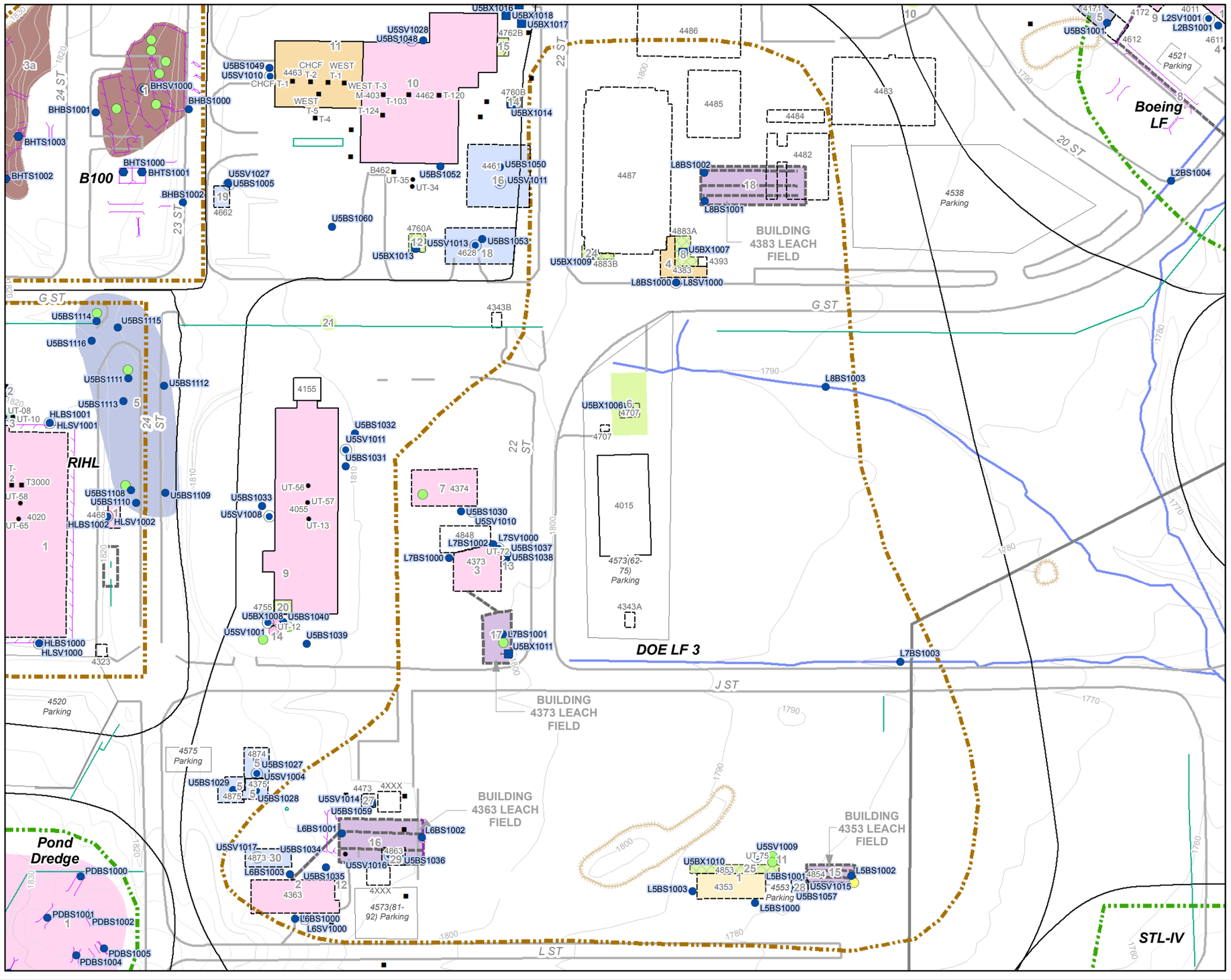
1 inch equals 100 feet

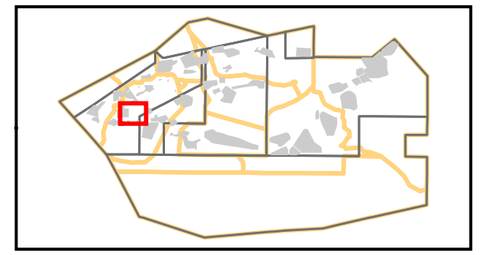
0 100 200 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

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

DOE LF3

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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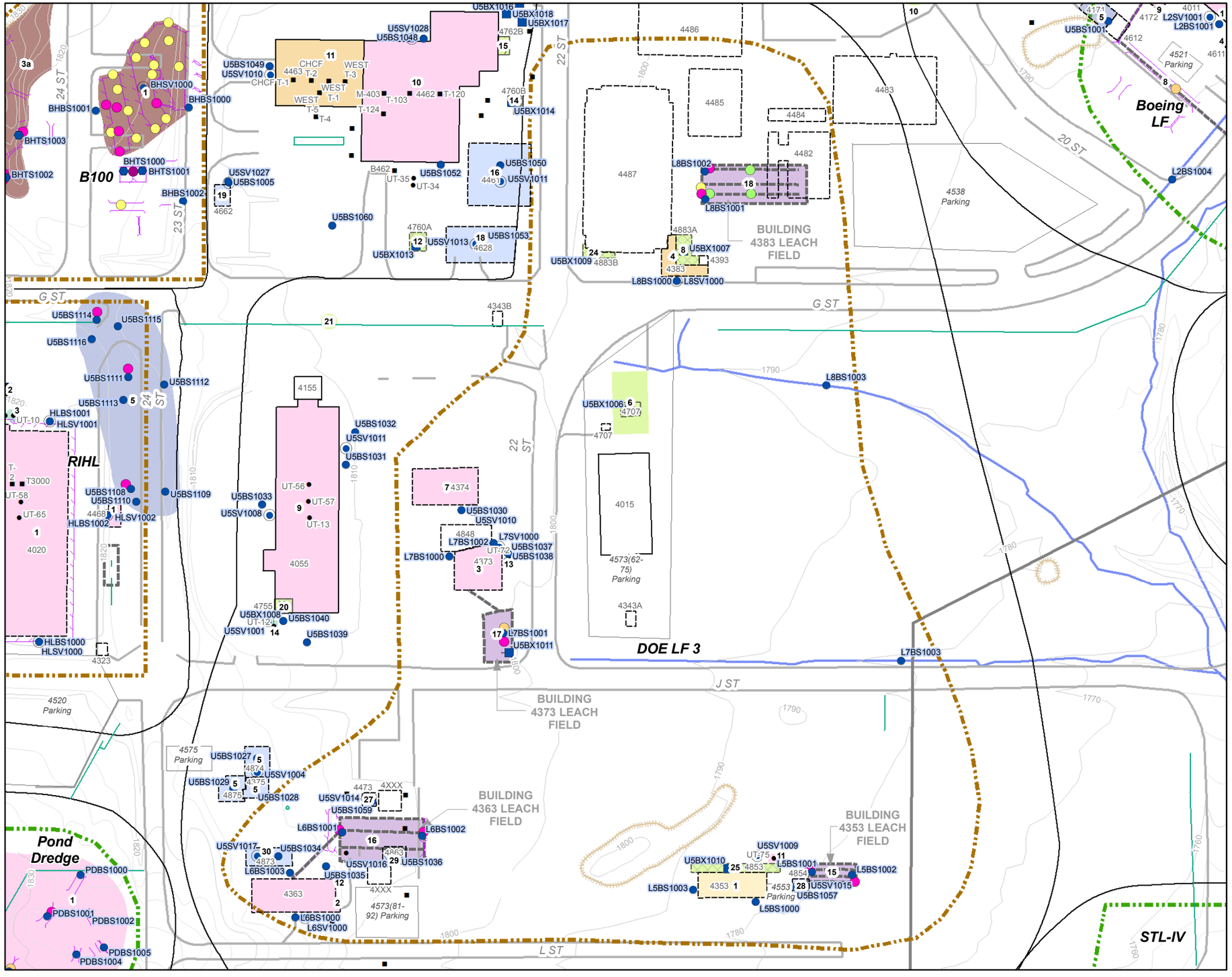
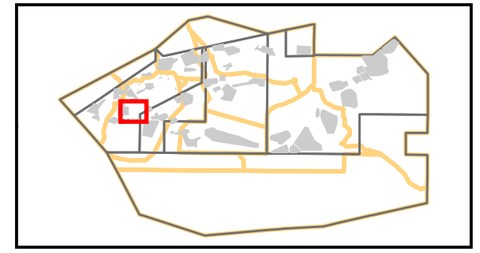
Figure 3





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

DOE LF3

Date: February 20, 2008 **WORKING DRAFT**

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1 inch equals 100 feet

0 100 200 Feet

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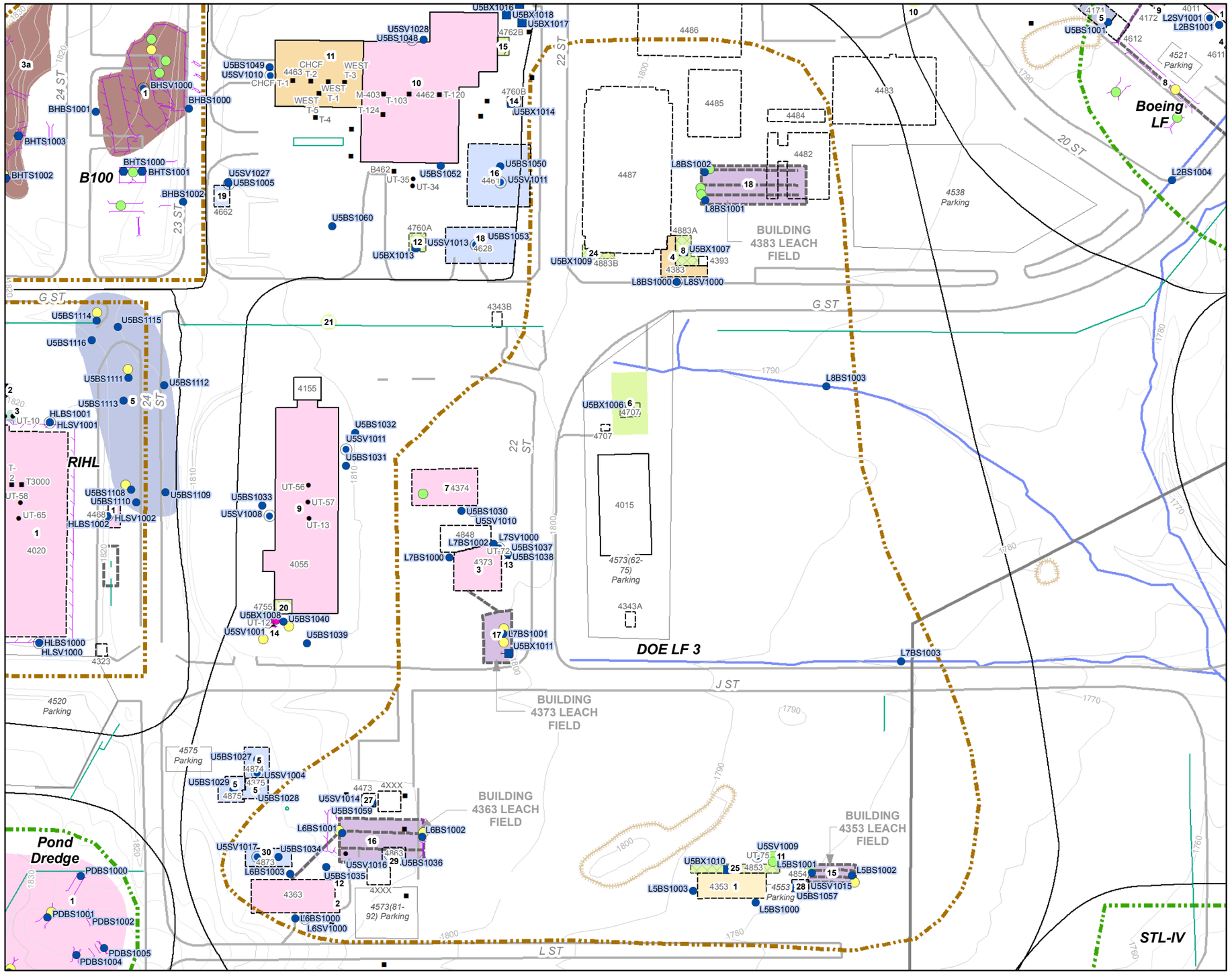
Figure 4



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

DOE LF3

Date: February 20, 2008 WORKING DRAFT

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1 inch equals 100 feet

0 100 200 Feet

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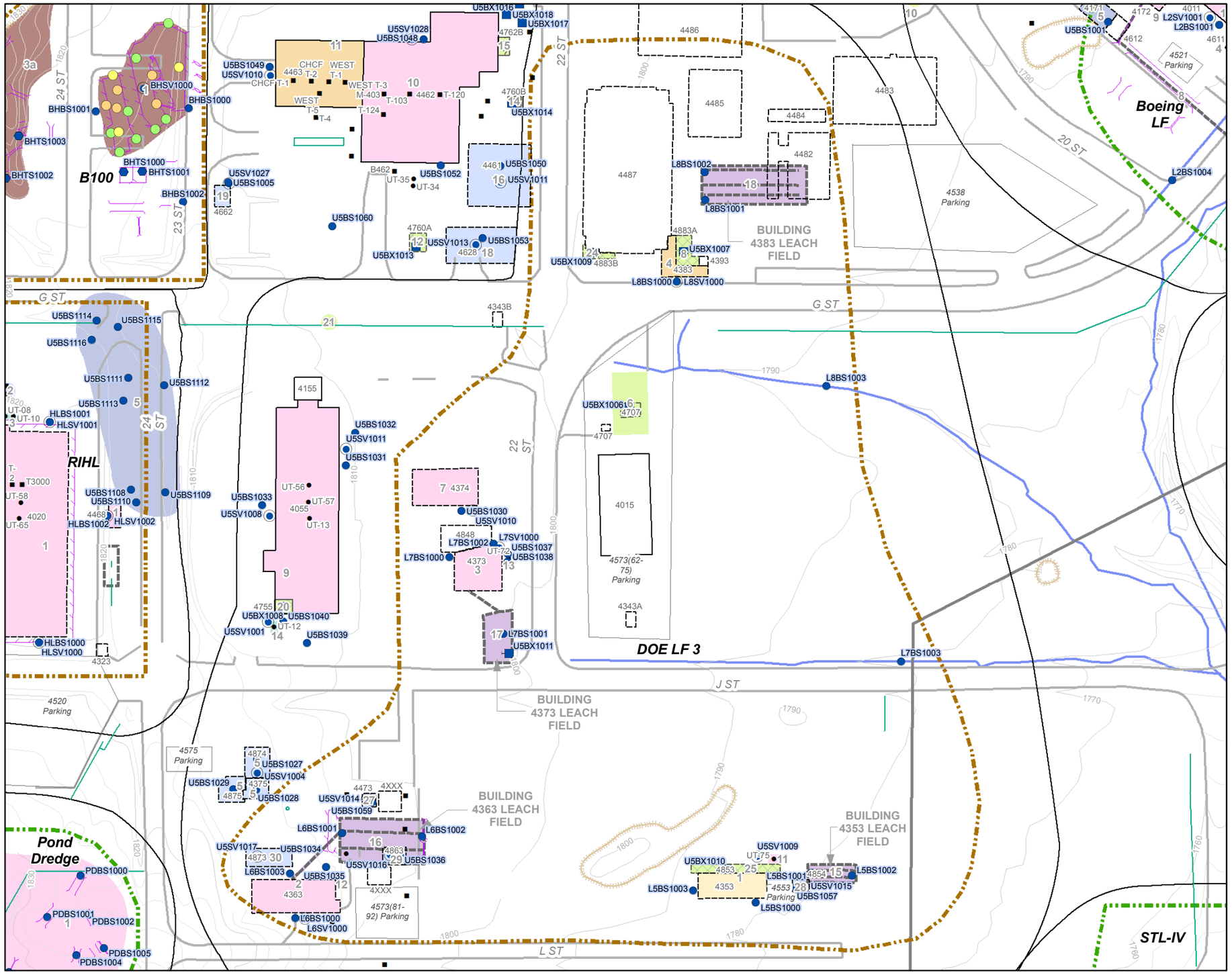
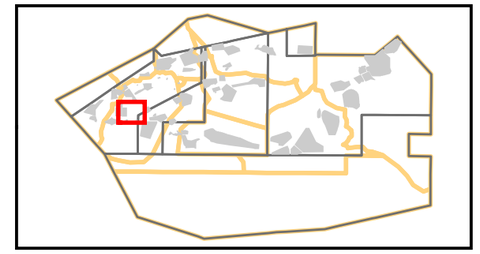
Figure 5





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

DOE LF3

Date: February 20, 2008

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1 inch equals 100 feet

0 100 200 Feet

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SANTA SUSANA FIELD LABORATORY

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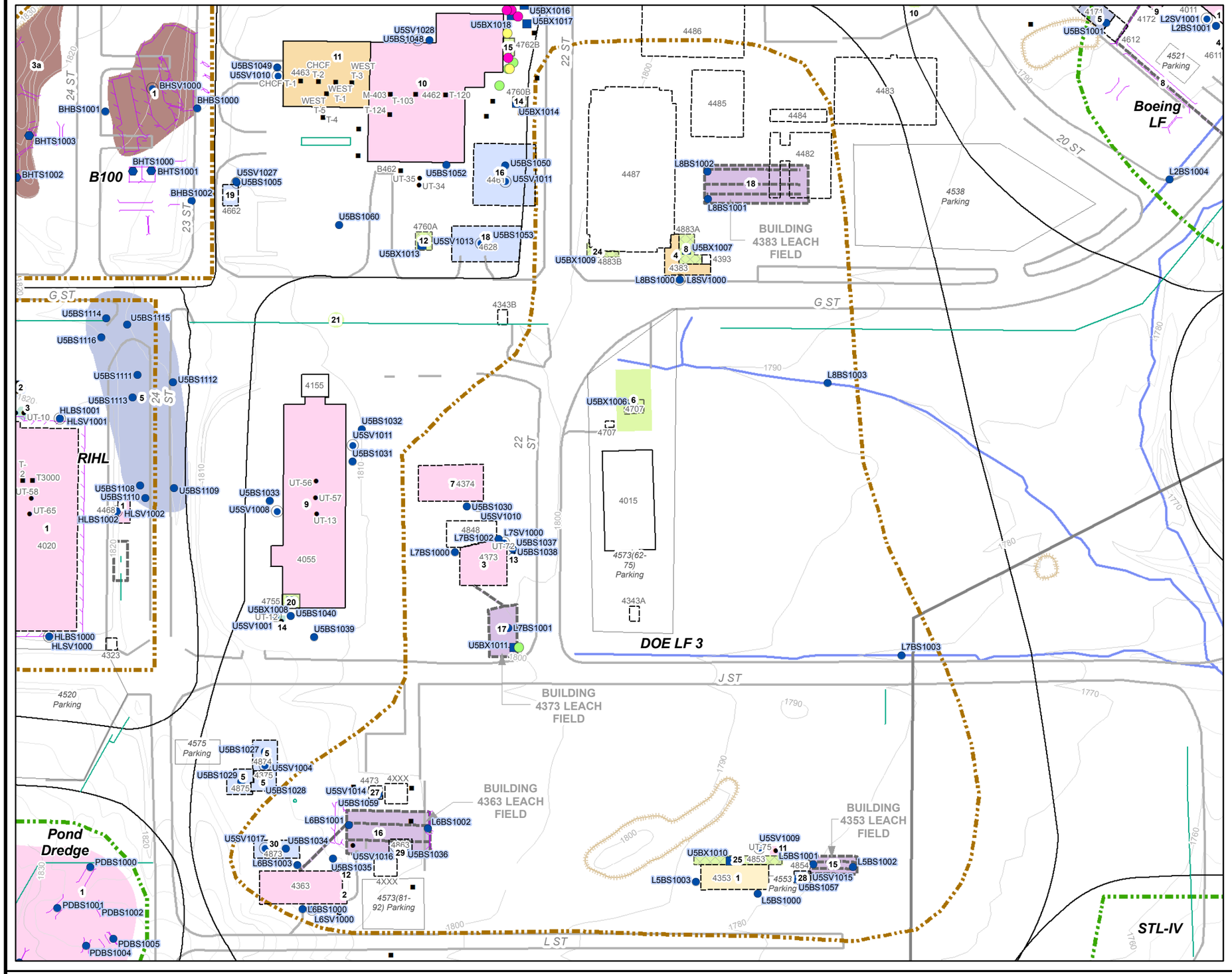
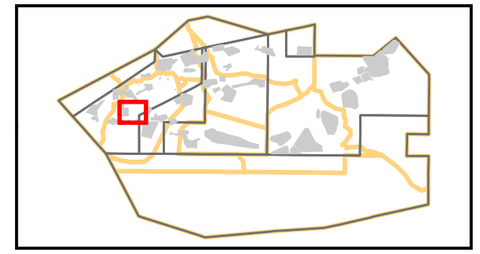
Figure 6





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

DOE LF3

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 7

Sampling and Analysis Plan for Hazardous Material Storage Area RFI Site, Group 5, Santa Susana Field Laboratory

PREPARED FOR: Boeing and DOE

PREPARED BY: CH2M HILL

DATE: January 29, 2008

This technical memorandum presents the sampling and analysis plan (SAP) for the Hazardous Material Storage Area(HMSA) 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 HMSA area includes Building 4457. Other chemical use areas evaluated with the HMSA include Buildings 4357, 4025, 4426, 4026, 4826, 4358, 4334, 4355, 4024, and 4226, two substations, and multiple above ground storage tanks (ASTs) and underground storage tanks (USTs).

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 HMSA. 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 HMSA 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 7 of the 10 chemical use areas identified for the HMSA. Data gaps also were identified based on elevated detection limits of previous samples and lack of soil data in the 0- to 6-foot-depth interval.

To address these data gaps, CH2M HILL is proposing to collect 46 soil samples and 24 soil vapor samples. These samples will be collected from a total of 28 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 polychlorinated biphenyls (PCBs). 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 Hazardous Material Storage Area 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	Chemical uses at Building 4357 include metals that have not been investigated.	X			1
2	Chemical uses at Building 4457 include storage of sulfuric acid and disposal of waste oils, acids, bases, solvents, metals, total petroleum hydrocarbon (TPH) oils, and lubricants. These chemicals were used, stored, and disposed of in Building 4457. Concentrations of metals near Building 4457 have exceeded ecological RBSLs, and detection limits for 10 VOCs are greater than human health RBSLs. These chemicals have not been characterized adequately (lateral and vertical extents of metals in soil, the vertical extent of VOCs in soil, and lateral extent of VOCs).	X			4
4	Chemicals uses at Building 4025 included acetic acid, potassium permanganate, sodium bisulfide, ammonium carbonate, ethylene diamine tetra-acetic acid (EDTA), and ferrous sulfate. These chemicals have not been characterized adequately in soil.	X			4
5	Chemicals uses at Building 4024 include PCBs and uses associated with a small chemistry laboratory. Sampling will include general chemical screening.	X			4
7	Buildings 4026, 4426, 4826, and 4226 - Chemical uses include hydrocarbons, ammonia, Deworals sodium, and Dowanol. Semivolatile organic compounds (SVOCs), TPH, metals, and nonmetal inorganic compounds have not been characterized at these buildings.	X			8
8	Substation 4726 - Chemical uses include polychlorinated biphenyls (PCBs). PCBs have not been investigated at this substation.	X			1
9	Building 4334 - Chemical uses include aqueous ammonia, anhydrous ammonia, turbine lube oil, compressor oil, greases, and lubricants. These chemicals have not been investigated at Building 4334.	X			1
10	Building 4358 - Chemical uses at Building 4358 have not been identified thoroughly. Chemical	X			1

TABLE 1

Data Gaps

Sampling and Analysis Plan for Hazardous Material Storage Area 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
	uses included metals, oil, and perchlorates.				
11	Building 4355 - Chemical uses at Building 4355 have not been previously investigated. Chemical uses include acids/bases, oils, and general chemical storage.	X			4
				Total	**28**

Notes:
Sitewide = Data Gap applies to the entire Hazardous Material Storage Area 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 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 Group 5 SAP (general text).

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 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.

TABLE 2

Proposed Samples for Hazardous Material Storage Area RFI Site

Sampling and Analysis Plan for Hazardous Material Storage Area 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	HSBS1000	Soil	1						X	X								No sampling has occurred at Building 4357. Chemical uses include metals. Sample location is located at the centroid of the former building footprint.
		Soil	6						X									
		Soil	10						H									
2	HSBS1001	Soil	1	X	X		X		X	X	H							Chemical uses include waste oils, acids, bases, solvents, TPH, oils, and lubricants. Sample location is on the south side of the previously excavated area.
		Soil	6	X	X		X		X		H							
		Soil	10	H	H		H		H		H							
2	HSBS1002	Soil	1	X	X		X		X	X	H							See above. Sample location is on the north side of the previously excavated area.
		Soil	6	X	X		X		X		H							
		Soil	10	H	H		H		H		H							
2	HSSV1000	Soil Vapor	5			X												Sample associated with HSBS1001. Chemical uses include waste oils, acids, bases, solvents, TPH oils, and lubricants. Sample location is on the north side of the previously excavated area.
		Soil Vapor	10			X												
2	HSSV1001	Soil Vapor	5			X												See above. Sample location is on the south side of the previously excavated area.
		Soil Vapor	10			X												
3																		No sampling is required at this location.
4	U5BS1122	Soil	1		X				X	X	H					X		No sampling has occurred at Building 4025. Chemical uses include acetic acid, potassium permanganate, sodium bisulfide, ammonium carbonate, EDTA, oils, solvents, and ferrous sulfate. Sample location is at the centroid of the former building footprint.
		Soil	6		X				X		H					X		
		Soil	10		H				H		H					H		
4	U5BS1123	Soil	1		X				X	X	H					X		No sampling has occurred at Building 4025. Chemical uses include acetic acid, potassium permanganate, sodium bisulfide, ammonium carbonate, EDTA, oils, solvents and ferrous sulfate. Sample location is at the southeast corner of the former building footprint.
		Soil	6		X				X		H					X		
		Soil	10		H				H		H					H		
4	U5SV1106	Soil Vapor	5			X												Soil vapor sample associated with soil sample U5BS1122.
		Soil Vapor	10			X												
4	U5SV1107	Soil Vapor	5			X												Soil vapor sample associated with soil sample U5BS1123.
		Soil Vapor	10			X												
5	U5BS1126	Soil	1	X	X		X		X	X	H							No previous sampling has occurred at Building 4024. Chemical uses include PCBs and general chemical screening. Sample location is near a high bay door on the east side of the building.
		Soil	6	X	X		X		X		H							
		Soil	10	H	H		H		H		H							
5	U5BS1127	Soil	1	X	X		X		X	X	H							No previous sampling has occurred at Building 4024. Chemical uses include PCBs and general chemical screening. Sample location is at an entrance at the southeast corner (downgradient) of the building.
		Soil	6	X	X		X		X		H							
		Soil	10	H	H		H		H		H							
5	U5SV1110	Soil Vapor	5			X												Soil Vapor sample associated with U5BS1126.
		Soil Vapor	10			X												

TABLE 2

Proposed Samples for Hazardous Material Storage Area RFI Site

Sampling and Analysis Plan for Hazardous Material Storage Area 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)	
5	U5SV1111	Soil Vapor	5			X													Soil Vapor sample associated with U5BS1127.
		Soil Vapor	10			X													
6																			No sampling is required for Substation 4725.
7	U5BS1100	Soil	1	X	X		X		X		H								No sampling has occurred at Building 4026. Chemical uses include hydrocarbons, ammonia, deworals sodium, and dowanol. Sample location is located just south of former tank T-2, which was located just south of the centroid of the former building footprint.
		Soil	6	X	X		X		X		H								
		Soil	10	H	H		H		H		H								
7	U5SV1100	Soil Vapor	5			X													No sampling has occurred at Building 4026. Chemical uses include hydrocarbons, ammonia, deworals sodium, and dowanol. Sample location is located just south of former tank T-2, which was located just south of the centroid of the former building footprint.
		Soil Vapor	10			X													
7	U5BS1101	Soil	1	X	X		X		X		H								No sampling has occurred at Building 4826. Chemical uses include hydrocarbons, ammonia, deworals sodium, and dowanol. Sample location is located at the centroid of the former building footprint.
		Soil	6	X	X		X		X		H								
		Soil	10	H	H		H		H		H								
7	U5SV1101	Soil Vapor	5			X													
		Soil Vapor	10			X													
7	U5BS1102	Soil	1	X	X		X		X	X	H								No sampling has occurred at Building 4226. Chemical uses include oil, paint, gasoline, mercury, transformer and capacitor oil, hydraulic oil, alcohol, acetone, VOCs, and Freon. Sample location is located at the centroid of the former building footprint.
		Soil	6	X	X		X		X		H								
		Soil	10	H	H		H		H		H								
7	U5SV1102	Soil Vapor	5			X													See above. Sample location is located at the centroid of the former building footprint.
		Soil Vapor	10			X													
7	U5BS1121	Soil	1	X	X														No sampling has occurred at Building 4026. Chemical uses include asbestos, hydrocarbons, ammonia, deworals sodium, and dowanol. Sample location is located just south of a door that lead to Building 4426.
		Soil	6	X	X														
		Soil	10	H	H														
7	U5SV1105	Soil Vapor	5			X													No sampling has occurred at Building 4026. Chemical uses include hydrocarbons, ammonia, deworals sodium, and dowanol. Sample location is located just south of a door that lead to Building 4426.
		Soil Vapor	10			X													
8	U5BX1100	Soil	1								X								No sampling has occurred at Substation 4726. Chemical uses include PCBs. Samples will be collected from 4 locations and composited into one sample.
9	U5BS1103	Soil	1	X			X		X	X	H								No sampling has occurred at Building 4334. Chemical uses include aqueous ammonia, anhydrous ammonia, turbine lube oil, compressor oil, greases, and lubricants. Sample location is located at the centroid of the former building footprint.
		Soil	6	X			X		X		H								
		Soil	10	H			H		H		H								
10	U5BS1104	Soil	1	X			X		X	X	H			X					

TABLE 2

Proposed Samples for Hazardous Material Storage Area RFI Site

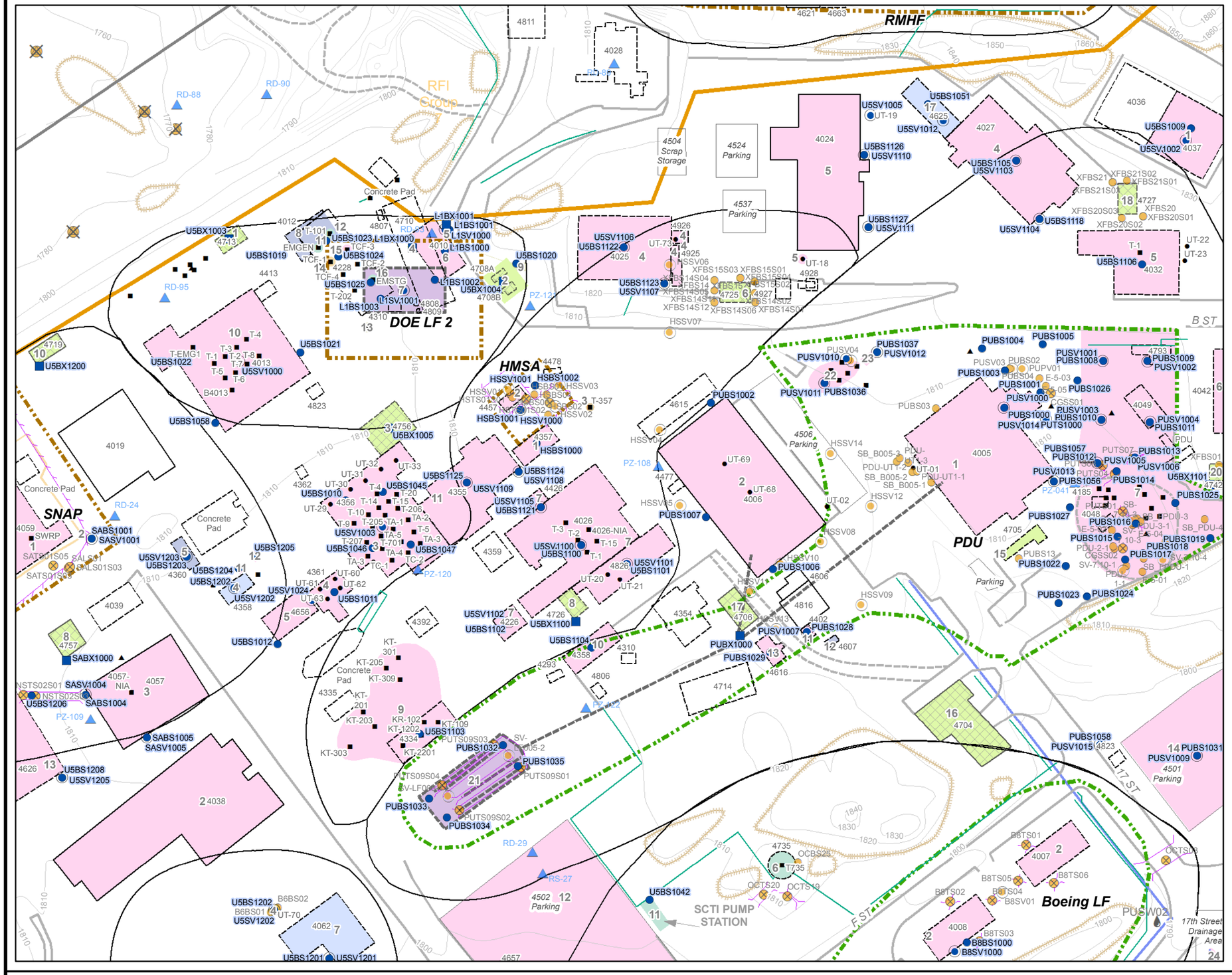
Sampling and Analysis Plan for Hazardous Material Storage Area RFI Site, Group 5, Santa Susana Field Laboratory

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	6	X			X		X		H			X				No sampling has occurred at Building 4358. Chemical uses include general chemical storage. In addition, the building served as storage for igniters that contained ammonium, magnesium, potassium perchlorates, and 55-gallon drums of lube oil. Sample location is at the centroid of the former building footprint.
		Soil	10	H			H		H		H			H				
11	U5BS1124	Soil	1	X			X		X	X	H							
		Soil	6	X			X		X	X	H							No sampling has occurred at Building 4355. Chemical uses inlude acids/bases, oils, and general chemical storage. Sample location is at the southeast (downgradient) corner of the building.
		Soil	10	H			H		H		H							
11	U5BS1125	Soil	1	X			X		X	X	H							
		Soil	6	X			X		X	X	H							No sampling has occurred at Building 4355. Chemical uses inlude acids/bases, oils, and general chemical storage. Sample location is at the centroid of the former building footprint.
		Soil	10	H			H		H		H							
11	U5SV1108	Soil Vapor	5			X												Soil vapor sample associated with soil sample U5BS1124.
		Soil Vapor	10			X												
11	U5SV1109	Soil Vapor	5			X												Soil vapor sample associated with soil sample U5BS1125.
		Soil Vapor	10			X												
Total Soil Samples for Analysis				24	20		22		28	14	1			2		4		
Total Soil Samples on Hold				12	10		11		14		39			1		2		
Total Soil Vapor Samples for Analysis						24												
Total Soil Samples Collected			46															
Total Number of Locations			28															

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

Basemap Legend

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

Date: February 20, 2008 **WORKING DRAFT**

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1 inch equals 100 feet

0 100 200 Feet

SANTA SUSANA FIELD LABORATORY

Proposed Sampling Locations

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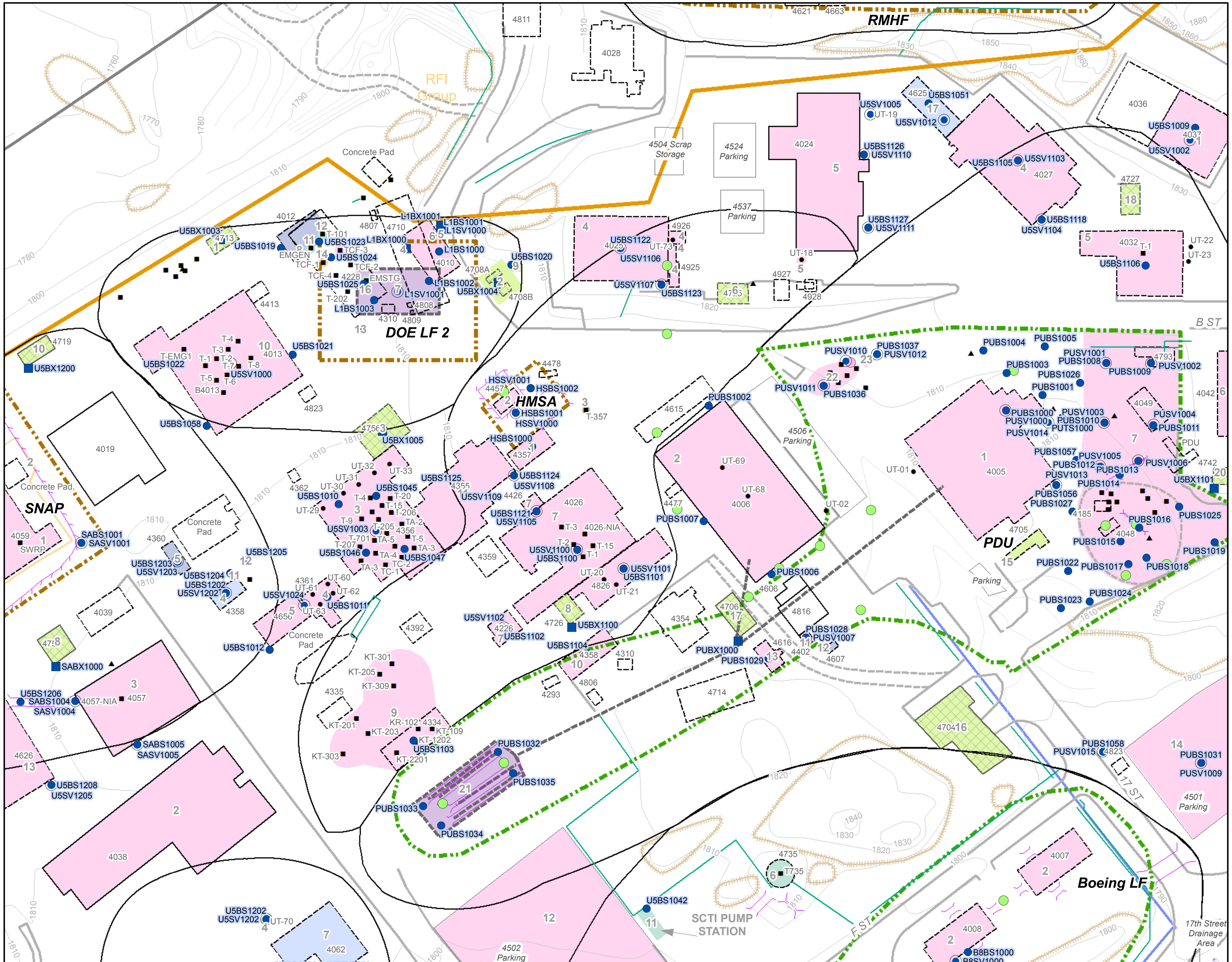
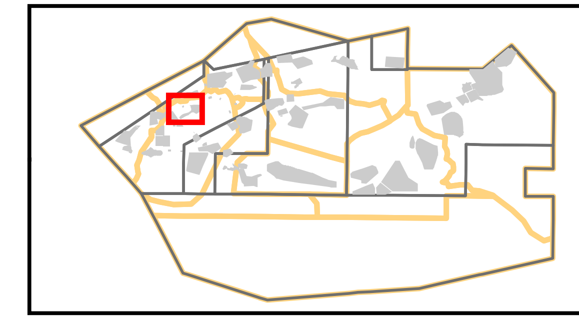
Figure 1





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

VOCs in Soil Vapor and Proposed Sampling Locations

HMSA

Date: February 21, 2008 WORKING DRAFT

1 inch equals 100 feet

0 100 200 Feet

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Figure 2

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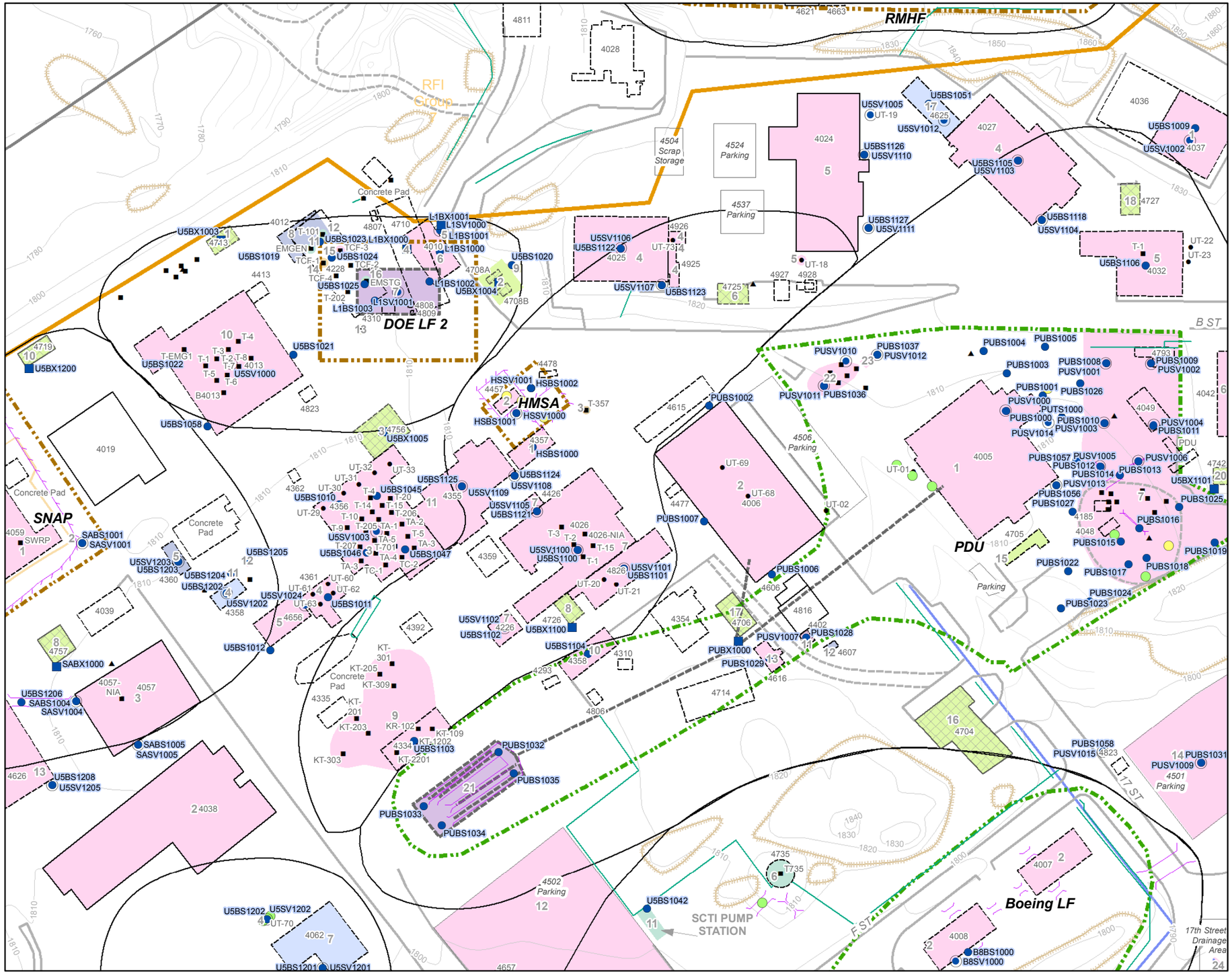

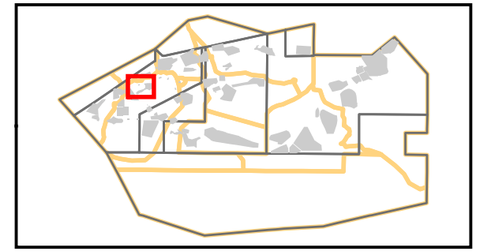

Proposed Sampling Locations

- 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

HMSA

Date: February 20, 2008

WORKING DRAFT

1 inch equals 100 feet

0 100 200 Feet

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SANTA SUSANA FIELD LABORATORY

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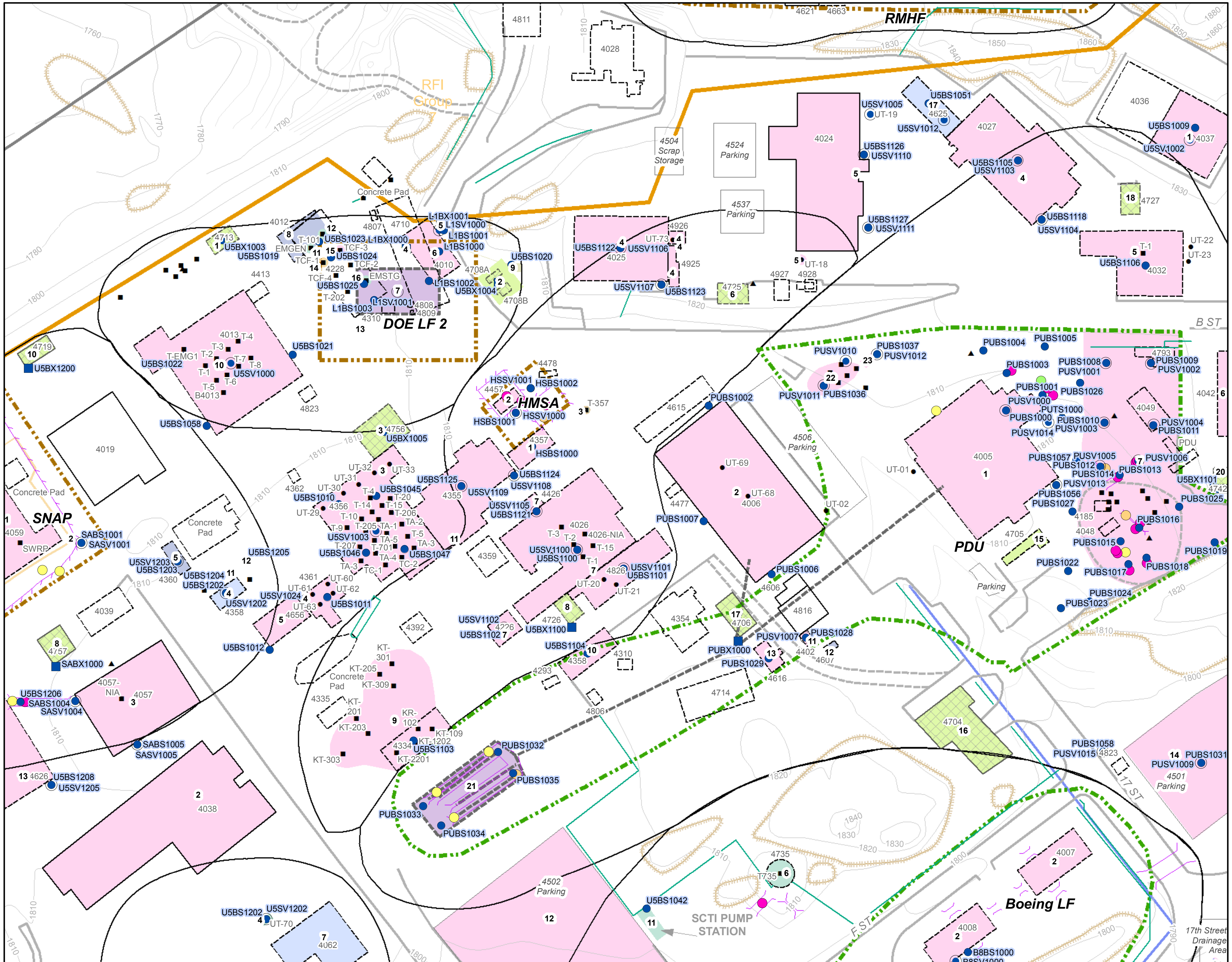
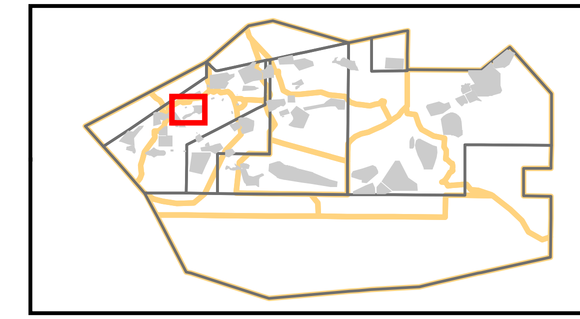
Figure 3





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

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1 inch equals 100 feet

0 100 200 Feet

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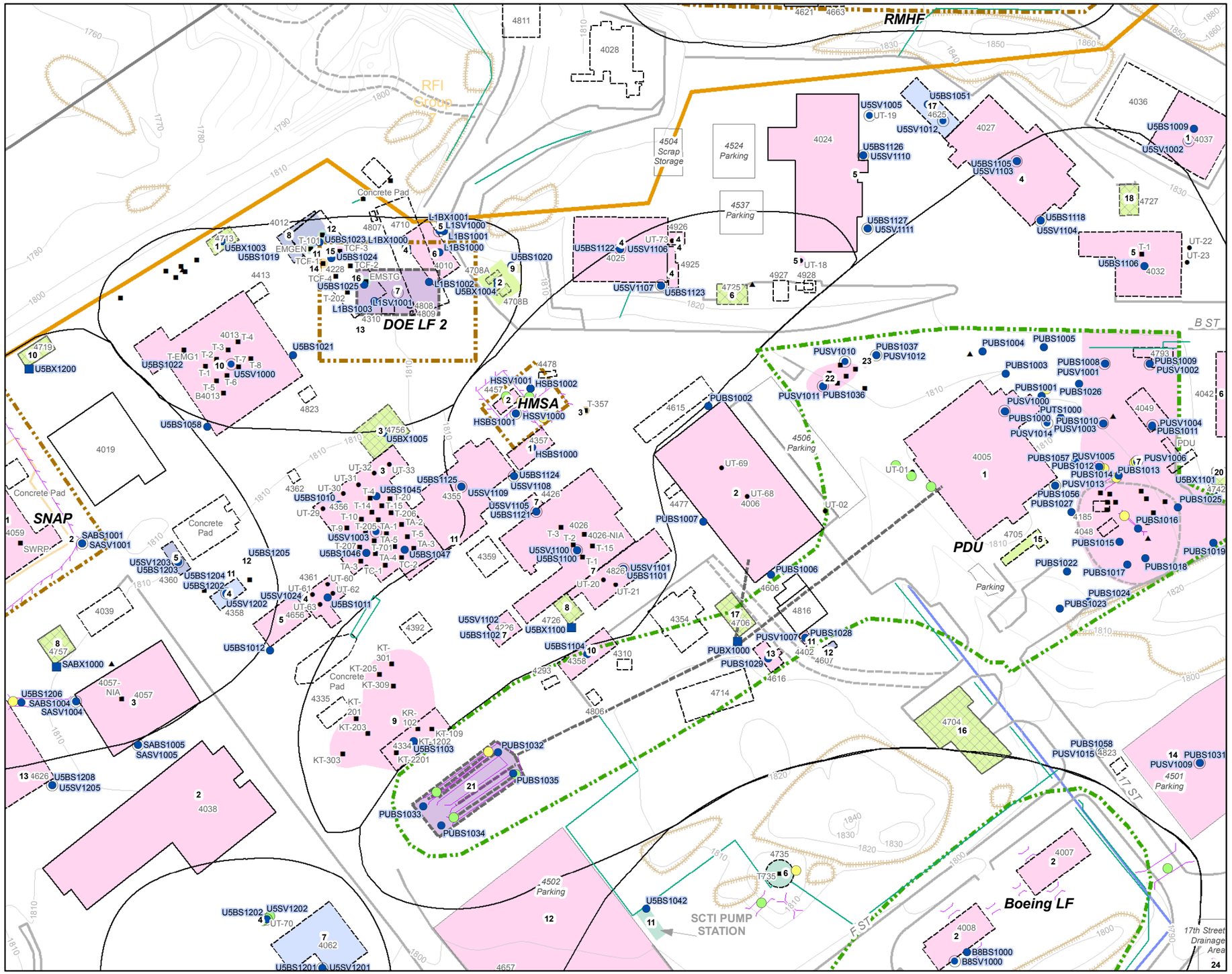
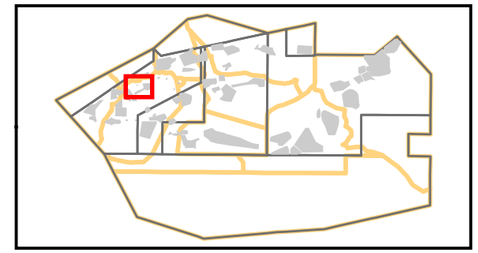
SANTA SUSANA FIELD LABORATORY

CH2MHILL

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

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1 inch equals 100 feet

0 100 200 Feet

SANTA SUSANA FIELD LABORATORY

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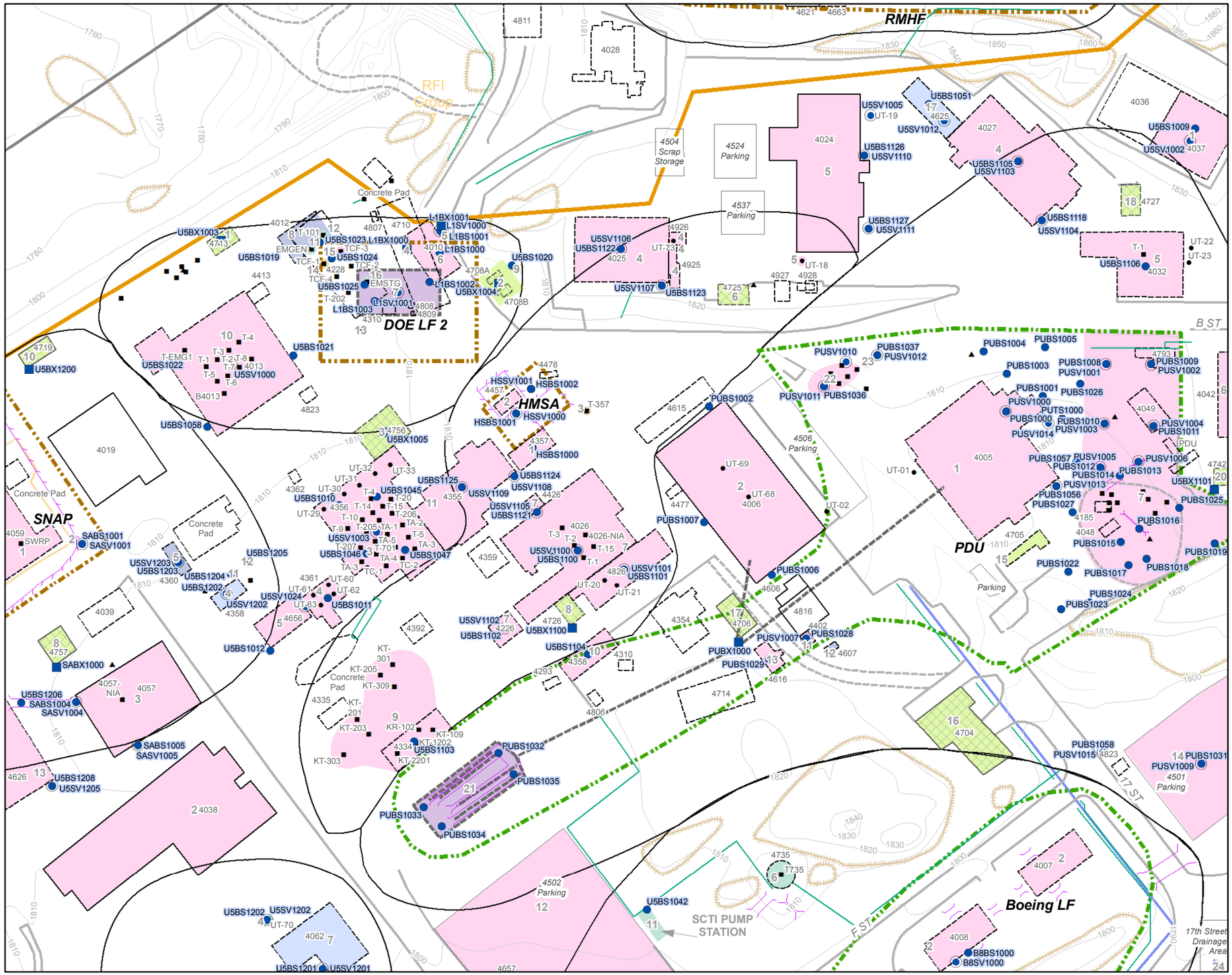
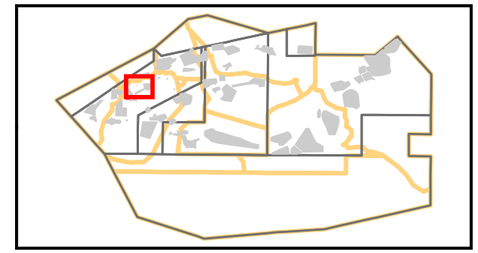
Figure 5





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

HMSA

Date: February 20, 2008

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1 inch equals 100 feet

0 100 200 Feet

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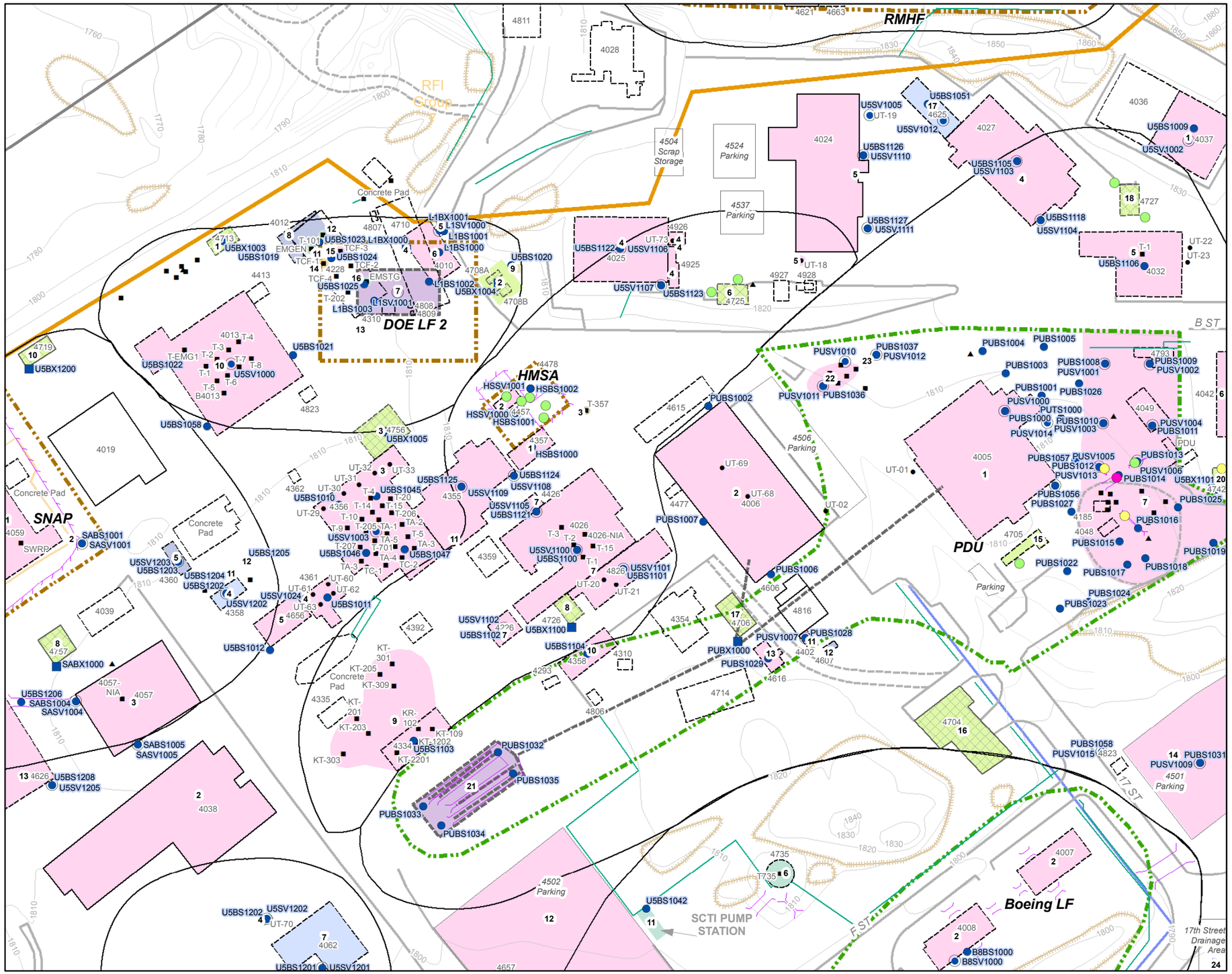
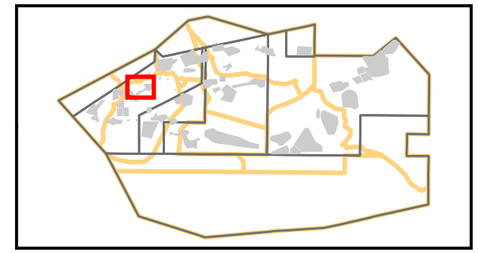
Figure 6





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
- 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

PCBs in Soil and Proposed Sampling Locations

HMSA

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 7

Sampling and Analysis Plan for Rockwell International Hot Lab 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 Rockwell International Hot Lab (RIHL) 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 RIHL area includes Buildings 4020 and 4468, substation 4720, and multiple above ground storage tanks (ASTs) and underground storage tanks (USTs).

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 RIHL. 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 Rockwell International Hot Lab 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 three of the five chemical use areas identified for the Rockwell International Hot Lab. Data gaps also were identified based on elevated detection limits of previous samples and lack of soil data in the 0- to 6-foot-depth interval and to screen for VOCs where trichloroethylene (TCE) was documented to be released near the northwest corner of Building 4020.

To address these data gaps, CH2M HILL is proposing to collect 55 soil samples and 20 soil vapor samples. These samples will be collected from a total of 30 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 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.

TABLE 1

Data Gaps

Sampling and Analysis Plan for Rockwell International Hot Lab 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 4020 - Chemical uses for Building 4020 and adjacent area include volatile organic compounds (VOCs) (in soil and soil vapor), semivolatile organic compounds (SVOCs), PCBs, metals, and total petroleum hydrocarbons (TPHs). These chemicals were used in the building and were stored in areas surrounding the building. These chemicals have not been characterized adequately (later and vertical extents are undefined). The tank housed in Building 4468 was a 3,000-gallon-capacity stainless steel radioactive waste holding tank. The tank may have contained a small amount of chemicals that were used in Building 4020. A documented TCE release at the northwest corner of Building 4020 will be investigated in soil and soil vapor.	X			20
4	Substation 4720 - Chemical uses include PCBs. PCBs have not been investigated in soil.	X			1 (Composite Sample)
5	Previous sampling for metals and VOCs in the northeastern portion of the RIHL site indicate metal concentrations in excess of ecological RBSLs. The lateral and vertical extents of impacts to the environment need to be evaluated.	X			9
				Total	**30**

Notes:
Sitewide = Data Gap applies to the entire Rockwell International Hot Lab 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 Table

3 of 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).

Schedule

This investigation is scheduled for March and April 2008. Prior to commencing the field work, 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 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.

TABLE 2

Proposed Samples for Rockwell International Hot Lab RFI Site

Sampling and Analysis Plan for Rockwell International Hot Lab 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	HLBS1000	Soil	1	X	X		X		X	X	H								No sampling has occurred at Building 4020. Chemical uses include TCE, SVOCs, PCBs, metals, acids and TPH. Sample location is located south of the former building footprint because of the large excavation within the footprint of the former building. This location is at the down gradient side of the building. The boring at this location will be advanced up to 40 feet bgs to define the depth to bedrock.
		Soil	6	X	X		X		X	X	H								
		Soil	10	H	H		H		H		H								
1	HLBS1001	Soil	1	X	X		X		X	X	H								No sampling has occurred at Building 4020. Chemical uses include TCE, SVOCs, PCBs, metals, acids, and TPH. Sample location is located north of the former building, near the entrance of the machine shop area within building 4020.
		Soil	6	X	X		X		X	X	H								
		Soil	10	H	H		H		H		H								
1	HLBS1002	Soil	1	X	X		X		X	X	H								No sampling has occurred at the 3,000-gallon capacity stainless steel radioactive waste holding tank located in Building 4468. The tank may have contained a small amount of chemicals that were used at 4020. Sample location is located in the centroid of the former tank.
		Soil	6	X	X		X		X	X	H								
		Soil	10	H	H		H		H		H								
1	HLBS1003	Soil	1		X														These locations are to screen for the documented TCE disposal near the northwest corner of Building 4020. The area targeted are the unpaved areas to the northwest corner of Building 4020. Addition sampling may be needed based on the results from the screening samples. The screen samples include HLBS1003, HLBS1004, HLBS1005, HLBS1006, HLBS1007, HLBS1008, and HLBS1009 and are located approximately 30 feet from Building 4020 and are separated from each other by 20 to 30 feet.
		Soil	6		X														
		Soil	10		H														
1	HLBS1004	Soil	1		X														
		Soil	6		X														Same as above.
		Soil	10		H														
1	HLBS1005	Soil	1		X														
		Soil	6		X														Same as above.
		Soil	10		H														
1	HLBS1006	Soil	1		X														
		Soil	6		X														Same as above. The boring at this location will be advanced up to 40 feet bgs to define the depth of bedrock.
		Soil	10		H														
1	HLBS1007	Soil	1		X														
		Soil	6		X														Same as above.
		Soil	10		H														
1	HLBS1008	Soil	1		X														
		Soil	6		X														Same as above.
		Soil	10		H														
1	HLBS1009	Soil	1		X														
		Soil	6		X														Same as above.
		Soil	10		H														
1	HLSV1000	Soil Vapor	5			X													No sampling has occurred at Building 4020. Chemical uses include TCE, SVOCs, PCBs, metals, acids, and TPH. Sample location is along the southern portion of the former building footprint.
		Soil Vapor	10			X													
1	HLSV1001	Soil Vapor	5			X													No sampling has occurred at Building 4020. Chemical uses include TCE, SVOCs, PCBs, metals, acids, and TPH. Sample location is located near the glove box room of the former building.
		Soil Vapor	10			X													

TABLE 2

Proposed Samples for Rockwell International Hot Lab RFI Site

Sampling and Analysis Plan for Rockwell International Hot Lab 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	HLSV1002	Soil Vapor	5			X													No sampling has occurred at the 3,000-gallon capacity stainless steel radioactive waste holding tank located in Building 4468. The tank may have contained a small amount of chemicals that were used at 4020. Sample location is located in the centroid of the former tank.
		Soil Vapor	10			X													
1	HLSV1003	Soil Vapor	5			X													These locations are to screen for the documented TCE disposal near the northwest corner of Building 4020. The area targeted are the unpaved areas to the northwest corner of Building 4020. Addition sampling may be needed based on the results from the screening samples. The screen samples include HLSV1003, HLSV1004, HLSV1005, HLSV1006, HLSV1007, HLSV1008, and HLSV1009.
		Soil Vapor	10			X													
1	HLSV1004	Soil Vapor	5			X													
		Soil Vapor	10			X													
1	HLSV1005	Soil Vapor	5			X													
		Soil Vapor	10			X													
1	HLSV1006	Soil Vapor	5			X													
		Soil Vapor	10			X													
1	HLSV1007	Soil Vapor	5			X													
		Soil Vapor	10			X													
1	HLSV1008	Soil Vapor	5			X													
		Soil Vapor	10			X													
1	HLSV1009	Soil Vapor	5			X													
		Soil Vapor	10			X													
2																			No sampling is needed at this location. The above ground tanks at this location contained liquid nitrogen.
3																			No sampling is needed at this location. The tanks associated with this chemical use area have received regulatory closure.
4	HLBX1000	Soil	1								X								No sampling has occurred at Substation 4720. Chemical uses include PCBs. Samples will be collected from 4 locations approximately 5 feet from the substation and composited into one.
5	U5BS1108	Soil	6						X										Step down of sample E-4-01. E-4-01 had a sample depth of 0.5 feet bgs and exceeded background and eco RBSL for metals.
		Soil	10						H										
5	U5BS1109	Soil	1						X	X									Sample location is approximately 55 feet east and downgradient of E-4-01. E-4-01 had a sample depth of 0.5 feet bgs and exceeded background and eco RBSL for metals.
		Soil	6						X										
		Soil	10						H										
5	U5BS1110	Soil	1	X	X		X		X	X	H								Sample location is approximately 30 feet southeast and downgradient of E-4-01. Sample will also serve as a downgradient screening sample for the waste tank contained in 4468. E-4-01 had a sample depth of 0.5 feet bgs and exceeded background and eco RBSL for metals.
		Soil	6	X	X		X		X		H								
		Soil	10	H	H		H		H		H								
5	U5BS1111	Soil	6						X	X									Step down of sample E-4-02. E-4-02 had a sample depth of 0.5 feet bgs and exceeded background and eco RSBSL for metals.
		Soil	10						H										
5	U5BS1112	Soil	1						X	X									Sample location is approximately 55 feet east and downgradient of

TABLE 2

Proposed Samples for Rockwell International Hot Lab RFI Site

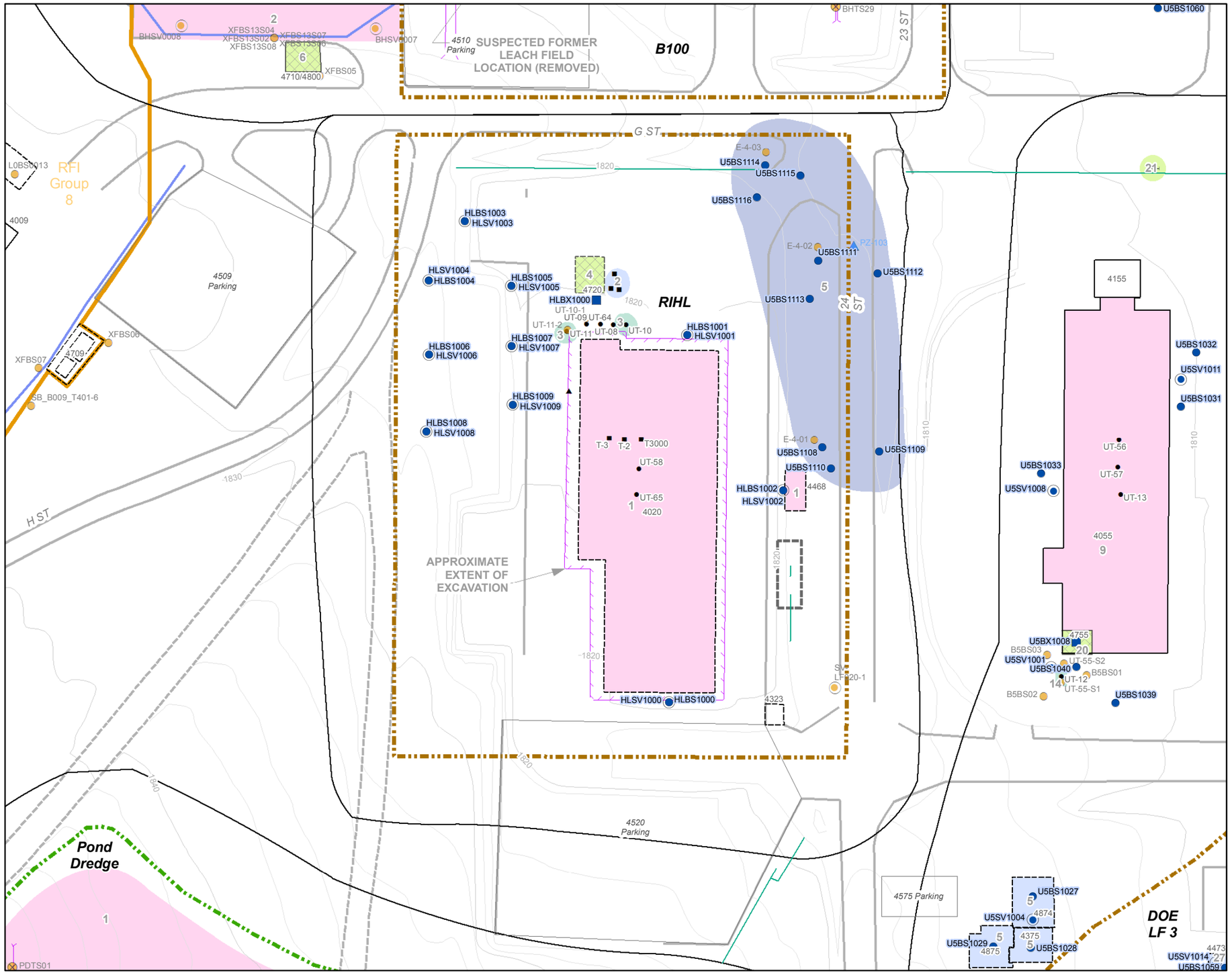
Sampling and Analysis Plan for Rockwell International Hot Lab RFI Site, Group 5, Santa Susana Field Laboratory

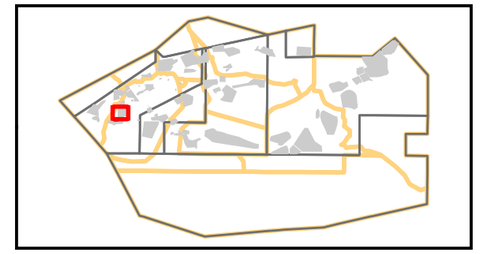
Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method															Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	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	6						X										Sample location is approximately 35 feet east and downgradient of E-4-02. E-4-02 had a sample depth of 0.5 feet bgs and exceeded background and eco RSBSL for metals.
		Soil	10						H										
5	U5BS1113	Soil	1						X	X									Sample location is approximately 35 feet south and cross-gradient of E-4-02. E-4-02 had a sample depth of 0.5 feet bgs and exceeded background and eco RSBSL for metals.
		Soil	6						X										
		Soil	10						H										
5	U5BS1114	Soil	6						X	X									Step down of sample E-4-03. E-4-03 had a sample depth of 0.5 feet bgs and exceeded background and eco RSBSL for metals.
		Soil	10						H										
5	U5BS1115	Soil	1						X	X									Sample location is approximately 30 feet southeast and downgradient of E-4-03. E-4-03 had a sample depth of 0.5 feet bgs and exceeded background and eco RSBSL for metals. This boring will be advanced up to 40 fee bgs to define the depth of bedrock.
		Soil	6						X										
		Soil	10						H										
5	U5BS1116	Soil	1						X	X									Sample location is approximately 30 feet south and cross-gradient of E-4-03. E-4-03 had a sample depth of 0.5 feet bgs and exceeded background and eco RSBSL for metals.
		Soil	6						X										
		Soil	10						H										
Total Soil Samples for Analysis				8	22		8		21	14	1								
Total Soil Samples on Hold				4	11		4		12		12								
Total Soil Vapor Samples for Analysis						20													
Total Soil Samples Collected			55																
Total Number of Locations			30																

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

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1 inch equals 60 feet

0 60 120 Feet

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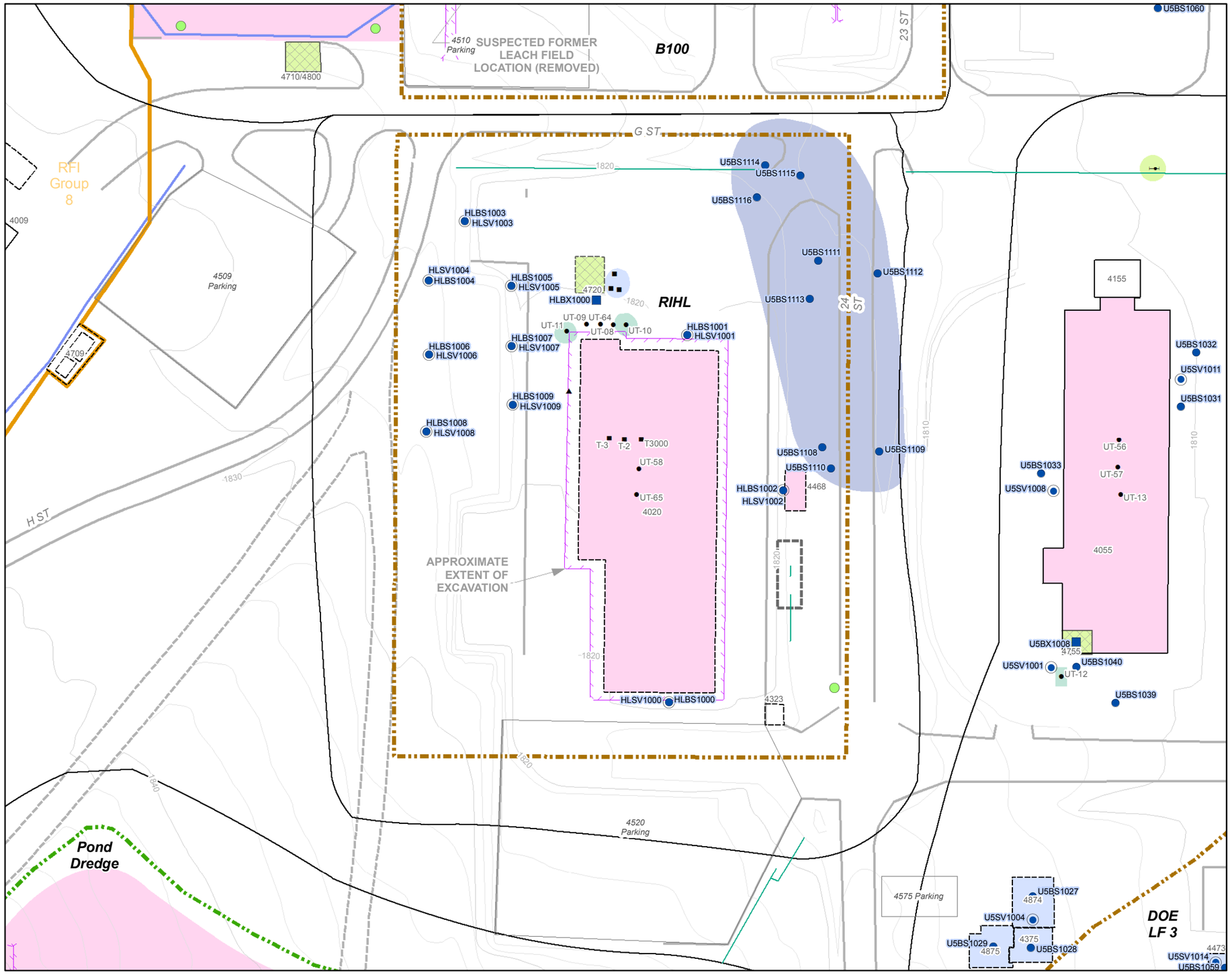
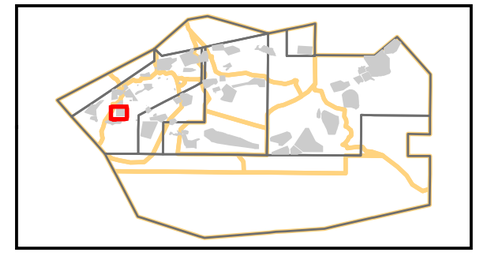
Figure 1





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

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1 inch equals 60 feet

0 60 120 Feet

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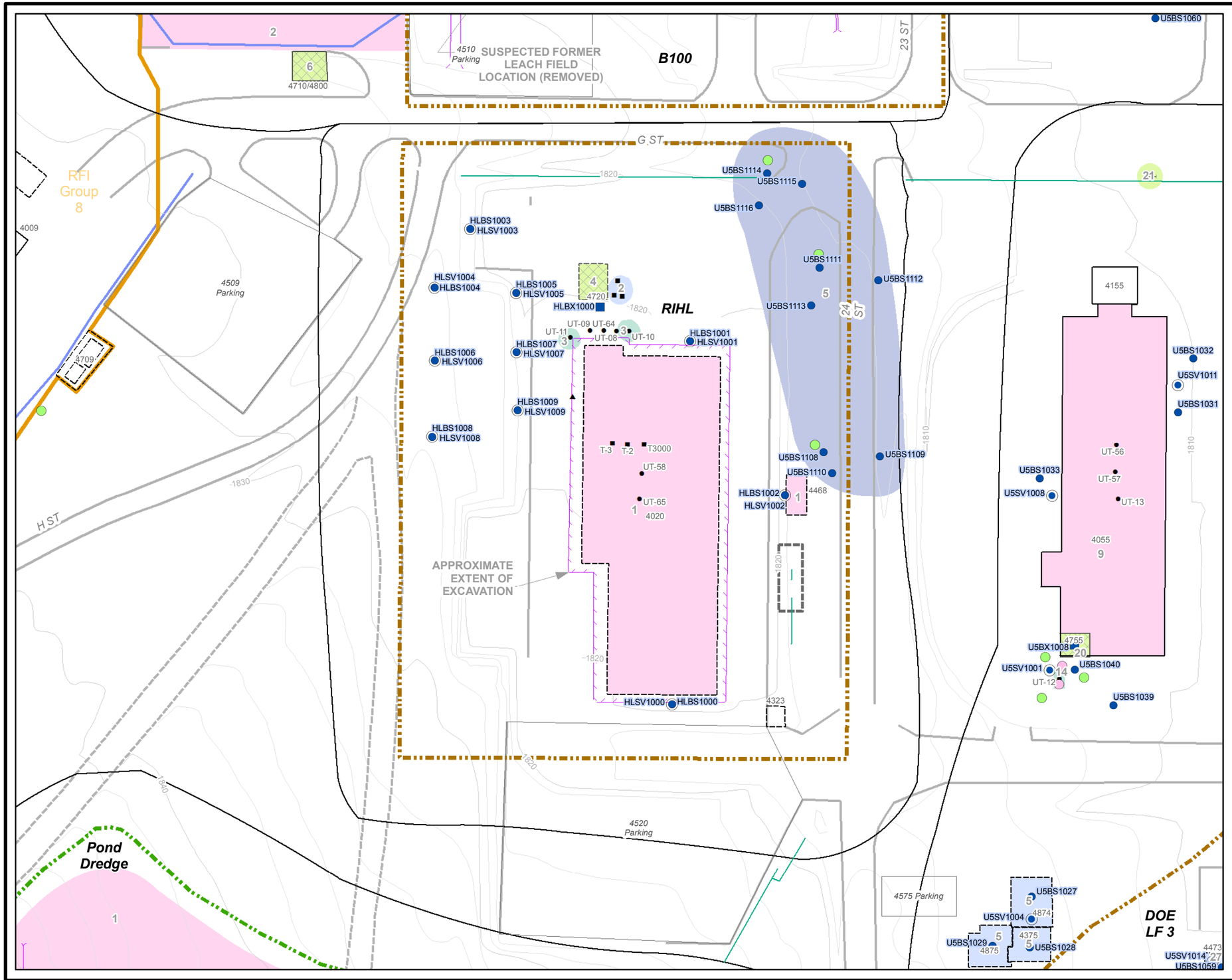
Figure 2



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

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1 inch equals 60 feet

0 60 120 Feet

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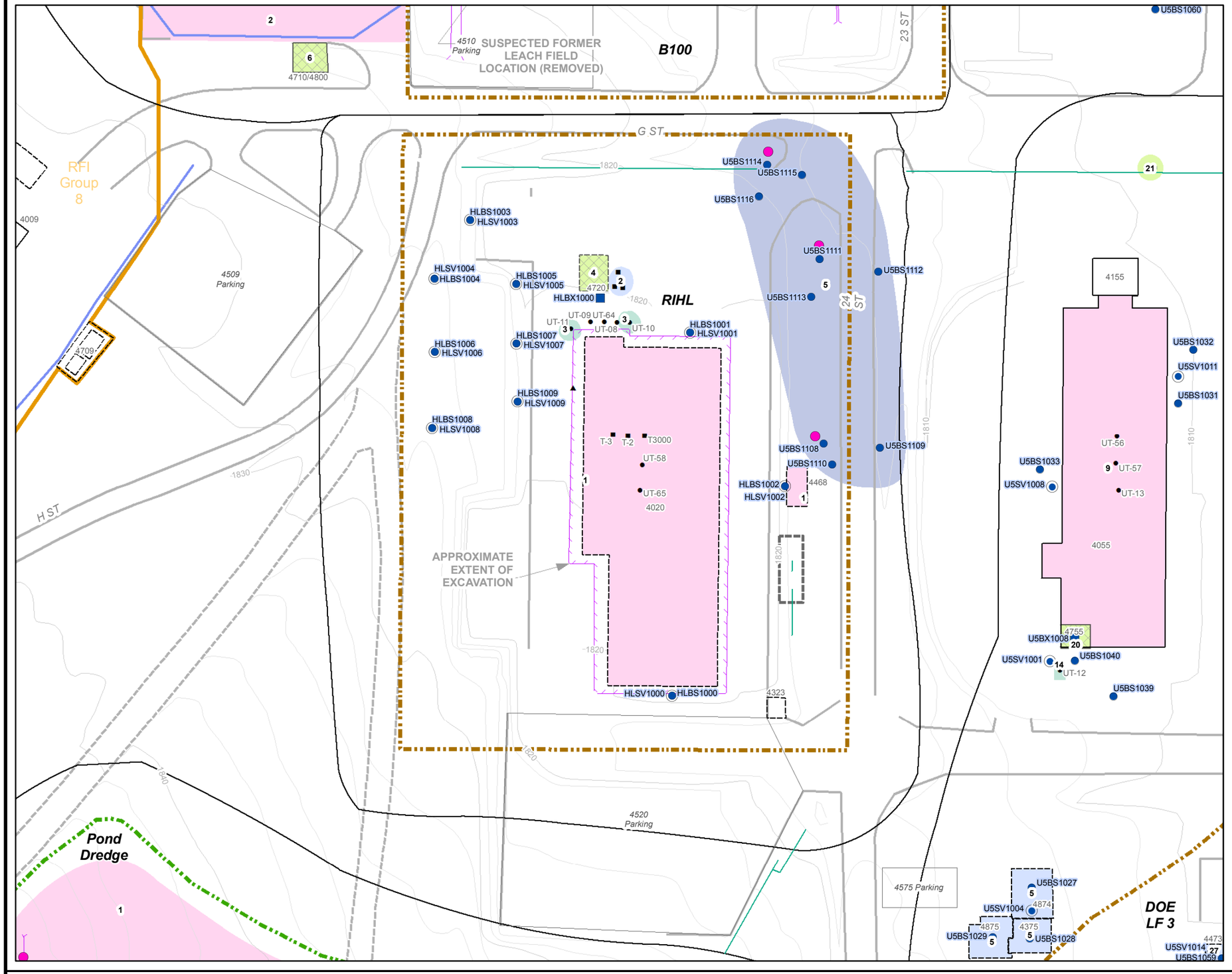
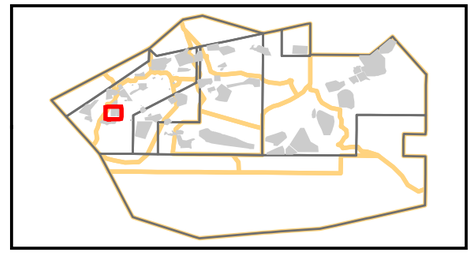
Figure 3





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

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1 inch equals 60 feet

0 60 120 Feet

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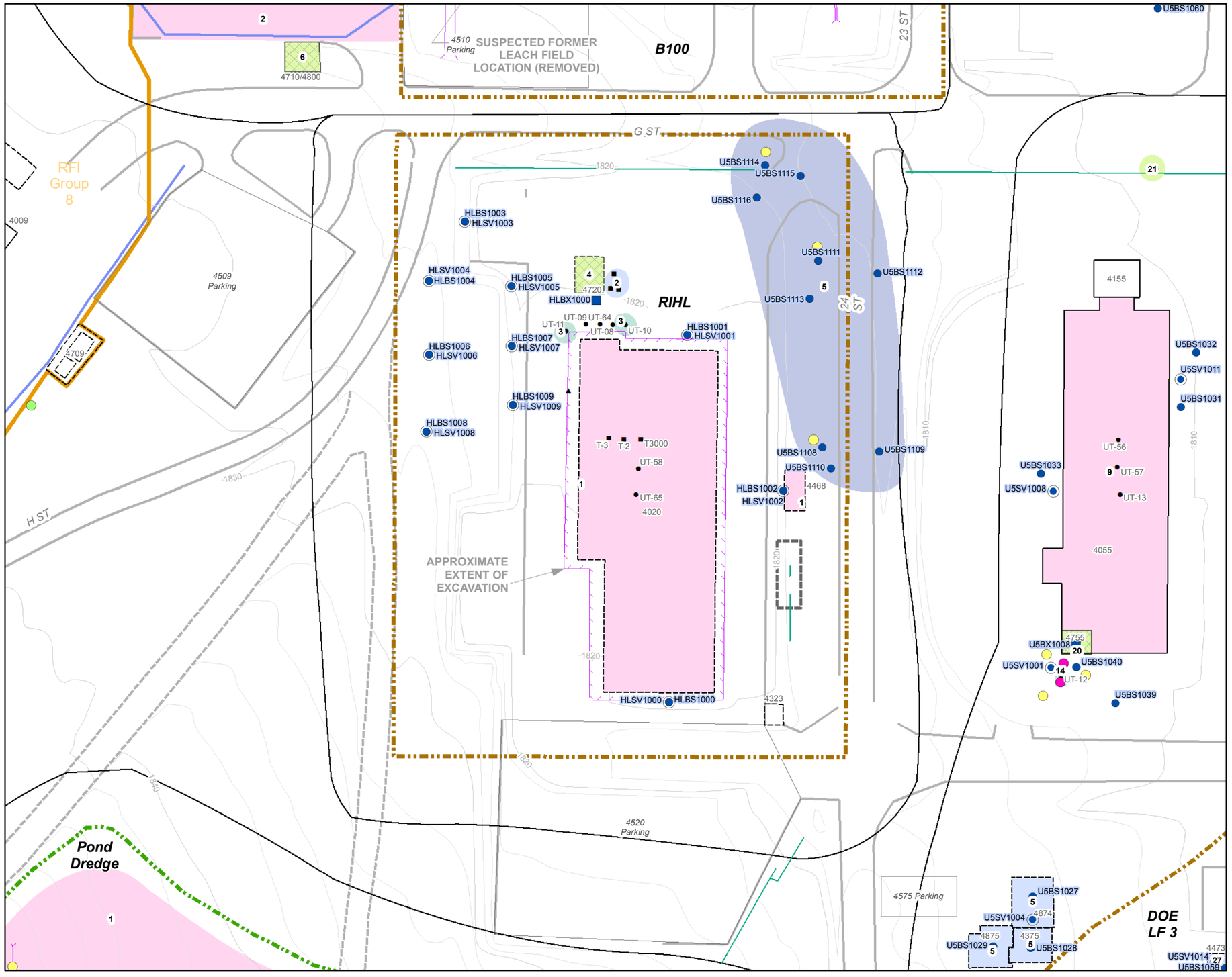
Figure 4



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

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Date: February 20, 2008 **WORKING DRAFT**

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1 inch equals 60 feet

0 60 120 Feet

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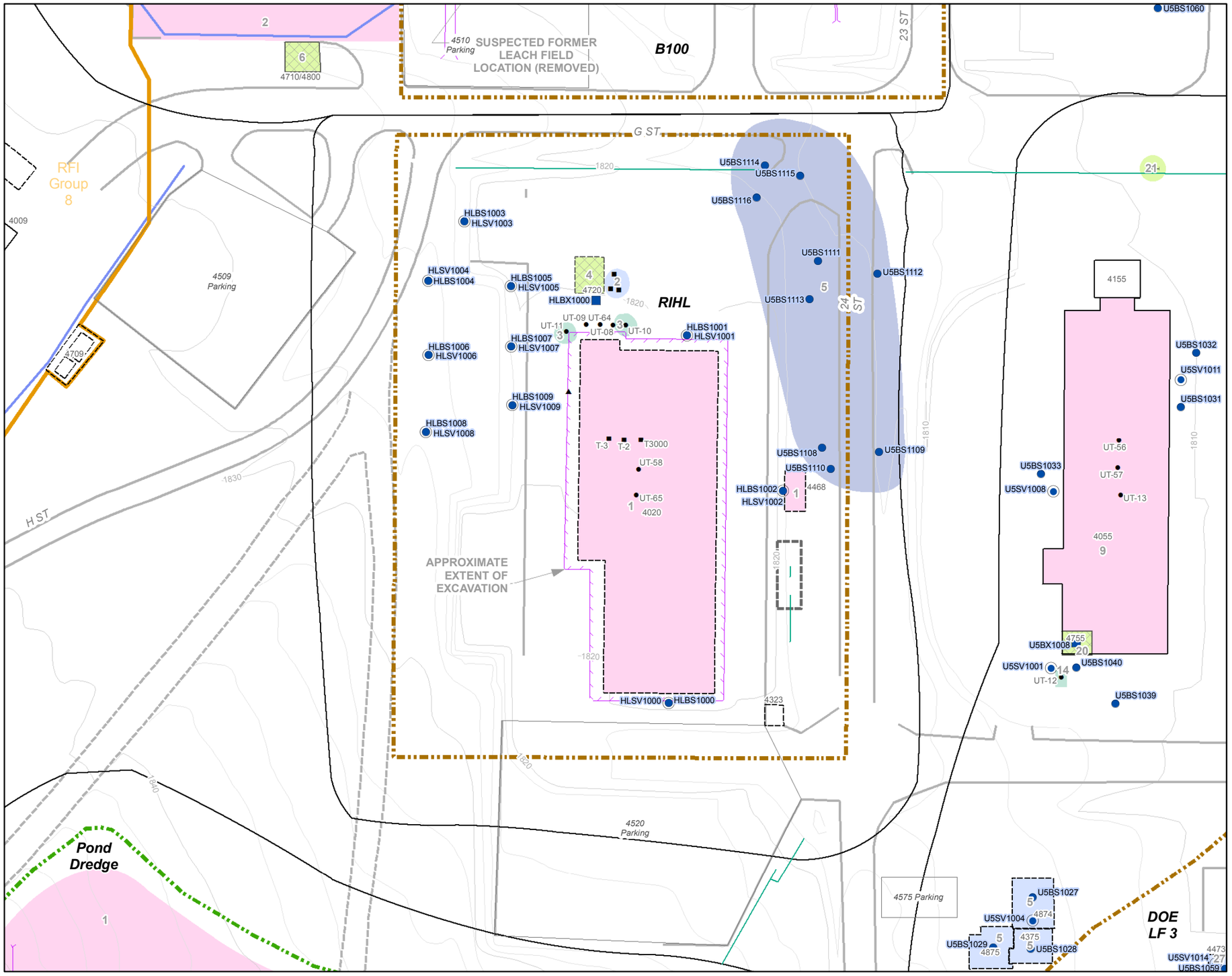
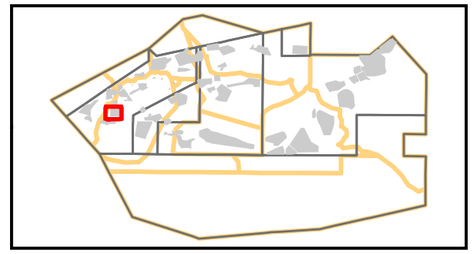
Figure 5





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

RIHL

Date: February 20, 2008 **WORKING DRAFT**

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1 inch equals 60 feet

0 60 120 Feet

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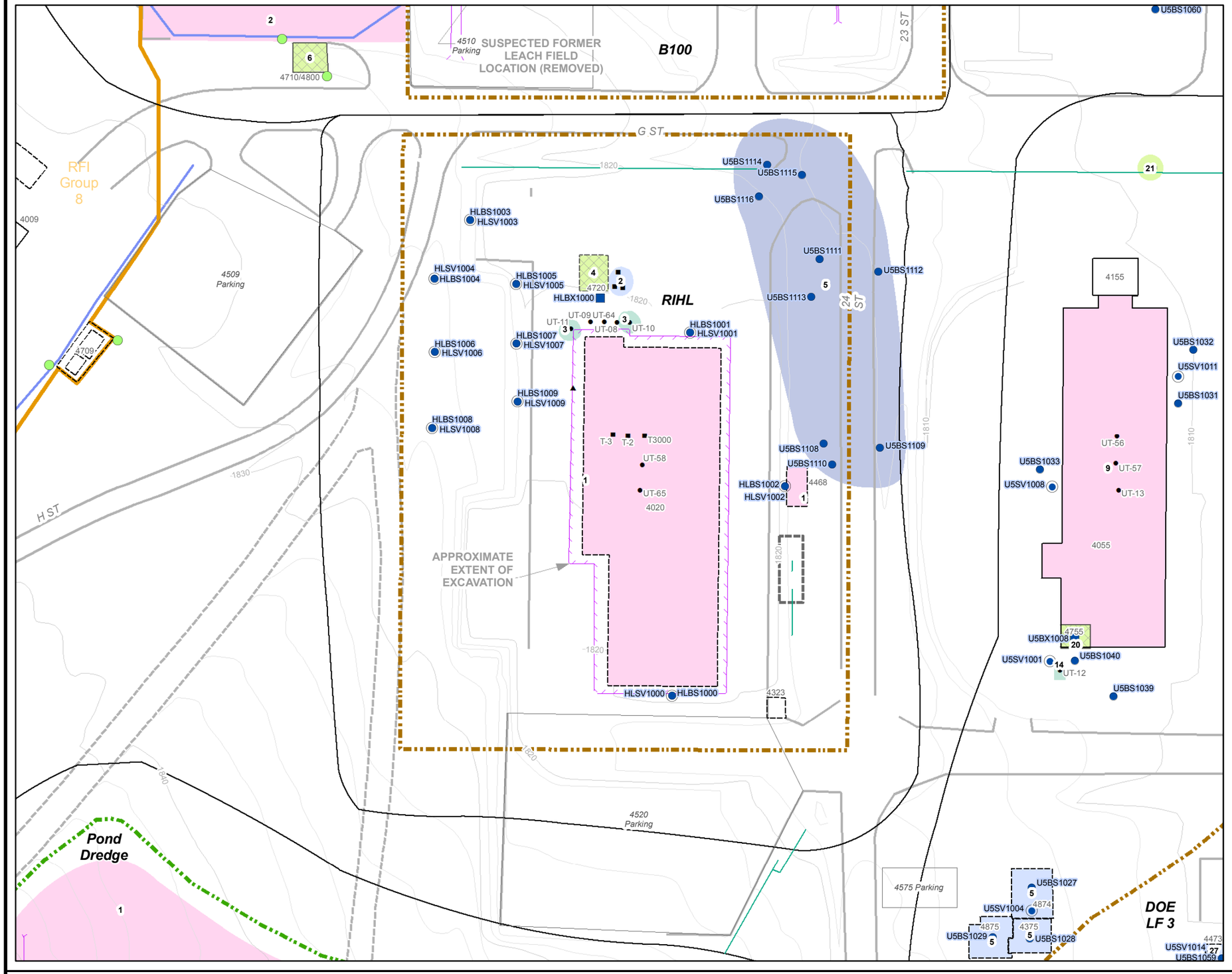
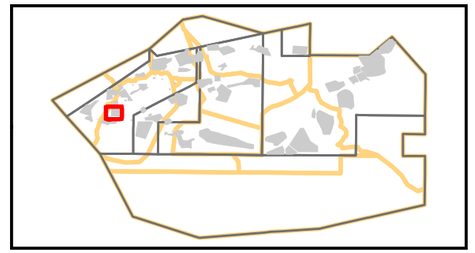
Figure 6





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

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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 Systems for Nuclear Power 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 Systems for Nuclear Auxiliary Power (SNAP) 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 SNAP area includes Buildings 4059 and 4459, the SNAP French drain, and substation 4759. Other chemical use areas evaluated with the SNAP area include Buildings 4360, 4358, 4057, 4626, two substations, and multiple above ground storage tanks (ASTs) and underground storage tanks (USTs).

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 Boeing Area IV Leach Fields. 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 SNAP 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 8 of the 10 chemical use areas identified for SNAP. Data gaps also were identified based on elevated detection limits of previous samples and on previous trenching samples with elevated metals concentrations not associated with an identified chemical use area. In addition, data gaps were identified based on the need for documentation related to regulatory closure of underground storage tank UT-36 and pipelines located at the site.

To address these data gaps, CH2M HILL is proposing to collect 39 soil samples and 20 soil vapor samples 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.

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). 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 SNAP 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 and 2	Building 4059 (Chemical Use Area 1) and Building 59 French Drain (Chemical Use Area 2). The source area(s) for VOCs detected in groundwater in the area of SNAP and Building 56 Landfill (located to the west in Group 8) has not been identified. No investigation of VOCs in the vadose zone has been performed to date at SNAP. Soil investigation needed at SNAP to assess potential presence of onsite VOC impacts. During Building 4059 demolition activities, the excavation area extended beyond the footprint of the building and French drain. However, additional soil sampling needed around the perimeter of the excavation to assess potential impacts from site constituents of potential concern (COPCs), including VOCs (covered above also), metals, and petroleum hydrocarbons.	X			8
3	Building 4057. The potential for impacts associated with historical chemical use at this building, including the outdoor chemical storage area, has not been evaluated.	X			4
4	Building 4358. The potential for impacts associated with historical unspecified chemical storage at this building has not been evaluated	X		X	2
5	Building 4360. The potential for impacts associated with historical chemical usage at this building has not been evaluated.	X		X	2
6	Building 4459. The potential for impacts associated with historical unspecified flammable chemical storage at this building has not been evaluated.	X		X	
7	UT-36. The status of investigation and closure of this former underground storage tank (UST) is unknown. Sample data from 1987 tank removal support site closure, and closure request submitted to Ventura County Environmental Health Division (VCEHD) in 1990. Documentation (Ogden, 2000, WPAA) indicates	X		X	

TABLE 1

Data Gaps

Sampling and Analysis Plan for SNAP 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
	VCEHD requested further investigation in 1994. No further documentation is available. Further investigation might be needed based on results of addressing documentation data gaps.				
8	Building 4757 Transformer. No investigations performed to date at this transformer for PCBs. Use period for this transformer is unknown (documentation data gap).	X		X	1 (Composite Sample)
9	Transformer 4759. Soil sampling has been performed and no PCBs were detected. The use period for this transformer is not known (documentation data gap). There are no other data gaps for this Chemical Use Area.			X	
10	Building 4719 (Chemical Use Area 10) Transformer. No investigations performed to date at this transformer for PCBs. Use period for this transformer is unknown (documentation data gap).	X		X	1 (Composite Sample)
11	Acid and sodium hydroxide aboveground storage tanks (ASTs). The potential for impacts associated with historical storage at these tanks has not been evaluated.	X			2
13	Building 4626. The potential for impacts associated with historical chemical usage at this building has not been evaluated.	X		X	4
Other	Between Buildings 4626 and 4757. Undocumented trenching and soil sampling was conducted in 2000 at the northeast corner of Building 4626. Metals were detected above background and ecological RBSLs in one of two shallow soil samples. No additional information available.	X		X	1
Sitewide	Metals, VOCs, propellants, and PCBs have not been characterized in soil at the 2- to 6-foot-depth interval used to assess ecological risks.	X			
Sitewide	Sediment and surface water runoff in drainage channels extending from the site have not been analyzed for site COPCs.	X			
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
				Total	**25**

Notes:
Sitewide = Data Gap applies to the entire SNAP RFI Site

TABLE 1

Data Gaps

Sampling and Analysis Plan for SNAP 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

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 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 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.

Ogden. 2000. *RCRA Facility Investigation; Work Plan Addendum Amendment*. June.

TABLE 2

Proposed Samples for SNAP RFI Site

Sampling and Analysis Plan for SNAP 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	SABS1000	Soil	1	X	X				X	X									Soil samples will be collected at four locations surrounding the previous SNAP excavation area. This sample is located at the northeast corner of the SNAP excavation. No previous sampling has occurred at this location. This sample will be used to delineate the extent of potential impacts to the environment from previous chemical uses.
		Soil	6	X	X				X										
		Soil	10	H	H				H										
1	SABS1001	Soil	1	X	X				X	X									Same as above. This sample is located at the southeast corner of the excavation.
		Soil	6	X	X				X										
		Soil	10	H	H				H										
1	SABS1002	Soil	1	X	X				X	X									Same as above. This sample is located at the southwest corner of the excavation.
		Soil	6	X	X				X										
		Soil	10	H	H				H										
1	SABS1003	Soil	1	X	X		X		X	X	H								Same as above. This sample is located at the northwest corner of the excavation. Samples collected from this location will also be used to evaluate the impacts from chemicals stored in Building 4459 (chemical use area 6).
		Soil	6	X	X		X		X		H								
		Soil	10	H	H		H		H		H								
1	SASV1000	Soil Vapor	5			X													No previous sampling for VOCs has occurred at the SNAP RFI site. This sample location is at the northeast corner of the SNAP excavation and will be used to delineate any potential impacts to the environment from previous chemical uses.
		Soil Vapor	10			X													
1	SASV1001	Soil Vapor	5			X													Same as above. This location is at the southeast corner of the excavation.
		Soil Vapor	10			X													
1	SASV1002	Soil Vapor	5			X													Same as above. This location is within the previously excavated area; southwest of former Building 4059.
		Soil Vapor	10			X													
1	SASV1003	Soil Vapor	5			X													Same as above. This location is at the northwest corner of the excavation.
		Soil Vapor	10			X													
2																			
3	SABS1004	Soil	1	X	X		X		X	X	H								No previous sampling has occurred in Area 3. Previous chemical uses include VOCs, SVOCs, TPH, PCBs, and metals. This sample is located at an entrance on the northwest corner of Building 4057.
		Soil	6	X	X		X		X		H								
		Soil	10	H	H		H		H		H								
3	SABS1005	Soil	1	X	X		X		X	X	H								No previous sampling has occurred in Area 3. Previous chemical uses include VOCs, SVOCs, TPH, PCBs, and metals. This sample is located at an entrance on the south side of Building 4057.
		Soil	6	X	X		X		X		H								
		Soil	10	H	H		H		H		H								
3	SASV1004	Soil Vapor	5			X													Soil vapor sample associated with Sample SABS1004.
		Soil Vapor	10			X													
3	SASV1005	Soil Vapor	5			X													Soil vapor sample associated with Sample SABS1005.
		Soil Vapor	10			X													
4	U5BS1202	Soil	1	X	X		X		X	X	H								No previous sampling has occurred at Building 4358. There is no known information about the entrances to this building, therefore, the sample is located at the centroid of the building footprint.. Previous chemical uses include VOCs, SVOCs, TPH, PCBs, and metals.
		Soil	6	X	X		X		X		H								
		Soil	10	H	H		H		H		H								

TABLE 2

Proposed Samples for SNAP RFI Site

Sampling and Analysis Plan for SNAP 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)	
4	U5SV1202	Soil Vapor	5			X													Soil vapor sample associated with Sample U5BS1202.
		Soil Vapor	10			X													
5	U5BS1203	Soil	1	X	X		X		X	X	H								No previous sampling has occurred at Building 4360. There is no known information about the entrances to this building, therefore, the sample is located at the centroid of the building footprint.. Previous chemical uses include VOCs, SVOCs, TPH, PCBs, and metals.
		Soil	6	X	X		X		X		H								
		Soil	10	H	H		H		H		H								
5	U5SV1203	Soil Vapor	5			X													Soil vapor sample associated with Sample U5BS1203.
		Soil Vapor	10			X													
6																			Sampling is covered with Sample SABS1003.
7																			No sampling is currently required for this tank. Documentation data gap exists for final regulatory closure status of the tank. In addition, tank was located within the SNAP excavation area.
8	SABX1000	Soil	1								X								No sampling has occurred at Substation 4757. Chemical uses include PCBs. Samples will be collected from 4 locations near the corners of the substation footprint approximately 5 feet from the substation and composited into one.
9																			Soil sampling for PCBs has been performed at Substation 4759 and PCBs were not detected. No further sampling is necessary.
10	U5BX1200	Soil	1								X								No sampling has occurred at Substation 4719. Chemical uses include PCBs. Samples will be collected from 4 locations near the corners of the substation footprint approximately 5 feet from the substation and composited into one.
11	U5BS1204	Soil	1							X									No previous sampling has occurred in the vicinity of these above ground tanks. The tanks contained acid and sodium hydroxide (Chemical Use Areas 11 and 12). The samples are being collected directly beneath the previous locations of the above ground tanks.
		Soil	6							X									
11	U5BS1205	Soil	1							X									
		Soil	6							X									
12																			Samples for this location will be collected as the samples associated with Area 11 (U5BS1204 and U5BS1205).
13	U5BS1207	Soil	1	X	X		X		X	X	X								No previous sampling has occurred at Building 4626. Chemical uses include general chemical storage. Sample location is at the centroid of the former building footprint.
		Soil	6	X	X		X		X		X								
		Soil	10	H	H		H		H		H								
13	U5BS1208	Soil	1	X	X		X		X	X	X								No previous sampling has occurred at Building 4626. Chemical uses include general chemical storage. Sample location is at the downgradient (southeast) corner of the former building.
		Soil	6	X	X		X		X		X								

TABLE 2

Proposed Samples for SNAP RFI Site

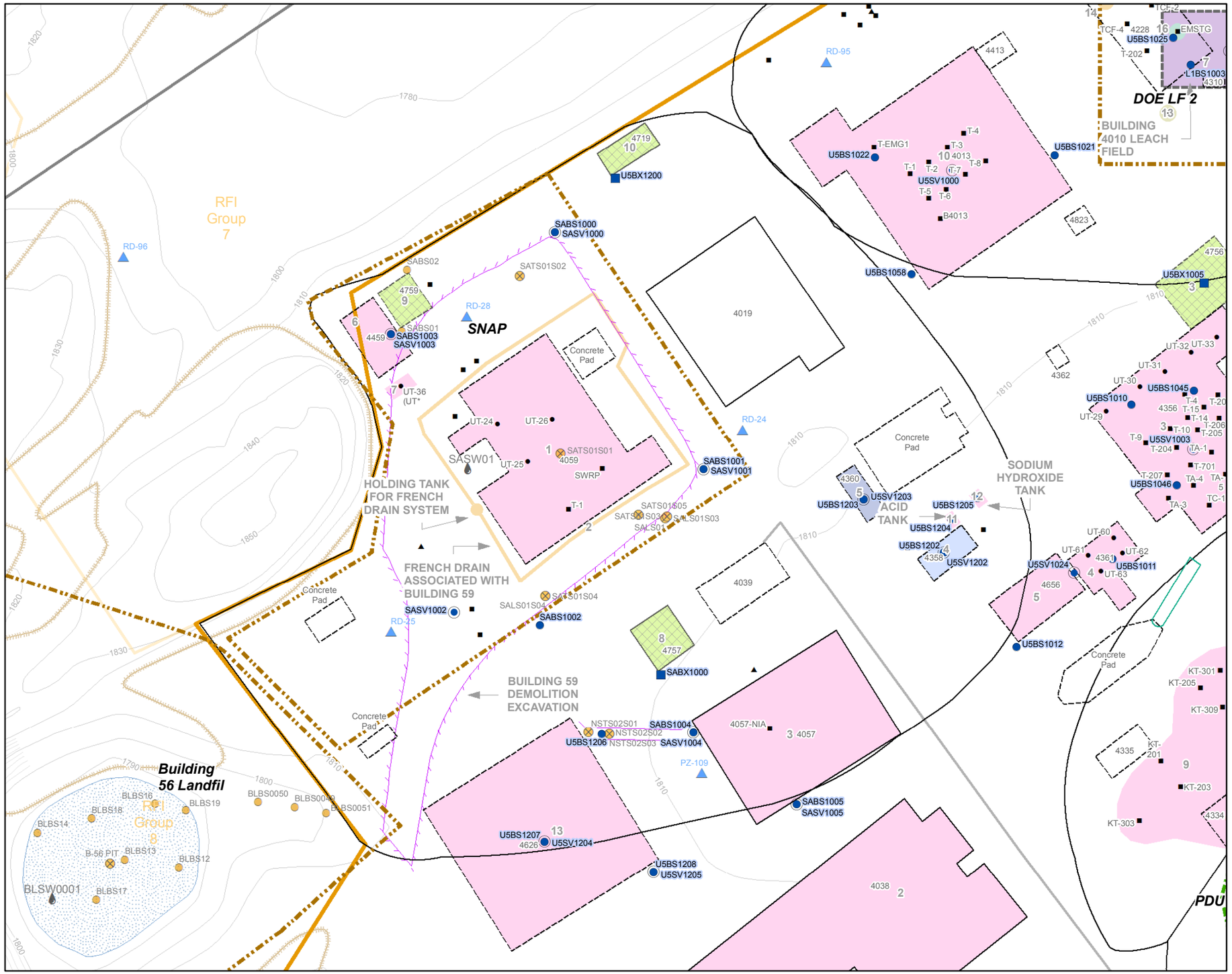
Sampling and Analysis Plan for SNAP RFI Site, Group 5, Santa Susana Field Laboratory

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		H							
13	U5BS1204	Soil Vapor	5			X												Soil vapor sample associated with Sample U5BS1204.
		Soil Vapor	10			X												
13	U5BS1205	Soil Vapor	5			X												Soil vapor sample associated with Sample U5BS1205.
		Soil Vapor	10			X												
Other	U5BS1206	Soil	1						X	X								This sample is a step out location for previous sample NSTS02S02. The previous sample exceeded RBSLs for metals. This sample is approximately 25 feet southwest of sample U5BS1210. The boring at this location will be advanced to 40 feet bgs to define the depth of bedrock.
		Soil	6						X									
		Soil	10						H									
Total Soil Samples for Analysis				20	20		14		22	15	6							
Total Soil Samples on Hold				10	10		7		11		17							
Total Soil Vapor Samples for Analysis						20												
Total Soil Samples Collected			39															
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	Groundwater - Spring
Soil - Composite	Water - Artificial
Soil - Sediment	Water - Discharge
Soil - Surface	Water - Surface
Air - Soil Vapor	Water - Surface (Seep)
Air	Biological
Groundwater	Other
Groundwater - Lysimeter	Sump

Basemap Legend

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

Proposed Sampling Locations

SNAP

Date: February 20, 2008 **WORKING DRAFT**

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1 inch equals 60 feet

0 60 120 Feet

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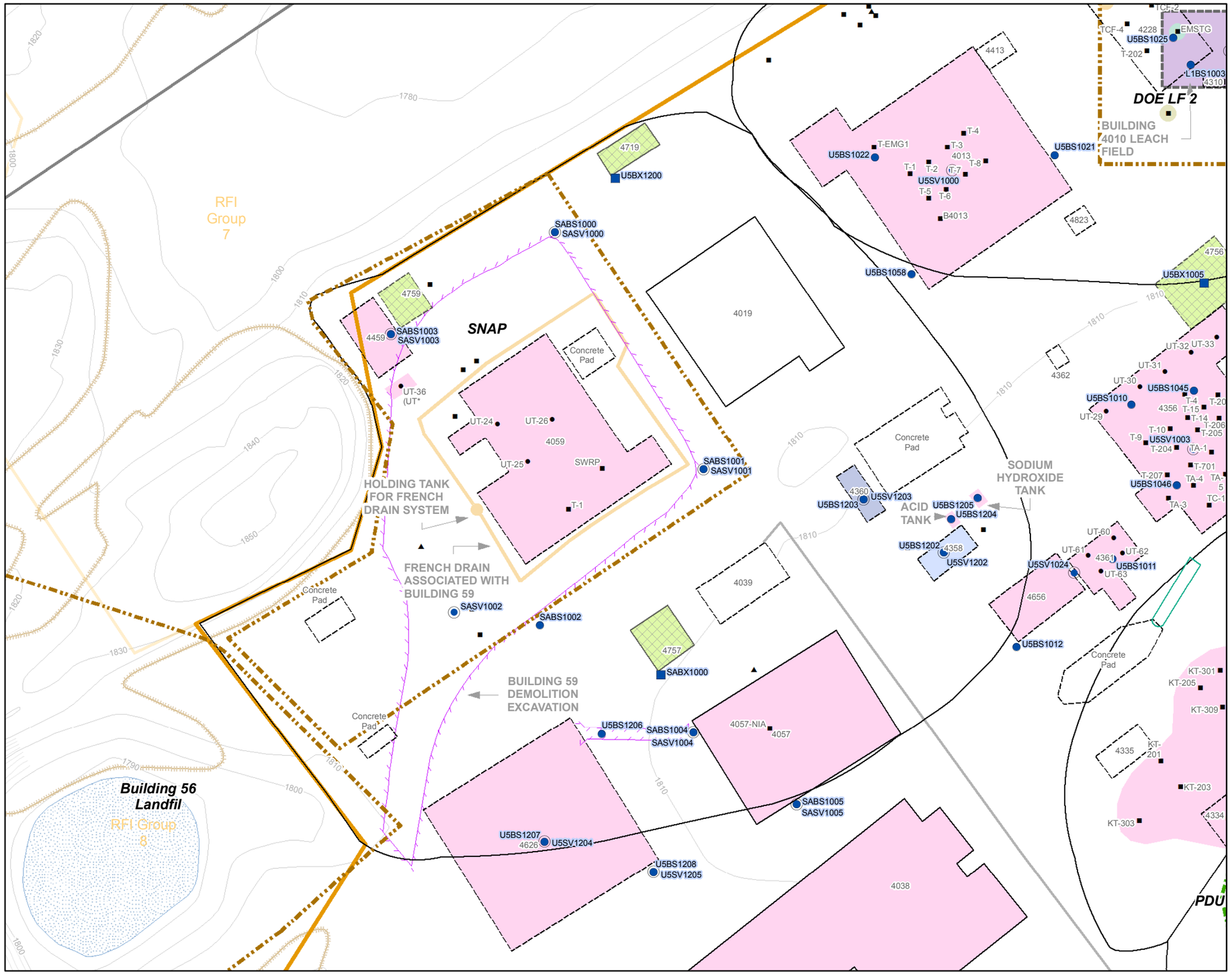
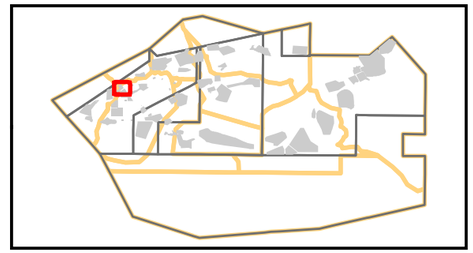
Figure 1





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

SNAP

Date: February 21, 2008 **WORKING DRAFT**

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1 inch equals 60 feet

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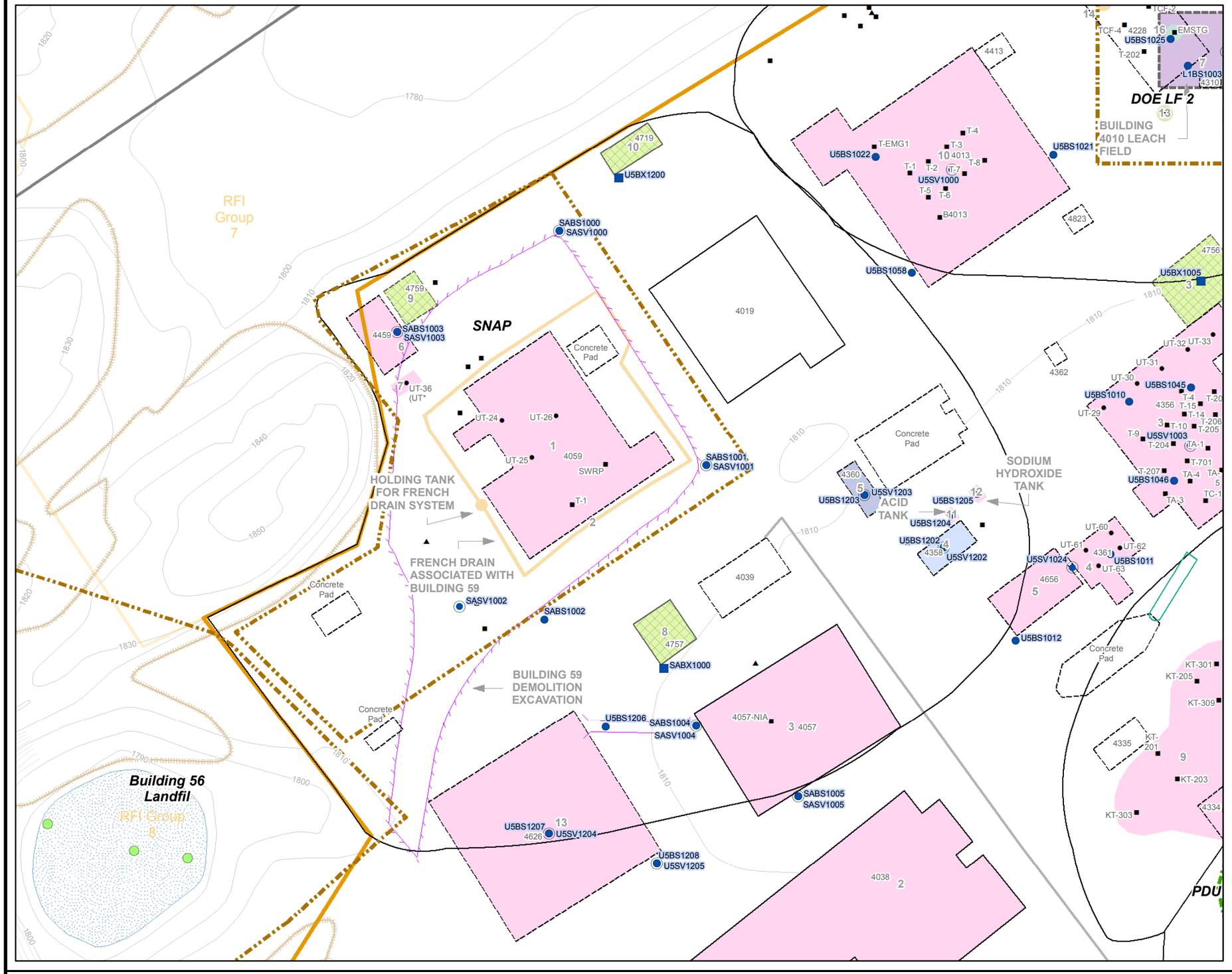
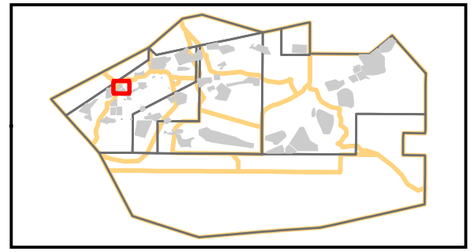
Figure 2





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

SNAP

Date: February 20, 2008 **WORKING DRAFT**

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1 inch equals 60 feet

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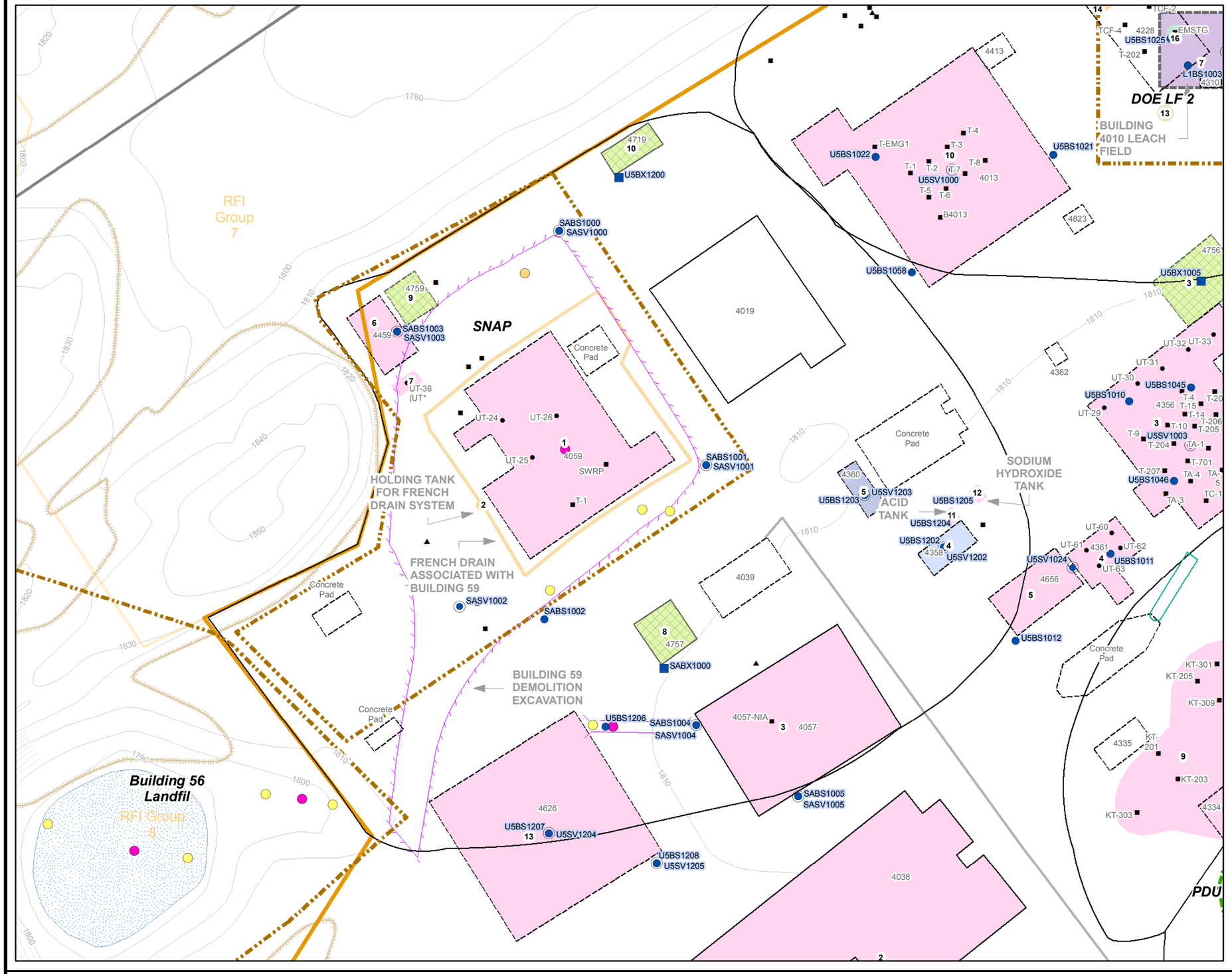
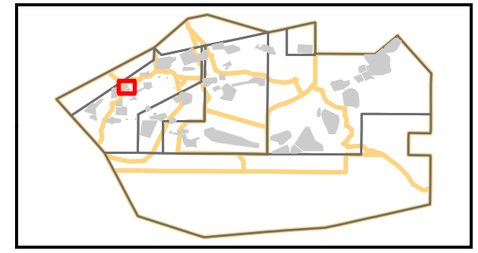
Figure 3





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

SNAP

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1 inch equals 60 feet

0 60 120 Feet

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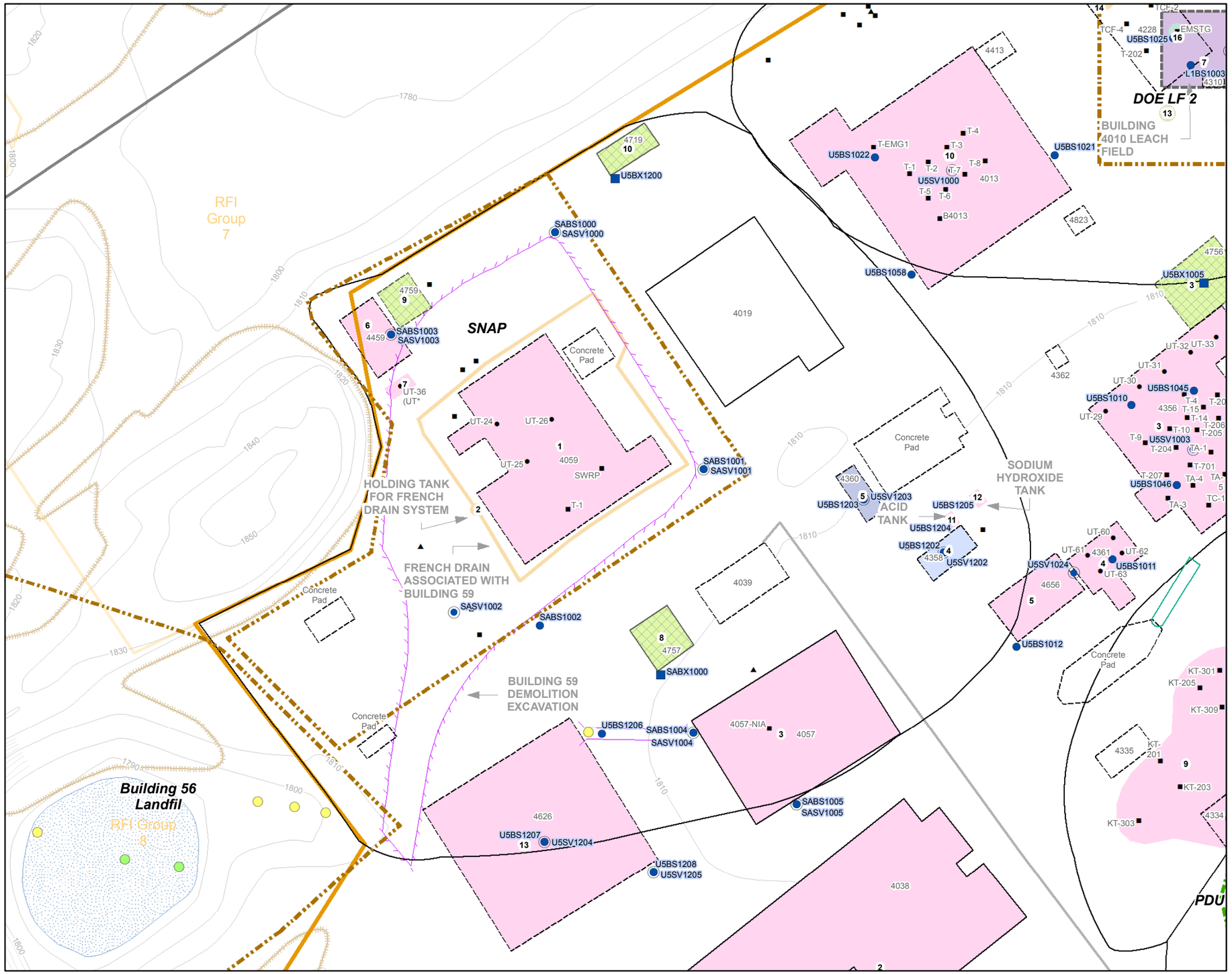
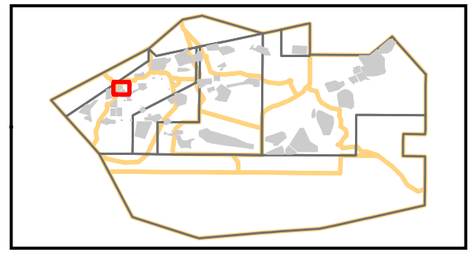
Figure 4





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

SNAP

Date: February 20, 2008 **WORKING DRAFT**

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1 inch equals 60 feet

0 60 120 Feet

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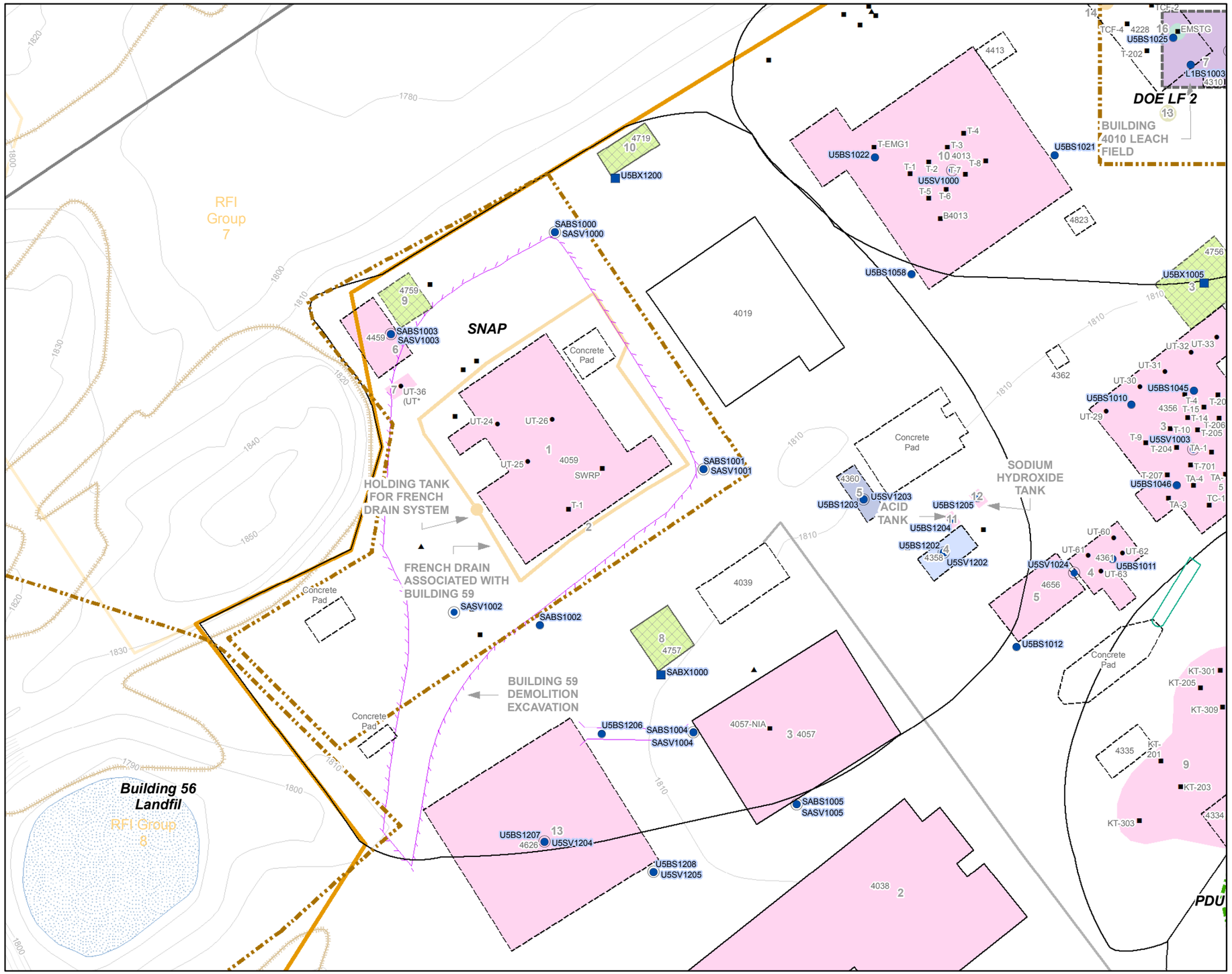
Figure 5



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

SNAP

Date: February 20, 2008 WORKING DRAFT

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1 inch equals 60 feet

0 60 120 Feet

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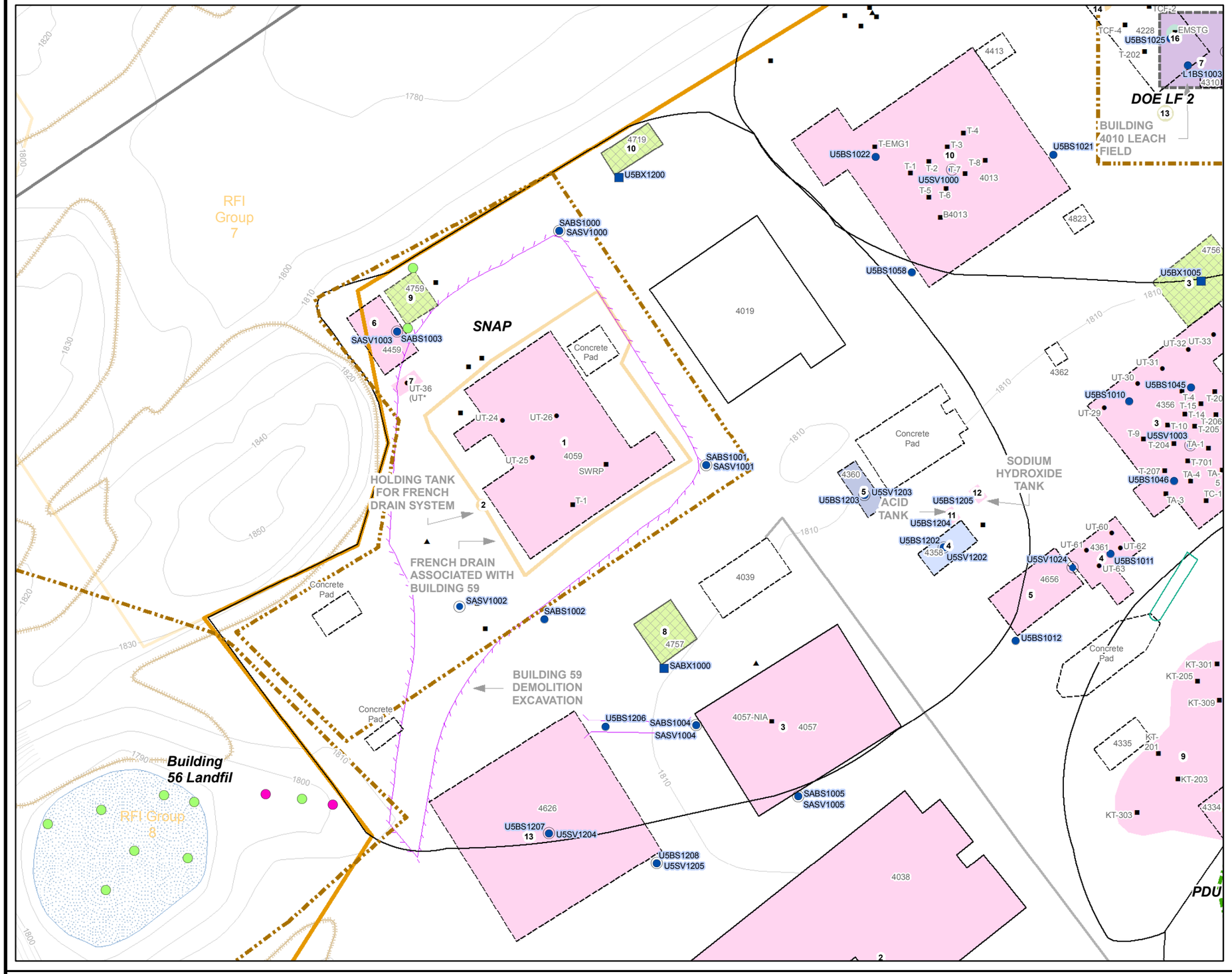
Figure 6



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

SNAP

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 DOE Unaffiliated Features, 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) Unaffiliated Features 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 DOE Unaffiliated Features. This SAP does not address the STL-IV Explosive Bunkers (a Boeing feature); that unaffiliated feature is addressed in a separate SAP (Attachment A-10). 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 Unaffiliated Features are summarized in Table 1. As presented in Table 1, chemical data gaps were identified for 17 of the 19 chemical use areas identified for the DOE Unaffiliated Features. Data gaps were also identified based on the need for documentation related to regulatory closure of 10 underground storage tanks (USTs).

To address these data gaps, CH2M HILL is proposing to collect 55 soil samples and 20 soil vapor samples. These samples will be collected from a total of 31 locations (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 Figures 1, 2, and 3.

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.

TABLE 1

Data Gaps

Sampling and Analysis Plan for Unaffiliated Features, 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 4037 - Chemical uses include solvents, 1,4-dioxane, diesel, hydraulic oil, waste oils, and metals. Building 4037 has not been investigated for these chemicals.	X			2
2	Building 4038 – This building was used as an office building. Based on the former uses of this building and the small quantity of hydraulic oil that was released, investigation of this building is not necessary.				N/A
3	Building 4356 - Chemical uses include metals, morpholine, hydrazine, polychlorinated biphenyls (PCBs), diesel, and sulfuric acid. Building 4356 has not been investigated for these chemicals.	X			5
4	Building 4361 - Chemical uses include chlorine, hydrazine, and acids/bases. Building 4361 has not been investigated for these chemicals. In addition, the contents of an aboveground tank (T-5) are unknown.	X		X	2
5	Building 4656 - Chemical uses include hydrazine, morpholine, and acids/bases. Building 4656 has not been investigated for these chemicals.	X			1
6	UT-19 - Chemical uses include fuel-oil. UT-19 has been closed by the Ventura County Environmental Health Division (VCEHD). No further investigation is required.	X			1
7	STL-IV Explosive Bunkers (Addressed in the SAP for the Boeing Unaffiliated Features)	X			N/A
8	UA-Tank-1 - Chemical uses include diesel. The location of this tank is unknown.	X	X	X	N/A (Tank location is unknown)
9	US-Tank-2 - Chemical uses are unknown. In addition, the location of this tank is unknown.	X	X	X	N/A (Tank location is unknown)
10	Building 4462 - Chemical uses include total petroleum hydrocarbon (TPH) and metals. TPH and metals have not been investigated in soil.	X			3
11	Building 4463 - Sodium Cleaning and Handling Facility. Records indicate that small quantities of solvents were used at the facility. Assess potential solvent releases at Building 4463. No investigations have been performed to date. Investigation is needed to evaluate if historic activities at this building have resulted in impacts to the environment.	X			2

TABLE 1

Data Gaps

Sampling and Analysis Plan for Unaffiliated Features, 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
12	Substation 4760 A - Chemical uses include PCBs. PCBs have not been investigated in soil.	X			1
13	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.				N/A
14	Substation 4760 B - Chemical uses include PCBs. PCBs have not been investigated in soil.	X			1
15	Substation 4762 - Chemical uses include PCBs. PCBs have been investigated in soil. However, the lateral and vertical extents of PCBs in soil have not been defined.	X			4
16	Building 4461 - Sodium Pump Test Facility Motor Generator Building. No investigation has been performed. Investigation is required to screen for potential impacts to the environment.	X			2
17	Building 4625 – Component Storage. No investigation has been performed. Investigation is required to screen for potential impacts to the environment.	X			2
18	Building 4628 – Hazardous Materials Storage. No investigation has been performed. Investigation is required to screen for potential impacts to the environment.	X			2
19	Building 4662 – Used for cleaning sodium off small parts. No investigation has been performed. Investigation is required to screen for potential impacts to the environment.	X			3
N/A	Documentation of regulatory closure of 10 underground storage tanks (UT-19, UT-29 through UT-33, UT-60 through UT-63) has not been located.			X	N/A
				Total	**31**

N/A = Not Applicable

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.

TABLE 2

Proposed Samples for DOE Unaffiliated Features

Sampling and Analysis Plan for DOE Unaffiliated Features, 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	U5BS1009	Soil	1	X	H		X		X	X	H							No sampling has occurred at Building 4037. Chemical uses include solvents, 1,4-dioxane, diesel, hydraulic oil, waste oils, and metals. The proposed sample is located near the centroid of the former building footprint. Samples will likely be collected through hand auguring due to the presence of a guard rail at the only entrance to the former building location. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from U5SV1002.
		Soil	6	X	H		X		X		H							
		Soil	10	H	H		H		H		H							
1	U5SV1002	Soil Vapor	5			X												Based on the historical use of solvents in this building, soil vapor samples will be collected (near the centroid of the building).
		Soil Vapor	10			X												
2																		No Data Gaps at Building 4038.
3	U5BS1010	Soil	1	X			X		X	X	H							No sampling has occurred at Building 4356. Chemical uses include metals, morpholine, hydrazine, PCBs, diesel, and sulfuric acid. The proposed sample is located with the building footprint, on the northern side of the building.
		Soil	6	X			X		X		H							
		Soil	10	H			H		H		H							Analysis is contingent on the results of analyses for more shallow samples.
3	U5BS1045	Soil	1	X			X		X	X	H		X					See above.
		Soil	6	X			X		X		H		X					
		Soil	10	H			H		H		H		H					Analysis is contingent on the results of analyses for more shallow samples.
3	U5BS1046	Soil	1	X			X		X	X	H		X					See above. The proposed sample is located within the building footprint, on the southern side of the building.
		Soil	6	X			X		X		H		X					
		Soil	10	H			H		H		H		H					Analysis is contingent on the results of analyses for more shallow samples.
3	U5BS1047	Soil	1	X			X		X	X	H							See above. The proposed sample is located within the building footprint, on the southern side of the building.
		Soil	6	X			X		X		H							
		Soil	10	H			H		H		H							Analysis is contingent on the results of analyses for more shallow samples.
3	U5SV1003	Soil Vapor	5			X												Based on the historical use of solvents in this building, soil vapor samples will be collected (near the centroid of the building).
		Soil Vapor	10			X												
4	U5BS1011	Soil	1	X	H		X		X	X			X			X		No sampling has occurred at Building 4361. Chemical uses include storage of chlorine in drums and storage of hydrazine and acids/bases in USTs. In addition, the contents of an AST are unknown (screening for potential contents of this AST). The proposed sample is located near the centroid of the former building footprint. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from U5SV1024.
		Soil	6	X	H		X		X				X			X		
		Soil	10	H	H		H		H				H			H		Analysis is contingent on the results of analyses for more shallow samples.
4	U5SV1024	Soil Vapor	5			X												See above. The proposed sample is located between Buildings 4361 and 4656.
		Soil Vapor	10			X												
5	U5BS1012	Soil	1					X		X			X					No sampling has occurred at Building 4656. Chemical uses include hydrazine, morpholine, and acids/bases. The proposed sample is located near the centroid of the former building footprint.
		Soil	6					X					X					

TABLE 2

Proposed Samples for DOE Unaffiliated Features

Sampling and Analysis Plan for DOE Unaffiliated Features, 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						Analysis is contingent on the results of analyses for more shallow samples.
6	U5SV1005	Soil Vapor	5			X													UT-19 was closed by the Ventura County Environmental Health Division. However, soil vapor data has not been collected from the location of this former UST.
		Soil Vapor	10			X													
7																			Chemical Use Area 7 (STL-IV Explosive Bunkers) is included in the SAP for the Boeing Unaffiliated Features in Group 5.
8																			The location of this tank is unknown; therefore no samples are proposed.
9																			The location of this tank is unknown; therefore no samples are proposed.
10	U5BS1052	Soil	1	X			X		X	X	H								Building 4462 was used as a Sodium Pump Test Facility. Between 1995 and 2004, there were releases of ethanol, metallic sodium, oil and coolant. The locations of releases are unknown. TPH, PAHs, and metals have not been investigated in soil. The proposed sample is located near a door on a south side of the building.
		Soil	6	X			X		X		H								
		Soil	10	H			H		H		H								Analysis is contingent on the results of analyses for more shallow samples.
10	U5BS1048	Soil	1	X			X		X	X	H								See above. The proposed sample is located near a door on the north side of the building.
		Soil	6	X			X		X		H								
		Soil	10	H			H		H		H								Analysis is contingent on the results of analyses for more shallow samples.
10	U5SV1028	Soil Vapor	5			X													Soil vapor samples will be collected to evaluate presence of VOCs in soil vapor in the area.
		Soil Vapor	10			X													
11	U5BS1049	Soil	1		H														Building 4463 was used as a Sodium Cleaning and Handling Facility. Records indicate that small quantities of solvents were used at the facility. VOCs have not been investigated in soil or soil vapor. The proposed sample is located at the doorway on the western side of the building. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from U5SV1010.
		Soil	6		H														
		Soil	10		H														Analysis is contingent on the results of analyses for more shallow samples.
11	U5SV1010	Soil Vapor	5			X													See above.
		Soil Vapor	10			X													
12	U5BX1013	Soil	0.5								X								Substation 4760A has not been investigated for PCBs. 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.
13																			There are no data gaps for Substation 4780 based on the results of previous sampling.
14	U5BX1014	Soil	0.5								X								Substation 4760B has not been investigated for PCBs. 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.

TABLE 2

Proposed Samples for DOE Unaffiliated Features

Sampling and Analysis Plan for DOE Unaffiliated Features, 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)	
15	U5BX1015	Soil	1								X							Soil samples collected around the transformer at substation 4762 contained PCBs at concentrations above Ecological RBSLs. The vertical and lateral extents of PCBs in soil have not been defined. The proposed sample is located approximately 10 feet north of the locations (XFBS16 and XFBS16S01) where PCBs were detected at concentrations up to 0.15 mg/kg at 1 feet bgs.
		Soil	2								H							Analysis is contingent on the results of analyses for more shallow samples.
15	U5BX1016	Soil	1								X							See above. The proposed sample is located approximately 10 feet northeast of the locations (XFBS16S01 and XFBS16S02) where PCBs were detected at concentrations up to 0.15 mg/kg at 1 feet bgs.
		Soil	2								H							Analysis is contingent on the results of analyses for more shallow samples.
15	U5BX1017	Soil	1								X							See above. The proposed sample is located approximately 10 feet southeast of the location (XFBS16S02) where PCBs were detected at concentrations up to 0.091 mg/kg at 1 feet bgs.
		Soil	2								H							Analysis is contingent on the results of analyses for more shallow samples.
15	U5BX1018	Soil	2								X							See above. The proposed sample is located within 5 feet of the previous sample locations (XFBS16, XFBS16S01, and XFBS16S02) where PCBs were detected at elevated concentrations at 1 foot bgs. The proposed sample will be collected from a depth of 2 feet bgs to define the vertical extent of contamination.
		Soil	3								H							Analysis is contingent on the results of analyses for more shallow samples.
16	U5BS1050	Soil	1	X	H		X		X	X								Building 4463 was used as the Sodium Pump Test Facility Motor Generator Building. No investigation has been performed to date. Soil near the centroid of the building will be screened for TPH, VOCs, SVOCs, and metals to assess potential impacts to the environment. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from U5SV1011.
		Soil	6	X	H		X		X									
		Soil	10	H	H		H		H									Analysis is contingent on the results of analyses for more shallow samples.
16	U5SV1011	Soil Vapor	5			X												See above.
		Soil Vapor	10			X												
17	U5BS1051	Soil	1	X	H		X		X	X								Building 4625 was used for Component Storage. No investigation has been performed to date. Soil near the centroid of the building will be screened for TPH, VOCs, SVOCs, and metals to assess potential impacts to the environment. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from U5SV1012.
		Soil	6	X	H		X		X									
		Soil	10	H	H		H		H									Analysis is contingent on the results of analyses for more shallow samples.
17	U5SV1012	Soil Vapor	5			X												See above.
		Soil Vapor	10			X												
18	U5BS1053	Soil	1	X	H		X		X	X	H							Building 4628 was used to store hazardous materials. No investigation has been performed. This proposed sample is located near the centroid of the building to investigate for the chemicals that were potentially stored in the building. VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from U5SV1013.
		Soil	6	X	H		X		X		H							
		Soil	10	H	H		H		H		H							Analysis is contingent on the results of analyses for more shallow samples.

TABLE 2

Proposed Samples for DOE Unaffiliated Features

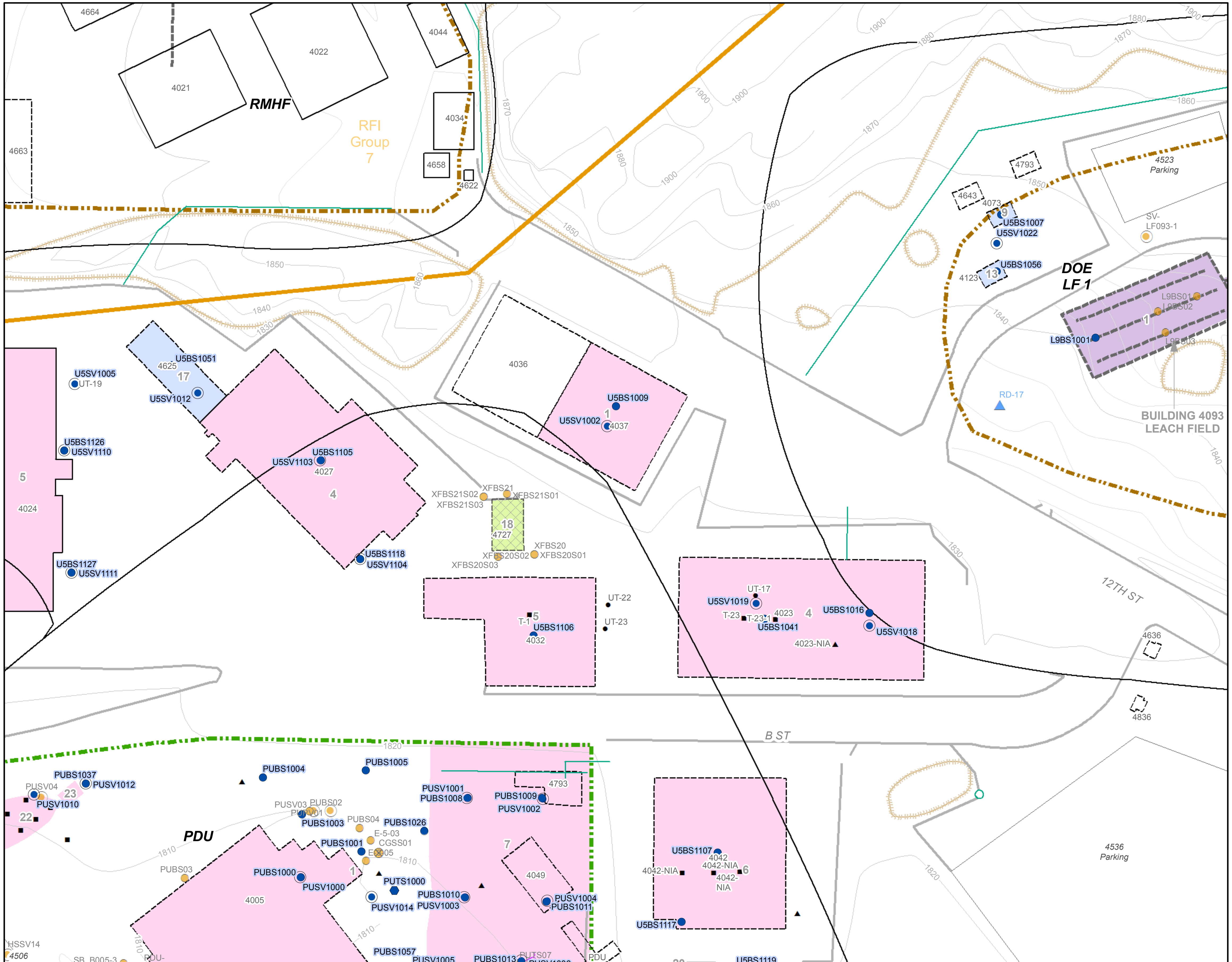
Sampling and Analysis Plan for DOE Unaffiliated Features, Group 5, Santa Susana Field Laboratory

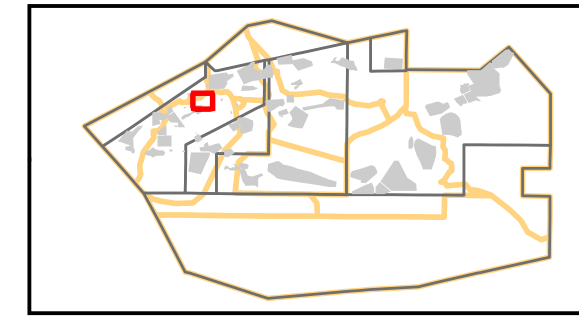
Chemical Use Area No.	Location ID	Matrix	Sample Depth (feet bgs)	Analytical Method														Rationale/Objectives
				TPH (ext.) (EPA 8015B)	VOCs (Full) (EPA 8260B)	VOCs (Soil Vapor) (EPA 8260B)	PAHs (EPA 8270C SIM)	SVOCs (EPA 8270C +TICS)	Metals (EPA 6010B/ EPA 6020)	pH (EPA 9045)	PCBs (EPA 8082)	Energetics (EPA 8330)	Hydrazine & Formaldehyde (EPA 8315A)	Perchlorate (EPA 6850)	Dioxins (EPA 1613B)	Inorganics (EPA 300.0)	Mercury (EPA 7471A)	Chromium VI (EPA 7196A)	
18	U5SV1013	Soil Vapor	5			X													See above. The proposed sample is located near the centroid of the former building to assess conditions in soil vapor beneath the former building footprint.
		Soil Vapor	10			X													
19	U5BS1005	Soil	1	X	H		X		X	X									No investigation has been performed at Building 4662 (Cleaning of small parts). Investigation will be performed to assess potential impacts to the environment. The proposed sample is located at the downslope end of the building (south of the building). VOCs will be analyzed in soil if VOCs are detected in a soil vapor sample collected from U5SV1027.
		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.
19	U5SV1027	Soil Vapor	5			X													See above.
		Soil Vapor	10			X													
19	U5BS1060	Soil	1	X	X		X		X	X									A sample is proposed near the drain of the catchment basin east of Building 4462. Sampling has not previously been performed within the catchment basin. Soil samples will be collected and screened for TPH, VOCs, SVOCs, and metals.
		Soil	6	X	X		X		X										
		Soil	10	H	X		H		H										Analysis of this sample will be contingent on the results for more shallow samples.
Total Soil Samples for Analysis				26	3		26	2	26	14	6	8	2						
Total Soil Samples on Hold				13	21		13	1	13		28	4	1						
Total Soil Vapor Samples for Analysis						20													
Total Soil Samples Collected			55																
Total Number of Locations			31																

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

Basemap Legend

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

Proposed Sampling Locations

Buildings 4037 and 4625

Date: February 20, 2008 WORKING DRAFT

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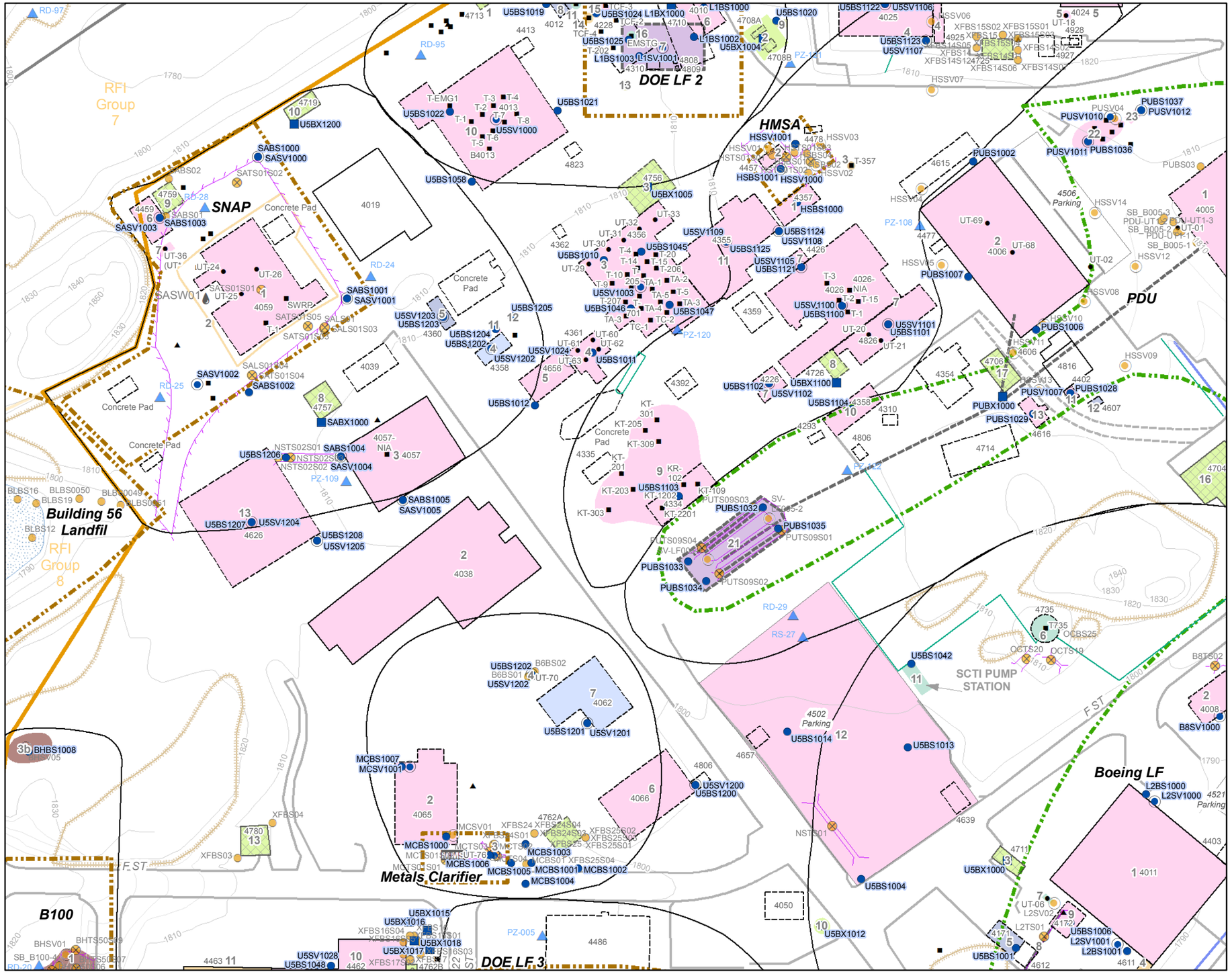
1 inch equals 60 feet

0 60 120 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

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

Buildings 4356, 4361, and 4656

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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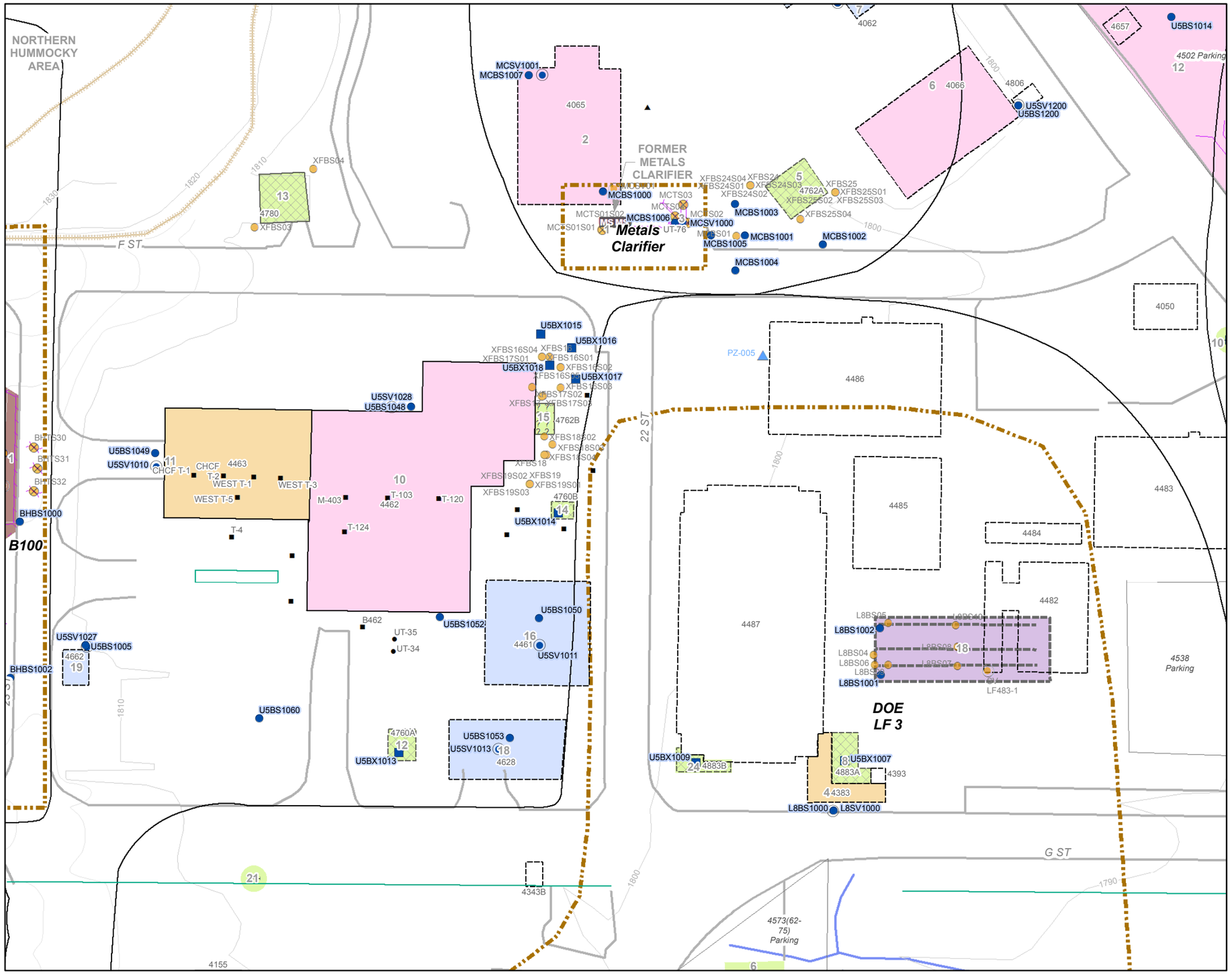
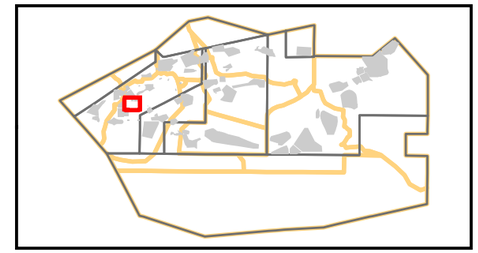
Figure 2





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

Basemap Legend

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

Proposed Sampling Locations

Buildings 4461, 4462, 4463, and 4662 and Electrical Substations 4760A, 4760B, 4762, and 4780

Date: February 20, 2008 **WORKING DRAFT**

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1 inch equals 60 feet

0 60 120 Feet

SANTA SUSANA FIELD LABORATORY

CH2MHILL

Figure 3