
SUBAREA 5D-SOUTH FSP ADDENDUM
SANTA SUSANA FIELD LABORATORY SITE
AREA IV RADIOLOGICAL STUDY

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Gregg Dempsey, Technical Advisor
DATE: September 13, 2011
SUBJECT: FSP Addendum for Subarea 5D-South
CONTRACT NO: EP-S7-05-05
TASK ORDER NO: 0038

INTRODUCTION

HydroGeoLogic, Inc. (HGL) has been tasked by the U.S. Environmental Protection Agency (USEPA) to conduct a radiological characterization study of Area IV and the Northern Buffer Zone at the Santa Susana Field Laboratory (SSFL) site in Ventura County, California. This work is being executed under USEPA Region 7 Architect and Engineering Services Contract EP-S7-05-05, Task Order 0038. The technical lead on the project is USEPA Region 9.

This document supports the field implementation of the overall soil sampling program and is an addendum to the master Field Sampling Plan (FSP) for Soil Sampling (HGL, 2010). A description of the overall project goals; data quality objectives; sampling strategy; laboratory analytical suites; sample depth interval selection; data quality control; and data evaluation are described in the FSP.

PURPOSE

This addendum documents the rationale used to determine the location and depth of soil samples to be collected during the first phase (Round 1) of soil sampling within Subarea 5D-South. Sample locations are summarized in Table 1 (Attachment 1) and illustrated on the figure provided in Attachment 2. This addendum also documents the laboratory analyses that will be performed for each soil sample, derived from the default suite from Table 2.4 of the FSP (HGL, 2010) and adding site-specific analytes to that list by location as appropriate.

It should be noted that the specific sample locations presented herein were discussed during a technical review meeting held on August 17, 2011, with members of USEPA's SSFL Technical Stakeholder group consisting of representatives of U.S. Department of Energy (DOE), the State of California Department of Toxic Substances Control (DTSC), The Boeing Company, USEPA, and the community. Recommendations and action items identified at the technical review meeting have been incorporated into this FSP Addendum.

All soil samples will be analyzed for the default suite analytes presented in Table 2.4 of the master soil sampling FSP for Soil Sampling (HGL, 2010).

Table 1 in Attachment 1 provides the location for each soil sample that will be collected in Subarea 5D-South during Round 1 of the soil sampling investigation as well as the technical justification and rationale for the selection of each sample location. Also summarized in this table is the suite of radiological analyses that will be performed on every sample, as well as other field-pertinent information including sample identification number, type, and general proximity to radiological facilities.

Figure 1 provides a map that shows the location and type (e.g. surface, subsurface, drainage) of each sample within Subarea 5D-South (Attachment 2). Table 2 below, provides a summary of sample numbers by sample type.

Table 2
Summary of Sample Numbers by Sample Type

Drainage	Surface	Subsurface	Total
2	34	38	74

Attachment 3 provides key technical information that led to the selection of sample locations, sample interval selection, and the laboratory analysis that will be performed for each sample collected. The key information includes results of geophysical surveys, gamma surface radiation surveys, results of past soil radiological investigations, and the findings summarized in the Technical Memorandum Subarea HSA-7, Subarea HSA-3, Subarea HSA-Northern Buffer Zone Historical Site Assessment (HGL, 2011).

SCHEDULE

Round 1 soil sampling within Subarea 5D-South will commence in mid September 2011, and be completed by mid December 2011. USEPA will provide periodic updates to SSFL Stakeholders regarding the status of the soil sampling program as well as the laboratory analysis and data interpretation.

REFERENCES

- HydroGeoLogic, Inc., 2010. Field Sampling Plan for Soil Sampling, Area IV Radiological Study, Santa Susana Field Laboratory Ventura County, California. October 4, 2010.
- HydroGeoLogic, Inc., 2011. Draft, Technical Memorandum, Subarea HSA-5D, Historical Site Assessment, Santa Susana Field Laboratory Area IV Radiological Study, Ventura County, California. March 28, 2011.
- State of California, Environmental Protection Agency, Department of Toxic Substances Control, 2010. Administrative Order On Consent For Remedial Action, Santa Susana Field Laboratory, Simi Hills, Ventura County, California. December 6, 2010.

LIST OF ATTACHMENTS

Attachment 1	Tables
Attachment 2	Figure 1
Attachment 3	Support Figures

ATTACHMENT 1

Table 1 Summary of Soil Sample Locations in Subarea 5D-South

Table 1
Summary of Soil Sample Locations in Subarea 5D-South

Location ID	Sample Type	Location Description	Technical Justification	Analytical Suite ¹
1	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 1T	Default
1	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 1T	Default
2	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 2T	Default
2	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 2T	Default
3	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 3T	Default
3	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 3T	Default
4	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 4T	Default
4	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 4T	Default
5	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 5T	Default
5	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 5T	Default
6	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 6T	Default
6	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 6T	Default
7	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 7T	Default
7	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 7T	Default
8	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 8T	Default
8	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 8T	Default
9	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 9T	Default
9	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 9T	Default
10	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 10T	Default
10	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 10T	Default
11	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 11T	Default
11	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 11T	Default
12	Surface	Southeastern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 12T	Default
12	Subsurface	Southeastern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 12T	Default
13	Surface	Southeastern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 12T	Default
13	Subsurface	Southeastern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 12T	Default
14	Surface	Southeastern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 12T	Default
14	Subsurface	Southeastern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 12T	Default
15	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 12T	Default
15	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 12T	Default
16	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 11T	Default
16	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 11T	Default
17	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 11T	Default
17	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 11T	Default

Table 1
Summary of Soil Sample Locations in Subarea 5D-South

Location ID	Sample Type	Location Description	Technical Justification	Analytical Suite ¹
18	Surface	Southern portion of Subarea 5D-South	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 10T	Default
18	Subsurface	Southern portion of Subarea 5D-South	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 10T	Default
19	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 8T	Default
19	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 8T	Default
20	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 6T	Default
20	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 6T	Default
21	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 5T	Default
21	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 5T	Default
22	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 4T	Default
22	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 4T	Default
23	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 3T	Default
23	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 3T	Default
24	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 3T	Default
24	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 3T	Default
25	Surface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 1T	Default
25	Subsurface	Southern portion of Subarea 5D-South.	Gamma scanning results show a potential gamma radiation anomaly - PGRAY 1T	Default
26	Surface	Southern portion of Subarea 5D-South, near next to the water tower.	Potential contamination from alternate uses of the vertical tank.	Default
26	Subsurface	Southern portion of Subarea 5D-South, near next to the water tower.	Potential contamination from alternate uses of the vertical tank.	Default
27	Surface	Southern portion of Subarea 5D-South.	Potential contamination from alternate use of vertical tank.	Default
27	Subsurface	Southern portion of Subarea 5D-South.	Potential contamination from alternate use of vertical tank.	Default
28	Surface	Southern portion of Subarea 5D-South, next to Tank 4702.	Potential contamination from alternate use of vertical Tank 4702.	Default
28	Subsurface	Southern portion of Subarea 5D-South, next to Tank 4702.	Potential contamination from alternate use of vertical Tank 4702.	Default
29	Surface	Southern portion of Subarea 5D-South.	Potential contamination from leaking above ground pipes.	Default
29	Subsurface	Southern portion of Subarea 5D-South.	Potential contamination from leaking above ground pipes.	Default
30	Drainage	Southern portion of Subarea 5D-South, down gradient from the vertical Tanks 4701 and 4702.	Potential contamination from surface water run-off from the vertical Tanks 4701 and 4702.	Default
31	Surface	Southern portion of Subarea 5D-South, next to above ground piping.	Potential contamination from leaking above ground piping associated with vertical Tanks 4701 and 4702.	Default
31	Subsurface	Southern portion of Subarea 5D-South, next to above ground piping.	Potential contamination from leaking above ground piping associated with vertical Tanks 4701 and 4702.	Default
32	Drainage	Southern portion of Subarea 5D-South, in drainage down gradient from vertical Tanks 4701 and 4702.	Potential contamination from vertical Tanks 4701 and 4702.	Default
33	Surface	Southern portion of Subarea 5D-South.	Geophysical Feature, "Conductivity Anomaly".	Default
33	Subsurface	Southern portion of Subarea 5D-South.	Geophysical Feature, "Conductivity Anomaly".	Default
34	Surface	Southern portion of SubArea 5D. Borrow Pit Area.	Geophysical Feature, "Conductivity Anomaly".	Default
34	Subsurface	Southern portion of SubArea 5D. Borrow Pit Area.	Geophysical Feature, "Conductivity Anomaly".	Default
35	Subsurface	Southern portion of SubArea 5D Borrow Pit Area.	Aerial Photo Feature - Grading Activity".	Default

Table 1
Summary of Soil Sample Locations in Subarea 5D-South

Location ID	Sample Type	Location Description	Technical Justification	Analytical Suite ¹
36	Subsurface	Sothern portion of Subarea 5D-South, Borrow Pit Area.	Aerial Photo Feature, "Grading Activity". Geophysical Feature, "Conductivity Anomaly".	Default
37	Subsurface	Southeastern portion of Subarea 5D-South, Borrow Pit area.	Aerial Photo Feature, "Grading Activity ". Geophysical Feature, "Conductivity Anomaly".	Default
38	Surface	Southern portion of SubArea 5D-South, Borrow Pit Area.	Aerial Photo Feature, "Grading Activity".	Default
38	Subsurface	Southern portion of SubArea 5D-South, Borrow Pit Area.	Aerial Photo Feature, "Grading Activity".	Default
39	Subsurface	Southern portion of Subarea 5D-South.	Geophysical Feature, "Magnetometer Anomaly".	Default
40	Surface	Northeastern corner of Subarea 5D-South.	Gamma scanning survey results indicate slightly elevated gamma readings.	Default
40	Subsurface	Northeastern corner of Subarea 5D-South.	Gamma scanning survey results indicate slightly elevated gamma readings.	Default

Notes:

¹ Default suite includes the radionuclide analysis shown in Table 2.4 of the Field Sampling Plan for Soil Sampling (HGL, 2010a). All samples will be tested for the default suite of analytes.

PGRAY - potential gamma radiation anomaly

ATTACHMENT 2

Figure 1 Subarea 5D-South Sample Locations

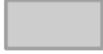
Figure 1
Subarea 5DS Sample Locations
Santa Susana Field Laboratory

U.S. EPA Region 9

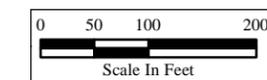


Legend

Buildings:

-  Demolished
-  Existing Water Tanks
-  Subarea 5DS

-  Subsurface Sample
-  Surface and Subsurface Sample
-  Drainage Sample

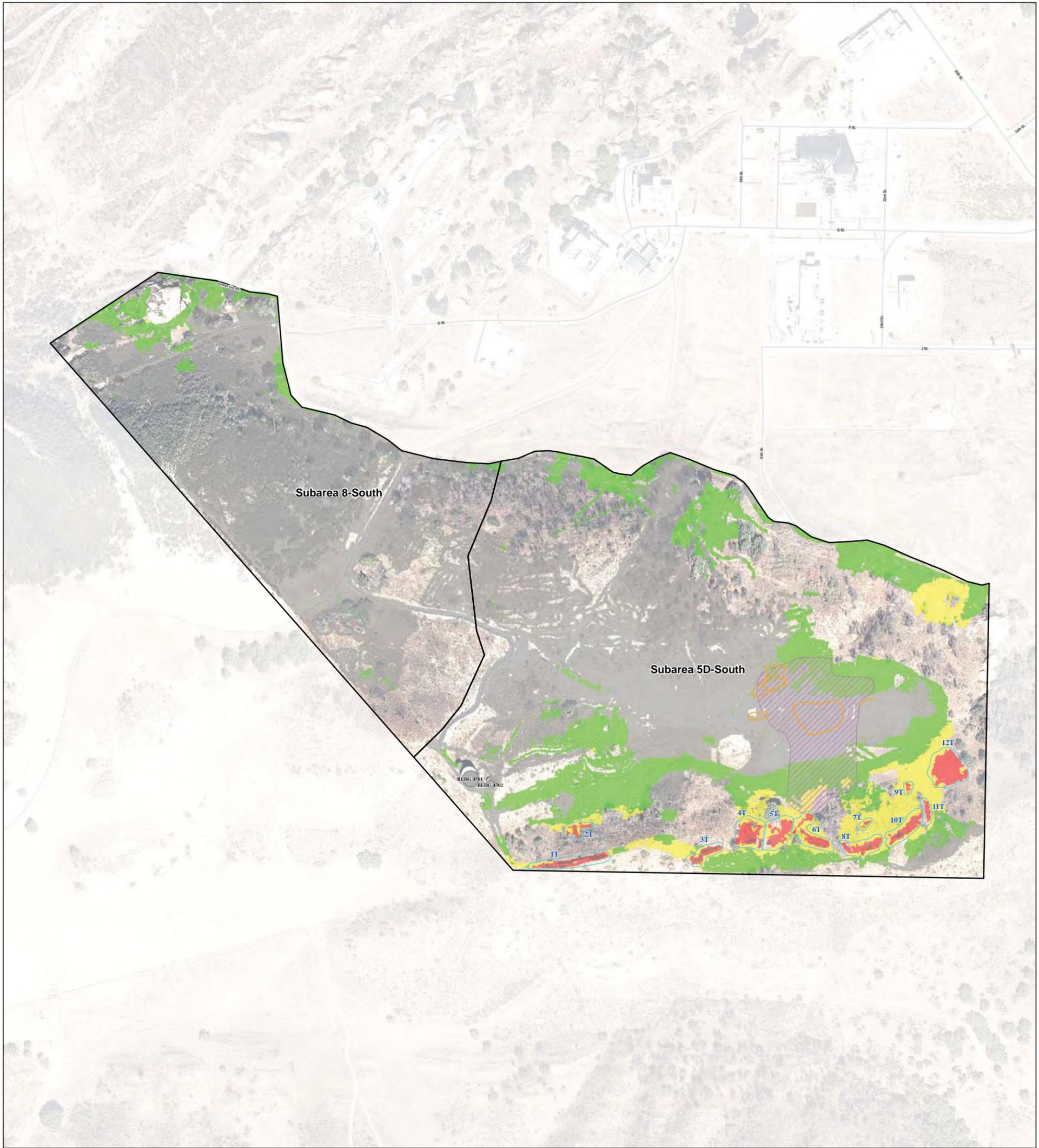


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(1)ProposedSampleLocations_11x17_5DS.mxd
8/30/2011 pbillock
Source:HGL2010, CIRGIS 2007



ATTACHMENT 3

Gamma Anomalies Static Count Subarea 5D-South and 8 South
Geophysical Anomalies Subarea 5D-South
Past Radiological Soil Investigations Subarea 5D-South
Plate 1 Subarea HSA-5D



Legend

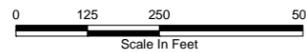
- PGRAY Boundary
- SubArea 5D South and 8 South Boundary
- Geophysical Anomalies
- HSA

Buildings

- DEMOLISHED
- EXISTING

Centerline Roads

- PRIMARY ROADS
- SECONDARY ROADS
- TERTIARY ROADS



**Gamma Anomalies
Static Count
Subarea 5D South and 8 South
Santa Susana Field Laboratory**

U.S. EPA Region 9



Path: g:\epa-09\Geophysical_Anomalies\EP9038\Gamma-counting\SubArea_5D_South_8_South_HSA_Geophysical_Gamma_Static_Count_20101026.mxd
Project: EP9038
Edited: 05/18/11 PL
Source: Boeing Company, 2008
CIRGIS, 2007





Legend

Subarea 5D South Groups

- Centerline Roads**
- Primary Roads
 - Secondary Roads
 - Tertiary Roads

- Buildings**
- Demolished
 - Existing

Magnetometer Anomaly Area

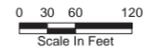
- Geophysical Anomalies**
- Terrain Conductivity
 - Magnetometer
 - Ground Penetrating Radar
 - Cut and Fill Boundaries
 - Magnetometer Anomaly Linear
 - Terrian Conductivity Anomaly Linear
 - Ground Penetrating Radar
 - Interpreted Drain Remnant
 - Buried Metals

- Surface Water**
- Intermittent Stream
 - Permanent Stream
 - Surface Water
 - Lined Channel

- Surface Water Flow**
- Surface Water Flow (From Boeing Database, 2008)

- Surface Features**
- Channel
 - Drain
 - Drain
 - Drainage Divide
 - Gutter
 - Tank
 - Tank
 - Vault
 - Well

- Utilities**
- Gas
 - Storm Drain
 - Sanitary Sewer
 - Water
 - Water (Removed)
 - Water (Removed)
 - Pipes (Unknown Type)
 - Pipes (Unknown Type)



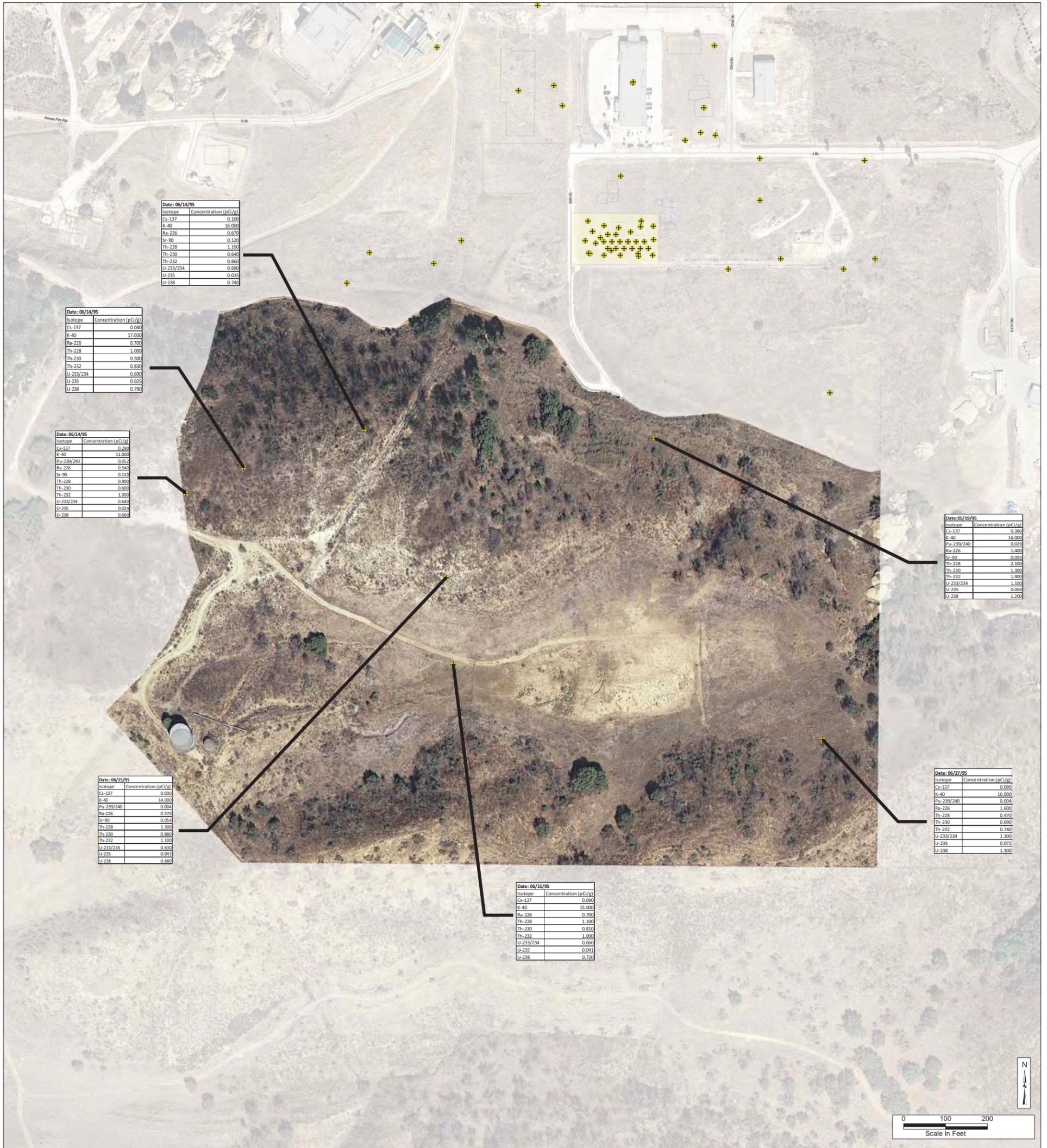
**Geophysical Anomalies
Subarea 5D South
Santa Susana Field Laboratory**

U.S. EPA Region 9



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Source:HGL 2010, CHGIS 2007
Coordinate System: NAD83 CA State Plane V





Legend

RAD Soil Location

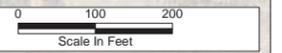
- + Above NDA
- + Below NDA
- ScreenLayer
- Subarea 5D Groups
- Primary Roads
- Secondary Roads
- Tertiary Roads
- Demolished
- Existing

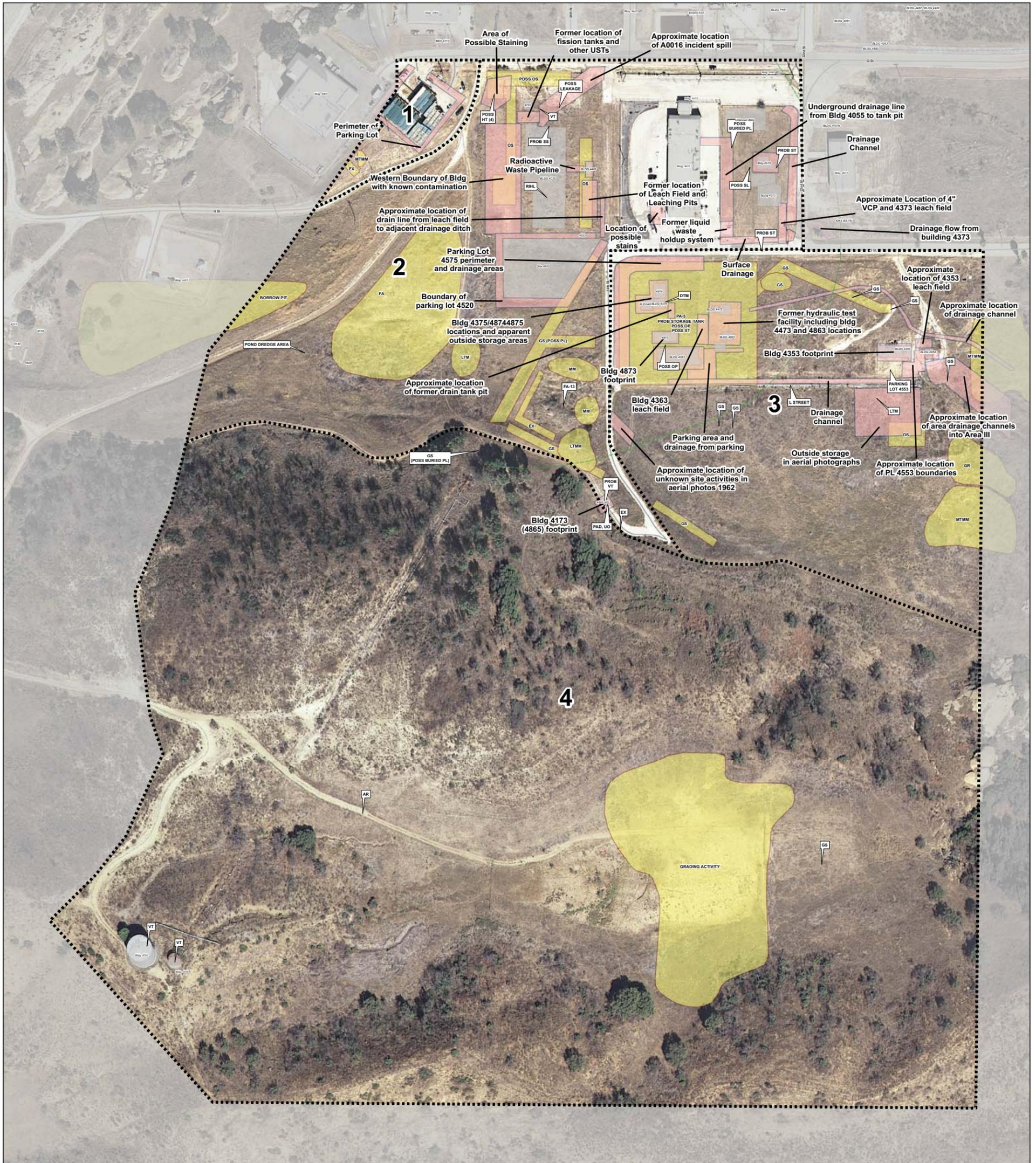
**Past Radiological Soil Investigations
Subarea 5D South
Santa Susana Field Laboratory**

U.S. EPA Region 9



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7/14/2011 sdmllos-lopecky
Source:HGL 2010, CIRGIS 2007





Legend																																																						
Subarea 5D Groups	Tanks	Aerial Photography Data	Surface Features	Aerial Photography Descriptors																																																		
Centerline Roads	<ul style="list-style-type: none"> Above ground Storage Tank Underground Storage Tank Unknown Tank Type French Drain Holding Tank Sump Dry Well Tank Footprint Drain Well French Drain Drainage Leach Field Septic System 	<ul style="list-style-type: none"> Aerial Photography Features Proposed Sampling Locations 	<ul style="list-style-type: none"> Channel Drain Drainage Divide Gutter Tank Vault Well 	<table border="0"> <tr><td>Type</td><td>Description</td></tr> <tr><td>B</td><td>Building</td></tr> <tr><td>CONT</td><td>Container</td></tr> <tr><td>CR</td><td>Crates</td></tr> <tr><td>DB</td><td>Debris</td></tr> <tr><td>DG</td><td>Disturbed Ground</td></tr> <tr><td>DTM</td><td>Dark Tone Material</td></tr> <tr><td>EX</td><td>Excavation</td></tr> <tr><td>FA</td><td>Fill Area</td></tr> <tr><td>GS</td><td>Ground Scar</td></tr> <tr><td>HT</td><td>Horizontal Tank</td></tr> <tr><td>IM</td><td>Impoundment</td></tr> <tr><td>LTMM</td><td>Light Toned Mounded Material</td></tr> <tr><td>MTMM</td><td>Medium Toned Mounded Material</td></tr> <tr><td>OS</td><td>Open Storage</td></tr> <tr><td>PA</td><td>Processing Area</td></tr> <tr><td>PL</td><td>Pipeline</td></tr> <tr><td>POSS</td><td>Possible</td></tr> <tr><td>PROB</td><td>Probable</td></tr> <tr><td>SS</td><td>Smoke Stack</td></tr> <tr><td>ST</td><td>Stain</td></tr> <tr><td>S-T</td><td>Storage Tank</td></tr> <tr><td>UO</td><td>Unidentified Object</td></tr> <tr><td>VT</td><td>Vertical Tank</td></tr> <tr><td>WDA</td><td>Waste Disposal Area</td></tr> </table>	Type	Description	B	Building	CONT	Container	CR	Crates	DB	Debris	DG	Disturbed Ground	DTM	Dark Tone Material	EX	Excavation	FA	Fill Area	GS	Ground Scar	HT	Horizontal Tank	IM	Impoundment	LTMM	Light Toned Mounded Material	MTMM	Medium Toned Mounded Material	OS	Open Storage	PA	Processing Area	PL	Pipeline	POSS	Possible	PROB	Probable	SS	Smoke Stack	ST	Stain	S-T	Storage Tank	UO	Unidentified Object	VT	Vertical Tank	WDA	Waste Disposal Area
Type	Description																																																					
B	Building																																																					
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HT	Horizontal Tank																																																					
IM	Impoundment																																																					
LTMM	Light Toned Mounded Material																																																					
MTMM	Medium Toned Mounded Material																																																					
OS	Open Storage																																																					
PA	Processing Area																																																					
PL	Pipeline																																																					
POSS	Possible																																																					
PROB	Probable																																																					
SS	Smoke Stack																																																					
ST	Stain																																																					
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UO	Unidentified Object																																																					
VT	Vertical Tank																																																					
WDA	Waste Disposal Area																																																					
Buildings	Utilities																																																					
<ul style="list-style-type: none"> Demolished Existing Parking Lots 	<ul style="list-style-type: none"> Gas Storm Drain Sanitary Sewer Sanitary Waste Water Water (Removed) 																																																					
Surface Water																																																						
<ul style="list-style-type: none"> Intermittent Stream Permanent Stream Surface Water Lined Channel 																																																						

Historical Site Assessment
Draft Technical Memorandum - HSA-5D

Plate 1 Subarea HSA-5D Santa Susana Field Laboratory

U.S. EPA Region 9

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 7/21/2011 gmsen