Addendum No. 8 to
Master Field Sampling Plan for Chemical Data Gap Investigation
Phase 3 Soil Chemical Sampling at Area IV
Santa Susana Field Laboratory
Ventura County, California

Subarea 5D

Prepared for:

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Master Field Sampling Plan for Chemical Data Gap Investigation
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Subarea 5D

Contract DE-EM0001128
CDM Smith Task Order DE-DT0003515

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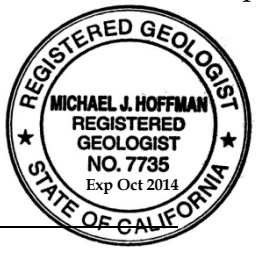
Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete."



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Introduction

This document supports implementation of the soil sampling program described in the *Work Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California* (Phase 3 Work Plan, CDM Smith 2012a). The Phase 3 Work Plan contains four appendices. Appendix A is the *Master Field Sampling Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California* (Master FSP, CDM Smith 2012b). Appendix B is the *Quality Assurance Project Plan, Chemical Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California* (Phase 3 QAPP, CDM Smith 2012c). Appendix C is the *Worker Health and Safety Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California* (Safety Plan, CDM Smith 2012d). And Appendix D of the Phase 3 Work Plan provides the Standard Operating Procedures (SOPs) (Phase 3 SOPs, CDM Smith 2012e) describing the details of sampling activities and sample management at SSFL.

The Master FSP addresses soil sampling within Area IV and the Northern Buffer Zone of the Santa Susana Field Laboratory (SSFL) as required under the *Administrative Order on Consent for Remedial Action* (Docket Number HSA-CO 10/11-037) (AOC) signed by the California Department of Toxic Substances Control (DTSC) and the Department of Energy (DOE). For all samples collected at locations within Subarea 5D, the Master FSP and the SSFL SOPs dictate the procedures pertaining to:

- locating and verifying sampling points
- surface soil sampling techniques
- subsurface soil sampling techniques using a direct push technology (DPT) rig and a hand auger and slide hammer for those locations not accessible by the DPT rig
- sampling of test pits
- sample handling and shipping
- analytical, quality control, and data review
- instrument calibration and maintenance

The AOC between DTSC and DOE was signed on December 6, 2010. The AOC is a legally binding order that describes the characterization of Area IV and Northern Buffer Zone soils/sediments and further defines DOE's obligations in relation to radiologic and chemical cleanup of soils within these areas. It stipulates that during Phase 1 of the chemical investigation activities, DOE was to analyze a soil sample for chemical constituents at locations where EPA collected a sample for radiological analysis. Phase 1 co-located sampling with EPA in Subarea 5D was completed during

two EPA sampling periods. Soil and sediment samples were collected with EPA within Subarea 5D North during May, June, and August 2011. Soil and sediment samples were collected within Subarea 5D South September and December, 2011. Phase 2 (random co-located sampling with EPA in the Northern Buffer Zone) was conducted in March and April 2011.

Phase 3 of the AOC is the data gap analysis, which includes an assessment of data adequacy using the data collected under the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) program, the results of co-located soil samples collected during Phase 1 of the AOC, and multiple lines of evidence as described in the Phase 3 Work Plan (CDM 2012a). The purpose of the data gap analysis is to identify additional soil chemical data needed to support the Soil Remedial Action Implementation Plan for Area IV. The sampling that will be performed under this FSP Addendum is based on the results of the data gap analysis.

The Phase 3 sampling within Subarea 5D is governed by the Phase 3 Work Plan and its elements including the Master FSP, the QAPP, Safety Plan, and the Phase 3 SSFL SOPs. These documents are incorporated into this FSP Addendum by reference.

Purpose of FSP Addendum

This FSP Addendum addresses Phase 3 sampling in Subarea 5D. Figure 1 of this document illustrates the location of Subarea 5D within Area IV of SSFL. The rationale for sample location and chemical analytes is provided in the document *Subarea 5D Phase 3 Data Gap Analysis Technical Memorandum, Santa Susana Field Laboratory, Ventura County, California* (MWH 2013[1]) (*Subarea 5D Data Gap TM*). The *Subarea 5D Data Gap TM* is included as Attachment 1 to this FSP Addendum. It illustrates the proposed sample locations and includes Table 1, which provides the sampling rationale for each location. Figures 1 and 2 of the *Subarea 5D Data Gap TM* (MWH 2013) provide the proposed soil sample locations in Subarea 5D. Soil sample locations were identified during data gap analysis as well as from public comments received during the recent Subarea 5D Data Gap Investigation public meeting. Attachment 2 (Table F Subarea 5D Field Tracker) to this Subarea 5D FSP Addendum provides additional information beyond the rationale in Table 1 of the *Subarea 5D Data Gap TM* for sample locations that target specific field conditions. These include natural drainage pathways, edge of fill material, addressing subsurface anomalies (potential buried materials), and potential releases from lined man-made drainages. Information on specific field conditions and sample locations will be necessary as part of sample point staking and soil collection.

For Subarea 5d, surface, subsurface and test pit soil samples will be collected. For surface soil samples, only the top 6-inches of soil (surface soil) will be collected. The

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[1] MWH prepared this Technical Memorandum under contract with The Boeing Company, which is under direct contract with DOE. Through this contractual relationship and under the regulatory oversight of DTSC, MWH has represented DOE in conducting the Chemical Data Gap Analysis and in the preparation of this Technical Memorandum.

majority of sample locations will involve collection of subsurface samples. A direct push technology (DPT) rig will be used to sample subsurface soil at all locations except those inaccessible due to terrain constraints. Borings located in areas inaccessible to the DPT rig will be sampled using a hand auger and slide hammer as described in Phase 3 SSFL SOP 3. All borings will be drilled to the target depth specified in Table 1 of the *Subarea 5D Data Gap TM.* The cores will be visually inspected and monitored with field instruments for the presence of contamination, including discoloration, debris, and fill. Soil samples will be targeted where contamination is evident.

Tests pits will be excavated using a back hoe directed by MWH. A CDM Smith geologist and sampler will collect soil from test pit sidewalls or from the back-hoe bucket per Phase 3 SSFL SOP 5. A CDM Smith sample coordinator will be responsible for sample preparation and shipment to an analytical laboratory under contract with CDM Smith.

CDM Smith will be responsible for the hand auger and DPT rig sampling aspects of the field sampling program under Phase 3 of the AOC. This includes locating in the field the sample locations selected during the data gap investigation and that were initially generated and displayed electronically using Geographic Information System (GIS) coordinates. The GIS coordinates are downloaded into a Geographic Positioning System (GPS) unit for physically locating the samples in the field. SSFL SOP 1 provides the process for verifying that the sample locations initially identified by GIS review reflect the targeted feature described in Table 1 and are consistent with the GPS coordinates generated in the field. If necessary the sample location will be adjusted in the field so that the targeted feature is sampled. Adjusted and all final sample location coordinates will be provided back to the GIS managers so that the GIS database can be updated.

CDM Smith will be responsible for the physical collection of all samples per the procedures and controls specified in the Master FSP. CDM Smith personnel will be responsible for the sample container preparation, sample handling and documentation, sample shipment, laboratory coordination, chemical analyses of the samples, and chemical data review. Soil samples collected by CDM Smith will be analyzed for chemical analytes identified in Table 1 of the *Subarea 5D Data Gap TM* (MWH 2013). Analytical methods and quality control criteria to be used are stipulated in Table 8-3 (Quality Control Objectives for Analytical Methods) of the QAPP (CDM Smith 2012c) and Table 6-1 (Analytical Methods, Containers, Preservatives, and Holding Times) of the Master FSP (CDM Smith 2012b).

Table 1 of the *Subarea 5D Data Gap TM* also identifies proposed target depths for sample collection. Samples will also be collected from depth intervals (until refusal) that exhibit evidence of staining, odor, debris, or photoionization detector (PID) readings above background.

This FSP Addendum addresses the collection of surface soil and subsurface soil to the bedrock interface using hand augers and the DPT rig by CDM Smith. The digging of

trenches or test pits will be coordinated with MWH, The sampling of soil gas or other media will be addressed in future sampling plans.

Sample Analytes

Table 1 of the *Subarea 5D Data Gap TM* (MWH 2013) provides the chemical analyses (analytes) for each sample proposed for collection under this FSP Addendum and the respective rationale for sample location and chemical analyses. The chemical analyses by location were identified through the data gap investigation process.

Field Locating Soil Sample Locations

CDM Smith will be responsible for determining the precise position of soil sample locations in the field in accordance with SSFL SOP 1. At the same time, each sample location will also be cleared for buried utilities, and assessing the presence of cultural and biological resources for their protection.

Surface Soil Sampling

Surface soil samples will be collected at each location as proposed in Table 1. Surface soil samples will be collected in accordance with SSFL SOP 2. A slide hammer with stainless steel sleeve will be used to collect the soil sample to be analyzed for semi-volatile organic compounds and polychlorinated biphenyls. Volatile organic compounds and total petroleum hydrocarbon samples will be collected using Encore samplers. Soil for all other sample analytes will be place in one or more glass jars.

Subsurface Soil Sampling

Subsurface soil samples will be collected primarily through the use of a DPT rig. SSFL SOP 4 describes the DPT sampling procedures. Sampling will be conducted through the use of 5-foot long acetate sleeves placed within the DPT sampling tool. All cores will be screened using a PID instrument for volatiles and a Micro R gamma detection instrument and a dual phosphor alpha/beta detection instrument (SSFL SOPs 6 and 7, respectively). Soil samples will be collected at the depths specified in Table 1 of the *Subarea 5D Data Gap TM* (MWH 2013) and/or at locations where instrument readings, soil staining, or evidence of debris is observed.

To determine depth of contamination at locations where prior data indicates contamination at the surface but depth has not been defined, the core will be divided into one-foot long samples and with the sample depth intervals identified in Table 1 prepared for shipment to the laboratory. Table 1 also identifies the chemical analyses proposed for each depth interval.

There will be proposed sampling locations that the DPT rig will not be able to access. At those locations, subsurface samples will be collected using a hand auger to access the sample depth and a slide hammer sampler with stainless steel sleeves will be used to collect the actual sample. SSFL SOP 3 describes the hand auger sampling procedure.

The soil logging of all surface and subsurface samples will be conducted following SSFL SOP 9.

Test Pit Soil Sampling

Tests pits will be excavated using a back hoe directed by MWH. A CDM Smith geologist and sampler will collect soil from test pit sidewalls or from the back-hoe bucket per Phase 3 SSFL SOP 5. The geologist will be responsible for logging the test pit and describing soil samples. A CDM Smith sample coordinator will be responsible for sample preparation and shipment to an analytical laboratory under contract with CDM Smith. Test pit sampling will occur as part of an Area IV sampling event involving most Subareas.

Sampling of Locations with Sustained Instrument Readings, Odor, or Staining

For any locations where PID instrument readings remain above measured background readings, there is an odor, or the soil appears to be stained with hydrocarbons, samples will be collected at the sample depth interval and analyzed for VOCs, 1,4-dioxane, and total petroleum hydrocarbons-gasoline range organics (TPH-GRO) using Encore samplers, in addition to the target analytes specified in Table 1 of the *Subarea 5D Data Gap TM*. Any sustained instrument readings above background (PID, Micro R gamma detection, and dual phosphor alpha/beta detection instruments) will be immediately reported to DOE by the CDM Smith Field Team Leader and DOE will contact Boeing with this information in accordance with the Worker Health and Safety Plan requirements. The monitoring instruments will be operated per SSFL SOPs 6 (volatile organics) and 7 (radiation).

Decontamination of Sampling Equipment

Equipment that comes in contact with sample material will be decontaminated per SSFL SOP 12. Investigation derived waste will be handled per SSFL SOP 13.

Sample Handling, Recording, and Shipment

SSFL SOPs 10 and 11 describe the sample custody, handling, information recording, preservation, and shipping procedures. Any photographic documentation of sampling activities will be performed per SSFL SOP 15.

Instrument Calibration and Maintenance

All instruments used to screen samples for volatile organics and radioactivity will be calibrated and maintained per SSFL SOP 16.

Laboratory Sample Preparation (Homogenization)

Soil samples intended for chemical analyses of non-volatile and non-semivolatile constituents (e.g. metals, PCBs, and dioxins) will be homogenized by the analytical laboratory in the laboratory in accordance with SSFL SOP 17.

Geophysical Survey

The *Subarea 5D Data Gap TM* Figure 3 identifies a geophysical survey to be conducted near the northeastern corner of Subarea 5D. The survey will be conducted in accordance with SSFL SOP 14. The geophysical survey will be conducted with remaining geophysical surveys, as identified during the final data gap review currently in progress.

Schedule

Soil sampling activities under this FSP Addendum will most likely start the week of August 19, 2013, following DTSC approval of this Subarea 5D FSP Addendum, which will involve locating and staking of proposed sample locations and conducting utilities clearances. Surface soil sampling will start August 26, and subsurface soil borings (hand-auger and DPT) will start by September 3. It is anticipated that 40 surface samples, 32 shallow hand auger samples, and 32 DPT boring samples will be collected each week. The digging and sampling of test pits is scheduled for early fall 2013.

References

CDM Smith. 2012a. *Work Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California.* April.

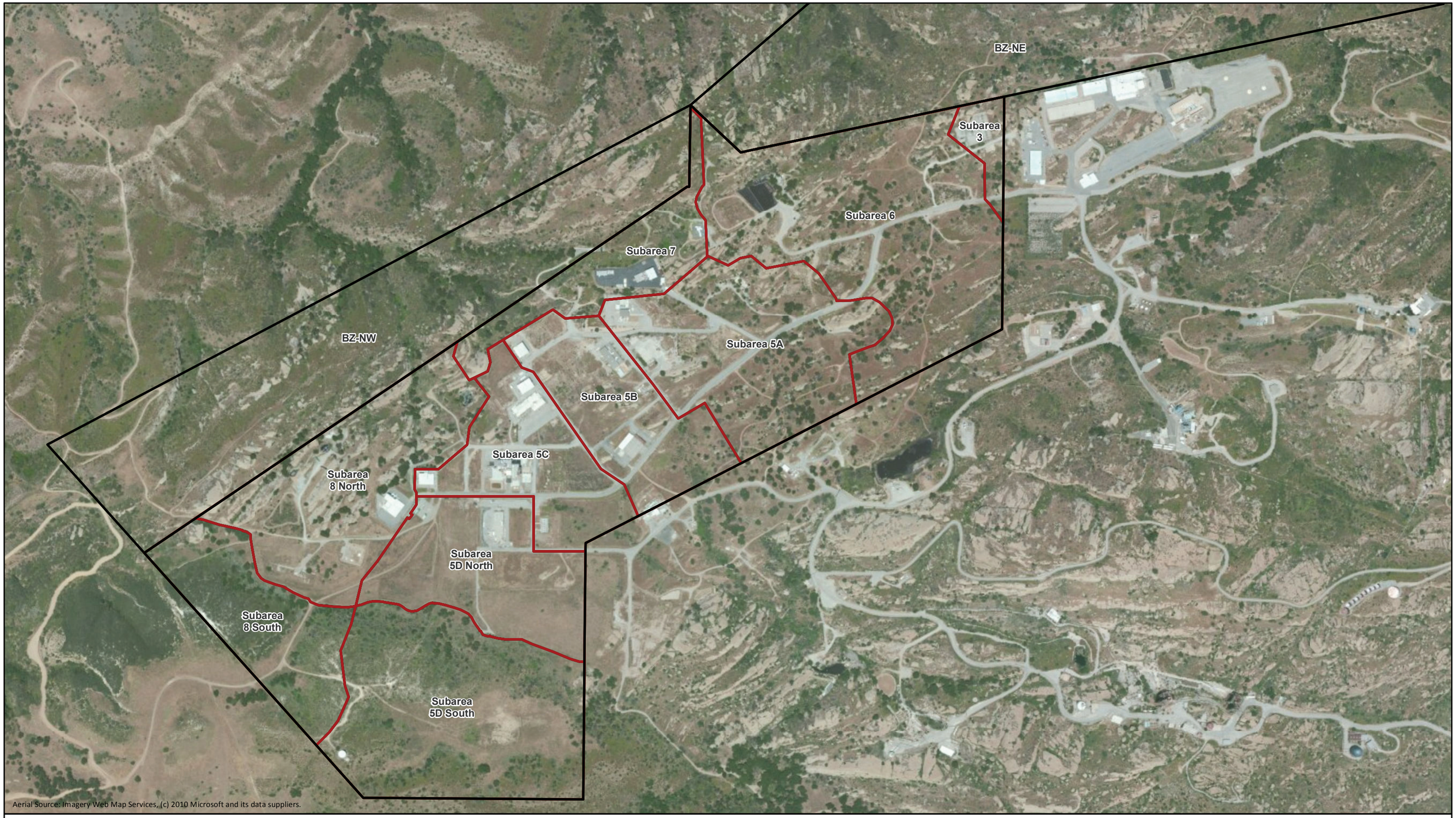
CDM Smith. 2012b. *Master Field Sampling Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California.* April.

CDM Smith. 2012c. *Quality Assurance Project Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California.* April.

CDM Smith. 2012d. *Worker Health and Safety Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California.* April.

CDM Smith. 2012e. *Standard Operating Procedures*.

MWH 2013. *Subarea 5D Phase 3 Data Gap Analysis Technical Memorandum Santa Susana Field Laboratory, Ventura County, California.* August.



Aerial Source: Imagery Web Map Services, (c) 2010 Microsoft and its data suppliers.

Legend

Area IV & Northern Buffer Zone

Area IV Subarea

Subarea Designations
Area IV

0 300 600 1,200 Feet

Santa Susana Field Laboratory
Ventura County, California
Figure 1

CDM Smith

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Attachment 1

Subarea 5D Phase 3 Data Gap Analysis Technical Memorandum, Santa Susana Field Laboratory, Ventura County, (MWH 2013)

SUBAREA 5D PHASE 3 DATA GAP ANALYSIS
TECHNICAL MEMORANDUM
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Prepared For:

THE UNITED STATES DEPARTMENT OF ENERGY

Prepared By:

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August 2013

"I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete."

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ACRONYMS AND ABBREVIATIONS

AOC	Administrative Order on Consent
BTV	background threshold value
DOE	Department of Energy
DQO	Data Quality Objective
DTSC	Department of Toxic Substances Control
EPA	Environmental Protection Agency
GIS	geographic information system
HGL	Hydrogeologic, Inc.
HSA	historical site assessment
ISL	interim screening level
LUT	Look-Up Table
MFSP	Master Field Sampling Plan
MRL	method reporting limit
MWH	MWH Americas, Inc.
NDMA	n-nitrosodimethylamine
NBZ	Northern Buffer Zone
PAH	polyaromatic hydrocarbon
PCB	polycyclic biphenyls
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SSFL	Santa Susana Field Laboratory
TM	technical memorandum
TPH	total petroleum hydrocarbon
VOC	volatile organic compound

1.0 INTRODUCTION

This technical memorandum (TM) has been prepared to describe the chemical data gap analysis performed by MWH Americas, Inc. (MWH) for the U.S. Department of Energy (DOE) for Subarea 5D within Area IV and the Northern Buffer Zone (NBZ) at the Santa Susana Field Laboratory (SSFL). The chemical data gap analysis was performed in compliance with the Administrative Order on Consent (AOC) for Remedial Action (AOC; Docket No. HSA-CO 10/11 - 037), and serves as the basis for the Phase 3 data gap investigation being performed in Subarea 5D within Area IV by DOE and implemented by CDM Smith, a contractor to DOE. This Data Gap TM is included as an appendix to the Master Field Sampling Plan (MFSP) Addendum for Subarea 5D prepared by CDM Smith for review and approval by the California Environmental Protection Agency Department of Toxic Substances Control (DTSC).

Information provided in this data gap TM describes the overall background and approach for the chemical data gap analysis and investigation, followed by a description of specific application of the data gap analysis approach or unique circumstances within Subarea 5D.

2.0 DATA GAP ANALYSIS PROCESS

The AOC requires a chemical data gap investigation to identify locations within Area IV, the NBZ, or contiguous areas where additional chemical investigation is necessary. Per the AOC (Section 2.5.3.2):

> "In determining the scope, DOE and DTSC shall evaluate the results from the Phase 1 Co-Located sampling effort, the results from the Phase 2 Co-Located sampling effort[1], the results of the U.S. EPA's radiological survey and characterization efforts, the data and information presented in the previous RFI reports and RFI work plans, and any available historical Site data. This scoping effort shall be used to determine the locations at the Site where insufficient chemical data exists and additional chemical investigation is necessary."

This TM describes the data evaluation process that has been used to identify chemical data gaps. Data gaps exist where more information is needed for DTSC and DOE to make remedial planning decisions, (i.e., whether soil contamination exists, and if so, to what extent). The data gap analysis approach was developed using the U.S. Environmental Protection Agency's (EPA's) seven-step Data Quality Objective (DQO) process that presents a systematic approach to identify chemical sampling needs, address existing data gaps, and obtain environmental data and information required for future remedial planning. The Phase 3 chemical data gap investigation

[1] According to the AOC, the Phase 2 random sampling is to be conducted with EPA. EPA has completed random sampling within the NBZ. The data gap analysis will use the results from Phase 2 sampling within the NBZ to assess additional sampling for that area.

DQOs are the framework for the analysis described in this TM and are presented in Section 4.0 of the MFSP (CDM Smith, 2012b).

The Phase 3 data gap analysis is an iterative process. In data gap evaluations for prior Subareas (5C, 5B, 5A, 6/3, and 7), data were compared with the interim screening levels (ISLs) developed for evaluation of available data (see Master Phase 3 Work Plan Table 2-1, CDM Smith, 2012a) since DTSC had not yet established Chemical Look-Up Table (LUT) values. The ISLs were developed jointly by DTSC and DOE, and reflect the 2005 background soil concentrations for metals and dioxins, and analytical reporting limits for chemicals not having a background value.

In June 2013, DTSC issued the revised Chemical LUT values for the chemicals most frequently detected within Area IV, including all background constituents and additional chemicals of interest to DTSC. DTSC indicated that a second part of the Chemical LUT will be issued during summer 2013, and would reflect required Method Reporting Limits (MRLs) for the remaining chemicals being investigated at the site. Since the DTSC Chemical LUT values are now available for the most frequently detected chemicals in Area IV, and because these values provide the AOC standard for remediation, the newly issued LUT values are being used for Phase 3 data gap analysis, including Subarea 5D presented in this TM. Since the second part of the Look-Up Table has not yet been issued by DTSC, MRLs achievable by several analytical laboratories, similar to or lower than the ISL MRLs, were used in the Subarea 5D data gap analysis as the comparison values for the remaining chemicals. The remaining LUT values based on MRLs will be used in future subarea data gap analyses after they are issued by DTSC.

At the completion of the first round of Phase 3 data gap analysis of all Area IV subareas, DTSC's Chemical Look-Up Table values and EPA's final radionuclide sampling results will be used for data screening and identification of any remaining chemical data gaps. Ultimately, all available previous chemical data, including prior Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) results and Phase 1, 2, and 3 chemical data, will be evaluated using DTSC's Look-Up Table values per the AOC and summarized in the Final Chemical Data Summary Report.

This data gap analysis is based on prior RFI data, the Phase 1 co-located sample results, and historical information on activities within Area IV, and considers results from EPA's radiological investigation activities (e.g., radionuclide sampling results, gamma surveys, geophysical surveys, aerial photograph interpretations).

The data gap analysis identifies where additional information is needed for remedial planning by:

- Comparing existing soil sampling results to LUT criteria to identify additional sample locations needed to define the extent of contamination (based on criteria exceedance) and/or gradients in chemical concentrations away from a potential source;

- Evaluating migration pathways to ensure that samples are collected where contamination may have migrated via natural or anthropogenic processes; and
- Evaluating historical documents and site survey information to identify potential release areas that may not have been adequately characterized.

Each of these evaluation steps are described below.

2.1 COMPARISON OF PREVIOUS SAMPLING DATA TO SCREENING CRITERIA

To determine future chemical sampling needs (to be implemented under the Master Phase 3 Work Plan and MFSP), validated soil chemistry results are compared with LUT values. The LUT values are based on either 2012 soil background threshold values (BTVs) or analytical MRLs for chemicals that do not have established BTVs. The LUT values currently being used for the data gap analysis are dated June 2013, and are posted on DTSC's SSFL web site and provided herein as Attachment A.

This data comparison is conducted to answer several questions:

- Are the data adequate to define the extent of soil contamination? (i.e., what is the areal extent? How deep does contamination go?)
- Where are additional data needed to address areal and depth extent?
- What types of chemical data are needed at each location?

The soil chemical results within the analytical database are "filterable," meaning each individual soil chemical result can be selectively evaluated or results can be collectively reviewed for each prior sample point. The analytical database incorporates data files for soil chemical data collected under the RFI and co-located sampling programs. A geographic information system (GIS) is used to spatially display the sampling results. To display the data, the sampling results are compared with the LUT values for all chemicals analyzed at each sample location using a computer algorithm. The algorithm calculates the ratio of the soil concentration to the LUT value. The GIS is then used to display the maximum comparison value (i.e., 'ratio') at a sampling location, so that the highest result relative to the LUT is displayed. The GIS uses a color-coded system to display the soil concentration relative to the LUT value. For example, soil concentrations that are at or below the LUT value are displayed as a green symbol. Locations where the soil concentration exceeds the LUT are displayed as yellow, orange, magenta, or red, depending on the degree of exceedance of the LUT value. Maps displaying the sampling results as color-coded symbols are included in this Data Gap Analysis TM (Figure 1) to help display this evaluation step in the context of proposed sampling locations.

The data gap analysis includes review of sampling results for combined chemicals, individual chemical groups (e.g. volatile organic compounds [VOCs], polyaromatic hydrocarbons [PAHs], polycyclic biphenyls [PCBs], etc.), and individual chemicals (e.g., barium, perchlorate). Sampling results in the database are 'filtered' to determine which chemicals are above LUT values, their depth of occurrence, and which chemicals are co-located. This allows for effective evaluation and selection of step-out sample locations and analytical suites for assessing the extent and/or distribution of chemicals that exceed their respective LUT values. In some cases, sampling to address elevated reporting limits in historical data is not proposed in all areas of Subarea 5D in this TM. In areas where other data gaps have been identified, sampling for elevated reporting limits is also proposed as needed. In other areas, data gap evaluation for elevated reporting limits in historical data will be addressed in the context of all recent sampling results after collection of the samples as proposed in this TM.

The GIS display of the LUT-compared sampling results is used to evaluate potential sampling locations. In areas where detected concentrations exceed LUT values, previous sampling data are evaluated to determine if the lateral or vertical extent of the exceedance is limited by other sampling results below LUT values or other features at the site (e.g., bedrock). If not, then additional sampling is proposed in that area. Conversely, in some areas existing sampling results are adequate to support remedial planning. A review of the distribution of results along with other lines of evidence (described below) is used to identify where additional sampling is needed.

Some locations with elevated concentrations (now recognized as significant exceedances of LUT values) have been identified by DOE and DTSC as soil "clearly contaminated areas." These are areas most likely requiring remediation based on the existing elevated sampling results, and are displayed in GIS and on maps in this TM with pink shading. The data gap analysis for these areas considers whether sufficient information is available to determine the lateral and vertical extent of contamination. In many cases, more data are needed to determine a volume of soil to be remediated for use in remedial planning, and additional sampling is proposed in these areas.

2.2 EVALUATION OF MIGRATION PATHWAYS

Migration pathways are the means by which chemicals can move in the environment, including surface water transport, downward movement to subsurface soil, or air/wind dispersion. Migration pathways are evaluated to answer several questions:

- Where could potentially contaminated soil migrate via surface water flow?
- Where could contaminants migrate in subsurface soils? Could groundwater be affected by the soil contamination?

- Were chemicals potentially released into the air, dispersed by wind and deposited in surrounding areas at concentrations exceeding LUT values?

The topographic and surface water flow data in the GIS is used to identify surface water pathways from potential contamination sources. Prior data for those pathways will be evaluated as to the adequacy for addressing contaminant migration. If additional data are needed to define the extent of chemicals moved by surface water, downward migration in the subsurface, or to assess air dispersion, sampling locations are proposed for the migration pathways.

This data gap analysis identifies previous soil sampling locations or features where there may be outstanding groundwater investigation program data needs. At these features, the data gap analysis is evaluating the adequacy of existing soil sampling results to assess potential migration of contaminants to groundwater, and proposing additional soil sampling to the top of bedrock if gaps are identified.

2.3 HISTORIC AND SITE SURVEY INFORMATION REVIEWS

The data gap analysis also addresses potential sources of contamination not covered by prior sampling events. Historical survey and site operational information for Area IV is represented in GIS and viewed in context of previous sampling results. Historical and site survey information will be used to answer two questions:

- Are there any potential chemical use/release features that have not been sampled?
- If a potential chemical use area has already been sampled (but not for all chemicals potentially used), are additional samples/analyses needed to complete characterization?

A checklist has been developed that is reviewed along with the chemical data to ensure that features not covered by RFI or Phase 1 co-located sampling are addressed. The checklist includes the results of the historical site assessment (HSA) conducted by Sapere (2005), site operational and aerial photographic information recently compiled for the RFI, and the recent HSA completed by EPA (Hydrogeologic, Inc. [HGL], 2012). The “lines of evidence” reviewed as part of the checklist are published in the Master Phase 3 Work Plan Table 2-2, and provided herein (Table 3) for how they were applied in Subarea 5D.

Site information includes various site features or survey information that is displayed in GIS using a common coordinate system (similar to latitude and longitude). Tanks, buildings, leach fields, geophysical survey results, historical aerial photos, storage areas, debris/disposal areas, identified chemical use areas, and surface water flow paths are examples of site information/features used to identify potential data gaps and proposed sampling locations. Site information is shown as layers in GIS that can be displayed individually or combined with sampling results. The site information features, compiled from historical documents, aerial

photo review, and site surveys are evaluated using existing data to assess the completeness of characterization. If gaps are identified (e.g., a storage area not previously sampled), sampling is proposed with the analytical suites developed based on surrounding site operational uses and existing sample result exceedances.

In addition to site historical use or survey information, soil borings and trench logs are reviewed to identify relevant soil conditions (e.g., debris, staining, bedrock depth) since unique soil characteristics may also guide proposed sampling intervals. For example, sampling may be proposed both within and below stained horizons, or in another case, both within fill materials and below fill materials in underlying native soils. In both of these cases, sampling is needed below a potential contamination zone to identify how far contamination has migrated downward.

Data gaps associated with some historical operational use features are not addressed in this TM but will be included in future documents. Historical operational use features not addressed in this plan include the Area IV sewer system, the natural gas pipelines within Area IV, and features within existing Area IV buildings. Data gaps associated with the sewer system and natural gas pipelines are being evaluated for these systems as a whole, and will be addressed in a separate technical memorandum. Where applicable, sampling is proposed in this TM where sewer pipelines leave former or existing buildings since these are considered site-specific sampling features. Data gaps associated with existing buildings are being evaluated as part of this process, but sampling requirements within or below existing buildings will be detailed in forthcoming demolition plans since that work will proceed under a different schedule and process.

2.4 DATA GAP ANALYSIS PROCESS SUMMARY

A systematic process that incorporates the evaluation components discussed in Sections 2.1 through 2.3 is being used during data gap analysis to ensure available information from multiple sources is considered during data gap review. Thus, combining data gap recommendations from the three evaluation components (data screening evaluations, migration pathway evaluations, and historical document/site survey reviews), sampling is proposed for the evaluated subarea.

The outcome of the data gap analysis process is the identification of soil sampling requirements for Phase 3, including rationale for Phase 3 samples, their locations, depths, and proposed analytical suites. Both soil and soil vapor sampling for chemicals in Phase 3 are proposed in this TM ('soil' sampling is often referred to as 'soil matrix' sampling to distinguish it from soil vapor sampling). Soil matrix and soil vapor media provide different types of chemical data for remedial planning purposes. Soil vapor sampling is preferred to assess the potential release of solvents, which contain VOCs. Since VOCs are highly volatile, they are generally best evaluated in soil vapor samples, not soil matrix. Therefore, soil vapor sampling is proposed in this TM to evaluate locations where solvents may have been used, stored, or released, or to

step-out around previous detections of VOCs above LUT values. Soil vapor sampling is also proposed to provide VOC data over larger areas to evaluate potential solvent release locations when historical operations are uncertain (e.g., large storage areas), or to assess vapor transport from an underlying groundwater plume.

The analytical parameters proposed for step-out or step-down sampling locations are based both on what the prior data indicate are chemicals of potential concern for the location, in conjunction with data needs identified based on review of migration pathways and other lines of evidence. Proposed sample spacing is based on the types of operations and releases, the magnitude and gradients of nearby sampling results, and site conditions (e.g., depth of soil, proximity of bedrock outcrops). Generally, samples are located with a 25 to 100 foot spacing laterally, and at 0.5-, 5-, and 10-foot depth intervals vertically. In many cases the deepest samples will be placed on 'hold' by the laboratory, and analyzed if elevated results are detected in the shallower samples. In special cases, sampling is proposed at shallower depths (e.g., 2 feet) to assess potentially more limited downward migration of large organic molecules like PCBs, dioxins, or PAHs.

The data gap analysis also identifies additional investigation techniques for some areas to aid in selection of sampling locations. The additional investigation techniques can include trenching or test pit excavation to observe soil conditions prior to sampling, or geophysical surveying of areas to identify targeted features, such as pipelines, underground storage tanks, or fill areas. In some cases, field reconnaissance or mapping is needed to refine proposed sampling locations, such as along drainages. The sampling rationales included in this TM specify these additional investigative techniques where applicable.

The data gap analysis can identify future sampling locations outside of the subarea being evaluated. These future locations are displayed with pink '+' symbols on Figure 1. In some cases, the samples are located outside of Area IV and will require additional surveys and coordination prior to sampling. In other cases, the proposed samples are within another subarea, and will be included in the corresponding Subarea Data Gap Analysis TM.

The information presented in this TM, along with supporting GIS and analytical information, is reviewed with DTSC during the data gap process and with interested stakeholders at the end of the data gap process. Input received from DTSC during review and from the public during meetings is incorporated into the proposed sampling included in this TM.

3.0 SUBAREA 5D DATA GAP ANALYSIS

The data gap analysis for Subarea 5D was performed following the process outlined above and using the DQOs presented in Section 4 of the MFSP (CDM Smith, 2012b). The proposed sampling for this subarea is presented in Tables 1 (Soil Matrix), 2 (Soil Vapor), and 3 (Future)

and Figure 1 (Soil Matrix) and Figure 2 (Soil Vapor). Geophysical investigation areas are presented in Figure 3. Table 4 presents the lines of evidence evaluation summary for this subarea, with checkmarks indicating what information resulted in proposed data gap samples.

As part of the Subarea 5D data gap analysis, some areas were identified where the DQOs were uniquely applied, or where specific sampling approaches have been recommended. These are briefly described below. More detailed, sample-specific rationales for these (and all) areas are provided in Tables 1 through 3.

- At representative geophysical anomaly locations, investigation using test pits or trenches is proposed to evaluate potential subsurface features associated with each anomaly and to inspect soil conditions prior to collecting a soil sample (e.g., 5D_DG-511 and 5D_DG-517).
- Sampling to address potential impacts associated with drainage channels is proposed by targeting drainage banks in areas with channel sample results above LUT values. Samples will be collected at two step-out locations along each side of the channel to assess potential lateral migration into the bank sediments (e.g., 5D_DG-531 through 5D_DG-533).
- At and adjacent to former Building 4020 and existing Building 4055, step-out sampling is proposed to define the extent of results above LUT values to the west and the south (e.g., 5D_DG-505, 5D_DG-506, 5D_DG-518, 5D_DG-519). Further investigation including geophysical analysis, sub-slab soil observation, and sampling within Building 4055 and in the surrounding paved areas is proposed to be conducted following demolition.
- At the former Pond Dredge area, step-out sampling is proposed to define the lateral and vertical extent of results above LUT values, and assess migration in surface water pathways in the area (e.g., 5D_DG-512 through DG-514). Also, field mapping of surface water pathways and soil piles in the western portion of the area is proposed and will be incorporated into GIS to aid in future remedial planning activities.
- South of the Pond Dredge Area and Building 4317, sampling is proposed to assess historical drainage features along an east-west road extending from the ESADA area to the west into Area III to the east (e.g., 5D_DG-515 and 5D_DG-551). Drainage features will be field mapped and results incorporated into GIS.
- Potential air dispersion impacts related to burning and treatment activities at the former FSDF Ponds (Subarea 8) and venting from stacks located at other Area IV buildings, is addressed by sampling undeveloped areas and hillsides in Subarea 5D South. Both representative sampling and step-out sampling near previous sampling locations are proposed south of the Pond Dredge Area and former Building 4363 area, with sampling

extending up to the Area IV boundary. A total of 17 representative samples (e.g., 5D_DG-550, -563, -566), and 23 step-out samples (e.g., 5D_DG-542, -543, -571, -572, -580, -581) are proposed.

- Drainages east of former Building 4353 are targeted for future sampling in Area III to assess potential surface water migration of contaminants from Building 4353 operations (e.g., 5D_DG-584 through 5D_DG-586). Field mapping of these drainages is also proposed to more accurately reflect surface water drainage conditions and to aid in future remedial planning activities.
- At a reported leach field location south of Building 4353, geophysical surveying is proposed to identify any subsurface anomalies in the area (Figure 3). Surveying will extend from the area covered by EPA during Phase 1 sampling to west of the reported location. Trenching and sampling will be performed if geophysical anomalies are identified during this survey.
- Sampling to address potential impacts to groundwater is proposed at several locations (listed below and shown on Figure 2). Proposed sampling at these locations includes vertical sampling to top of bedrock (including VOC analysis in the deepest samples collected) and soil vapor sampling. In addition, further evaluation by the groundwater team is recommended for mobile chemicals detected in soil in the vicinity of these features, including VOCs, perchlorate, hexavalent chromium, and/or NDMA. The potential features/locations identified in Subarea 5D are:
    - Building 4020 Basement and Sumps
    - Building 4468 Sump
    - Building 4020 Leach Field
    - Building 4055 Vault and Radiological Liquid Waste Hold Up System
    - Building 4055 Former Fuel Oil UST (UT-12[UT-55])
    - Building 4353 Leach Field
    - Building 4363 Leach Field
    - Building 4373 Leach Field

4.0 REFERENCES

CDM Smith. 2012a. Work Plan for Chemical Data Gap Investigation, Phase 3 Chemical Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California. April.

CDM Smith. 2012b. Master Field Sampling Plan for Chemical Data Gap Investigation Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California. April.

Hydrogeologic, Inc. (HGL) 2012. Draft Final Historic Site Assessment Santa Susana Field Laboratory Site Area IV Radiological Study, Ventura County, California.

TABLES

Table 1
Subarea 5D Phase 3 Proposed Soil Sample Locations
(1 of 11)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method														Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Fluoride (EPA Method 6020A)	Barium (EPA Method 6020A)	Cr(VI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
5D_DG-501	B4020 Area	West of B4020	Soil Boring	0.5	X	X	X	X					X				X	X	√	Stepout for dioxins at SL-001-SA5DN to the north and dioxins and PAHs at SL-005-SA5DN to the southwest. Based on proximity to former UT-3 near B4009, **collect samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock.** Bedrock anticipated ~25 feet bgs. Analyze TPH in samples deeper than 5 feet to delineate lateral extent of impacts from former UST and deepest sample assesses potential lateral migration along bedrock, and place other analyses on hold pending shallow results.
				5	X	X	X	X					X				X	X		
				10	H	H		H					X				H	X		
				15	H	H		H					X				H	X		
				20	H	H		H					X				H	X		
				25	H	H		H					X				H	X		
5D_DG-502	B4020 Area	West of B4020	Soil Boring	0.5	X	X	X	X					X				X	X	√	Targets the unlined drainage along south side of H Street and serves as a stepout for dioxins at SL-130-SA8N to the southwest. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). **Collect and analyze samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock to assess potential vertical migration to bedrock.**
				5	X	X		X					X				X	X		
				10	X	X		X					X				X	X		
				15	X	X		X					X				X	X		
				20	X	X		X					X				X	X		
				25	X	X		X					X				X	X		
5D_DG-503	B4020 Area	West of B4020	Soil Boring	0.5	X	X	X	X					X				X	X		Characterizes the area between H Street and a former dirt road. Bedrock anticipated ~20 feet bgs. Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					H				H	H		
5D_DG-504	B4020 Area	Alberson Fire Road	Soil Boring	0.5	X	X	X	X					X				X	X	√	Targets historic dirt road and surface water pathway. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). **Collect and analyze samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock to assess potential vertical migration to bedrock.**
				5	X	X		X					X				X	X		
				10	X	X		X					X				X	X		
				15	X	X		X					X				X	X		
				20	X	X		X					X				X	X		
				25	X	X		X					X				X	X		
5D_DG-505	B4020 Area	West of B4020	Soil Boring	0.5	X	X	X	X					X		X		X	X	√	Stepout for dioxins, PCBs, pesticides, and TPH at SL-207-SA5DN to the northeast, dioxins, PAHs, PCBs, TPH (deep), and mercury at SL-018-SA5DN to the northeast, dioxins, PAHs (deep), PCBs, and TPH (deep) at SL-016-SA5DN to the northeast, dioxins, PAHs (deep), and TPH at SL-021-SA5DN to the northeast, PAHs and TPH at SL-019-SA5DN to the east, TPH and PAHs at SL-120-SA5DN to the southeast, and fluoride (deep) at SL-002-SA5DN to the northwest. Also characterizes the area southwest of the former location of UT-11, which had a documented fuel release and targets historic dirt roads. Based on proximity to former UT-11, **collect samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock.** Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Analyze PAHs, TPH, and fluoride in samples deeper than 5 feet to stepout from deeper exceedances to the northeast, to delineate lateral extent of impacts from former UST, and deepest sample assesses potential lateral migration along bedrock. Place other analyses on hold in samples deeper than 5 feet pending shallow results.
				5	X	X		X					X		X		X	X		
				10	X	H		H	X				X		H		H	X		
				15	X	H		H	X				X		H		H	X		
				20	X	H		H	X				X		H		H	X		
5D_DG-506	B4020 Area	West of B4020	Soil Boring	0.5	X	X	X	X					X				X	X	√	Stepout for PAHs and TPH at SL-020-SA5DN to the east. Also targets a historic dirt road. Bedrock anticipated ~10 feet bgs. Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					H				H	H		
5D_DG-507	B4020 Area	West of B4020	Soil Boring	0.5	X	X	X	X					X				X	X	√	Stepout for PAHs, phthalates, PCBs, TPH (deep), mercury, and silver at SL-198-SA5DN to the southwest. Also targets fill extent identified in the EPA TM. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Analyze for TPH in 10-foot and 15-foot samples to stepout from TPH in 9-foot sample at SL-198-SA5DN, place other analyses on hold pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					X				H	X		
				15	H	H		H					X				H	X		
5D_DG-508	B4020 Area	West of B4020	Soil Boring	0.5	X	X	X	X					X				X	X	√	Stepout for PAHs, phthalates, PCBs, TPH (deep), mercury, and silver at SL-198-SA5DN to the southeast. Also targets fill extent identified in the EPA TM. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Analyze for TPH in 10-foot and 15-foot samples to stepout from TPH in 9-foot sample at SL-198-SA5DN, place other analyses on hold pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					X				H	X		
				15	H	H		H					X				H	X		

Table 1
Subarea 5D Phase 3 Proposed Soil Sample Locations
(2 of 11)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method														Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Fluoride (EPA Method 6020A)	Barium (EPA Method 6020A)	Cr(VI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
5D_DG-509	B4020 Area	West of B4020	Soil Boring	0.5	X	X	X	X					X				X	X		Stepout for dioxins and PCBs at SL-199-SA5DN to the southwest. Also targets the disturbed soil area. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X	√	
				10	H	H		H					H				H	H		
5D_DG-510	Pond Dredge	Northwest Portion of Pond Dredge Area	Soil Boring	0.5	X	X	X	X					X		X		X	X		Stepout for dioxins, PAHs, PCBs, and pesticides at SL-199-SA5DN to the north. Also targets the estimated area of the drop zone of depleted uranium slugs reportedly dropped in the 1960s identified in the EPA TM and a historic dirt road. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X		X		X	X	√	
				10	H	H		H					H		H		H	H		
5D_DG-511	Pond Dredge	Western Portion of Pond Dredge Area	Test Pit/ Soil Boring	0.5	X	X	X	X					X				X	X		Conduct exploratory test pit to investigate terrain conductivity anomaly. Collect 0.5 and 5 foot samples within test pit based on visual observations of fill, staining, debris, or other impacts. Collect sample targeting top of native soil if anomlies observed. Collect a separate soil boring to bedrock targeting the estimated area of the drop zone of depleted uranium slugs reportedly dropped in the 1960s identified in the EPA TM. The soil boring also targets a disturbed soil area and serves as a stepout for dioxins, PAHs, and TPH at SL-040-SA8N to the northwest. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Analyze for TPH in 10-foot and 15-foot samples to stepout from TPH in 9-foot sample at SL-040-SA8N, place other analyses on hold pending shallow results.
				5	X	X		X					X				X	X	√	
				10	H	H		H					X				H	X		
				15	H	H		H					X				H	X		
5D_DG-512	Pond Dredge	Western Portion of Pond Dredge Area	Soil Boring	0.5	X	X	X	X					X		X		X	X		Stepout for pesticides at SL-205-SA5DN and mercury at PDBS1406 to the southeast. Location also targets potential historical surface water pathway. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X		X		X	X		
				10	H	H		H					H		H		H	H		
5D_DG_513	Pond Dredge	Western Portion of Pond Dredge Area	Soil Boring	0.5	X	X	X	X	X			X	X			X	X	X		Stepout for dioxins, PAHs, PCBs, perchlorate, herbicides, TPH, silver, and fluoride (deep) at SL-191-SA5DN to the southeast, and silver at PDTS03, selenium at PDBS1012, and mercury at PDBS1406 to the southwest. Also targets the surface water pathway and a historical dirt road. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). **Collect and analyze samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock to assess potential vertical migration to bedrock.**
				5	X	X		X	X			X	X			X	X	X		
				10	X	X		X	X			X	X			X	X	X	√	
				15	X	X		X	X			X	X			X	X	X		
				20	X	X		X	X			X	X			X	X	X		
				25	X	X		X	X			X	X			X	X	X		
5D_DG-514	Pond Dredge	Northwest Portion of Pond Dredge Area	Soil Boring	0.5	X	X	X	X					X				X	X		Stepout for silver at PDBS1408 to the northeast, dioxins, PAHs, phthalates, and TPH at SL-197-SA5DN to the southeast, and TPH, silver, and thallium at PDTS01 to the south. Also targets the estimated area of the drop zone of depleted uranium slugs reportedly dropped in the 1960s identified in the EPA TM, a surface water pathway along a historical dirt road, and a disturbed soil area. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X	√	
				10	H	H		H					H				H	H		
5D_DG-515	Pond Dredge	Western Portion of Pond Dredge Area	Soil Boring	0.5	X	X	X	X	X				X		X		X	X		Targets potential drainage along north side of historic dirt road observed in 1960 aerial photo. Also serves as a stepout for pesticides at SL-205-SA5DN to the north, PAHs, TPH, antimony, and silver at PDTS03 to the north, selenium at PDBS1012 to the north, and fluoride (deep) at SL-190-SA5DN to east and SL-201-SA5DN to the southwest. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Analyze for fluoride in 10-foot sample to stepout from fluoride in 9-foot sample at SL-201-SA5DN, place other analyses on hold pending shallow results.
				5	X	X		X	X				X		X		X	X		
				10	H	H		H	X				H		H		H	X		
5D_DG-516	Pond Dredge	Southern Portion of Pond Dredge Area	Soil Boring	0.5	X	X	X	X			X		X			X	X	X		Stepout for PAHs, phthalates, herbicides, and hexavalent chromium (deep) at SL-188-SA5DN to the east and selenium at PDBS1008 to the north. Location also targets surface water pathway observed in historical aerial photograph (1962-63). Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Analyze for hexavalent chromium in 10-foot and 15-foot samples to stepout from hexavalent chromium in 9-foot sample at SL-188-SA5DN, place other analyses on hold pending shallow results.
				5	X	X		X			X		X			X	X	X		
				10	X	H		H			X		H			H	H	X		
				15	H	H		H			X		H			H	H	H		

Table 1
Subarea 5D Phase 3 Proposed Soil Sample Locations
(3 of 11)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method														Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Fluoride (EPA Method 6020A)	Barium (EPA Method 6020A)	Cr(VI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
5D_DG-517	Pond Dredge	Northeastern Portion of Pond Dredge Area	Test Pit/ Soil Boring	0.5	X	X	X	X			X	X	X		X	X	X	X	√	Conduct exploratory test pit to investigate terrain conductivity anomaly. Collect 0.5 and 5 foot samples within test pit based on visual observations of fill, staining, debris, or other impacts. Collect sample targeting top of native soil if anomlies observed. Collect a separate soil boring to bedrock to stepout for PAHs, phthalates, PCBs, TPH (deep), mercury, and silver at SL-198-SA5DN to the northwest, dioxins, PAHs, and perchlorate at SL-203-SA5DN to the west, phthalates and hexavalent chromium at SL-056-SA5DN to the northeast, PAHs and herbicides at SL-057-SA5DN to the southeast, dioxins, PAHs, pthalates, and pesticides at SL-196-SA5DN to the southwest, and dioxins, PAHs, phthalates, pesticides, and cadmium at SL-187-SA5DN to the south. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Analyze for TPH in 10-foot and 15-foot samples to stepout from TPH in 9-foot sample at SL-198-SA5DN, place other analyses on hold pending shallow results.
				5	X	X		X			X	X	X		X	X	X	X		
				10	H	H		H			H	H	X		H	H	H	X		
				15	H	H		H			H	H	X		H	H	H	X		
5D_DG-518	Pond Dredge	Eastern Portion of Pond Dredge Area	Soil Boring	0.5	X	X	X	X	X				X		X	X	X	X	√	Stepout for dioxins, PAHs, phthalates, pesticides, and cadmium at SL-187-SA5DN to the southwest, fluoride (deep) at SL-185-SA5DN to the south, antimony and silver at PDTS07 to the southeast, PAHs and mercury at SL-170-SA5DN to the southeast, PAHs and TPH at PDBS1000 to the southeast, dioxins, PAHs, phthalates, and cadmium at SL-058-SA5DN to the northeast, and PAHs and herbicides at SL-057-SA5DN to the northwest. Also targets the ground scar identified in the EPA TM. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Analyze for fluoride in 10-foot sample to stepout from fluoride in 9-foot sample at SL-185-SA5DN, place other analyses on hold pending shallow results.
				5	X	X		X	X				X		X	X	X	X		
				10	H	H		H	X				H		H	H	H	X		
5D_DG-519	Pond Dredge	Eastern Portion of Pond Dredge Area	Soil Boring	0.5	X	X	X	X					X				X	X	√	Stepout for PAHs and TPH at PDBS1000 to the southeast and dioxins, PAHs, phthalates, and cadmium at SL-058-SA5DN to the northwest. Also targets the ground scar identified in the EPA TM. Bedrock anticipated <15 feet bgs. Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					H				H	H		
5D_DG-520	Pond Dredge	Eastern Portion of Pond Dredge Area	Soil Boring	0.5	X	X	X	X					X		X		X	X	√	Targets unlined drainage along west side of 24th Street and completes vertical characterization of soils at SL-169-SA5DN. Previous samples at this location analyzed at 4-foot and 9-foot depths and analysis did not include TPH or pesticides. Bedrock anticipated <10 feet bgs. Collect and analyze deepest sample targeting soil just above bedrock to assess potential vertical migration to bedrock.
				5									X		X			X		
				10									X		X			X		
5D_DG-521	B4363/4353 Area	North of B4363	Soil Boring	0.5	X	X	X	X					X				X	X	√	Stepout for dioxins and PAHs at SL-122-SA5DN to the west and dioxins at SL-091-SA5DN to the north. Also serves to delineate fill with debris encountered at SL-091-SA5DN to a depth of 5 feet bgs in the drainage south of J Street. If fill, staining, debris, or other impacts are observed, collect sample targeting top of native soil. Bedrock anticipated ~10 feet bgs. Collect 10-foot sample and place on hold pending shallow results.
				5	X	X	X	X					X				X	X		
				10	H	H	H	H					H				H	H		
5D_DG-522	B4363/4353 Area	Northeast of B4363	Soil Boring	0.5	X	X	X	X					X		X		X	X	√	Targets the lined drainage at the northwest corner of the parking area north of the B4363 Leach Field. Also serves as a stepout for PAHs, phthalates, TPH, mercury, and selenium at U5BS1059 to the south and dioxins in SL-091-SA5DN to the northwest. Bedrock anticipated <10 feet bgs. **Collect and analyze deepest sample targeting soil just above bedrock to assess potential vertical lateral migration to bedrock.**
				5	X	X	X	X					X		X		X	X		
				10	X	X	H	X					X		X		X	X		
5D_DG-523	B4363/4353 Area	Northeast of B4363	Soil Boring	0.5	X	X	X	X					X		X		X	X	√	Stepout for dioxins, PAHs, and pesticides at SL-123-SA5DN to the southeast. Also assess the lateral extent of impacts in the drainage south of J Street. Bedrock anticipated ~5 feet bgs. If deep soils encountered, collect deep sample and place on hold pending shallow results.
				5	X	X		X					X		X		X	X		
				10	H	H		H					H		H		H	H		
5D_DG-524	B4363/4353 Area	Northeast of B4363	Soil Boring	0.5	X	X	X	X					X		X	X	X	X	√	Stepout for TPH and cadmium at L6TS02S01 to the west, TPH at U5BS1036 to the west, dioxins, phthalates, pesticides, TPH, and mercury at SL-107-SA5DN to the west, and dioxins, PAHs, phthalates, pesticides, herbicides, and mercury at SL-108-SA5DN to the southwest. Also characterizes the area downslope of the B4363 Leach Field. Bedrock anticipated <15 feet bgs. **Collect and analyze deepest sample targeting soil just above bedrock to assess potential lateral migration along bedrock.**
				5	X	X		X					X		X	X	X	X		
				10	X	X		X					X		X	X	X	X		
				15	X	X		X					X		X	X	X	X		

Table 1
Subarea 5D Phase 3 Proposed Soil Sample Locations
(4 of 11)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method														Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Fluoride (EPA Method 6020A)	Barium (EPA Method 6020A)	Cr(VI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
5D_DG-525	B4363/4353 Area	East of the B4363	Soil Boring	0.5	X	X	X	X					X		X		X	X		Characterizes the area east and downslope of B4363. Bedrock anticipated <5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results. Bedrock anticipated ~5 feet bgs.
				5	X	X		X					X		X		X	X		
5D_DG-526	B4363/4353 Area	Drainage Ditch North of L Street	Soil Boring	0.5	X	X	X	X					X				X	X	√	Targets the drainage on the north side of L Street and historic dirt road. Bedrock anticipated <5 feet bgs. **Collect and analyze deepest sample targeting soil just above bedrock to assess potential lateral migration along bedrock.**
				5	X	X		X					X				X	X		
5D_DG-527	B4363/4353 Area	West of B4353	Soil Boring	0.5	X	X	X	X					X				X	X		Stepout for dioxins, TPH, and mercury at SL-135-SA5DN and SL-137-SA5DN to the east and for dioxins and TPH at SL-138-SA5DN to the southeast. Bedrock anticipated <5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
5D_DG-528	B4363/4353 Area	West of B4353	Soil Boring	0.5	X	X	X	X					X				X	X	√	Characterizes the area east of B4363 and targets a historical dirt road. Bedrock anticipated <5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
5D_DG-529	B4363/4353 Area	Northwest of B4353	Soil Boring	0.5	X	X	X	X					X		X		X	X	√	Stepout for dioxins, PAHs, and pesticides at SL-123-SA5DN to the southwest and for dioxins, PAHs, and pesticides at SL-127-SA5DN to the northeast collected in the drainage south of J Street. Also targets the historical dirt road and ground scar identified in the EPA TM. Bedrock anticipated <5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X	X		X					X		X		X	X		
5D_DG-530	B4363/4353 Area	Northwest of B4353	Soil Boring	0.5	X	X	X	X					X		X		X	X	√	Transect/stepout for dioxins at SL-126-SA5DN to characterize overbank deposits. Four lateral stepout locations comprise a drainage transect (with previous drainage sample in the middle); collect stepouts 5 feet and 10 feet laterally from location SL-126-SA5DN. Bedrock anticipated <5 feet bgs. **Collect and analyze samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock to assess historical deposition over time and potential lateral migration along bedrock.**
				5	X	X	X	X					X		X		X	X		
5D_DG-531	B4363/4353 Area	Northwest of B4353	Soil Boring	0.5	X	X	X	X					X		X		X	X		
				5	X	X	X	X					X		X		X	X		
5D_DG-532	B4363/4353 Area	Northwest of B4353	Soil Boring	0.5	X	X	X	X					X		X		X	X		
				5	X	X	X	X					X		X		X	X		
5D_DG-533	B4363/4353 Area	Northwest of B4353	Soil Boring	0.5	X	X	X	X					X		X		X	X		
				5	X	X	X	X					X		X		X	X		
5D_DG-534	B4363/4353 Area	North of B4353	Soil Boring	0.5	X	X	X	X					X				X	X	√	Targets the ground scar identified in the EPA TM and a historic dirt road. Bedrock anticipated <5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
5D_DG-535	B4363/4353 Area	North of B4353	Soil Boring	0.5	X	X	X	X					X		X		X	X	√	Stepout for dioxins, PAHs, and pesticides at SL-127-SA5DN to the northwest collected in the drainage south of J Street. Bedrock anticipated <5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X	X		X					X		X		X	X		
5D_DG-536	B4363/4353 Area	North of B4353	Soil Boring	0.5	X	X	X	X					X				X	X	√	Targets drainage along south side of J Street and serves as a stepout for dioxins, PAHs, and phthalates at SL-127-SA5DN to the west. Also targets historic dirt road. Bedrock anticipate <10 feet bgs. **Collect and analyze deepest sample targeting soil just above bedrock to assess potential vertical migration to bedrock.**
				5	X	X		X					X				X	X		
				10	X	X		X					X				X	X		
5D_DG-537	B4363/4353 Area	North of B4353	Soil Boring	0.5	X	X	X	X					X				X	X	√	Stepout for dioxins, PAHs, phthalates, arsenic, cadmium, mercury, and silver at SL-129-SA5DN to the southeast. Also targets a historic dirt road. Bedrock anticipated ~5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		

Table 1
Subarea 5D Phase 3 Proposed Soil Sample Locations
(5 of 11)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method														Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Fluoride (EPA Method 6020A)	Barium (EPA Method 6020A)	Cr(VI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
5D_DG-538	B4363/4353 Area	North of B4353	Soil Boring	0.5	X	X	X	X					X				X	X	√	Stepout for dioxins, PAHs, phthalates, arsenic, cadmium, mercury, and silver at SL-129-SA5DN to the southwest. Also targets an unknown aboveground storage tank. Bedrock anticipated ~5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
5D_DG-539	B4363/4353 Area	Northeast of B4353	Soil Boring	0.5	X	X	X	X					X				X	X	√	Stepout for dioxins, PAHs, phthalates, arsenic, cadmium, mercury, and silver at SL-129-SA5DN to the northwest. Also targets a historic dirt road. Bedrock anticipated ~5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
5D_DG-540	B4363/4353 Area	South of B4363	Soil Boring	0.5	X	X	X	X					X		X		X	X	√	Stepout for dioxins, PAHs, pesticides, and cadmium at SL-101-SA5DN to the northeast collected in the drainage south of L Street and for dioxins at SL-166-SA5DN to the southwest. Bedrock anticipated ~5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X	X		X					X		X		X	X		
5D_DG-541	B4363/4353 Area	South of B4363	Soil Boring	0.5	X	X	X	X				X	X				X	X	√	Stepout for dioxins, PAHs, and perchlorate at SL-148-SA5DN to the north collected in the drainage south of L Street. Bedrock anticipated ~5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X	X		X				X	X				X	X		
5D_DG-542	B4363/4353 Area	Southwest of B4353	Soil Boring	0.5	X	X	X	X					X		X		X	X		Stepout for dioxins and pesticides at SL-149-SA5DN to the east. Bedrock anticipated <10 feet bgs. If deep soils encountered, collect deep sample and place on hold pending shallow results.
				5	X	X		X					X		X		X	X		
				10	H	H		H					H		H		H	H		
5D_DG-543	B4363/4353 Area	South of B4353	Soil Boring	0.5	X	X	X	X					X		X		X	X	√	Stepout for dioxins and pesticides at SL-149-SA5DN to the north and dioxins and PAHs at SL-150-SA5DN to the northeast. Also historic dirt road. Bedrock anticipated <10 feet bgs. If deep soils encountered, collect deep sample and place on hold pending shallow results.
				5	X	X		X					X		X		X	X		
				10	H	H		H					H		H		H	H		
5D_DG-544	B4363/4353 Area	South of B4363	Soil Boring	0.5	X	X	X	X					X				X	X	√	Characterizes the hillslope south of B4363. Targets historic dirt road. Bedrock anticipated ~10 feet bgs. Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					H				H	H		
5D_DG-545	B4363/4353 Area	South of B4363	Soil Boring	0.5	X	X	X	X					X				X	X	√	Characterizes the hillslope south of B4363. Targets magnetometer anomaly and a historic dirt road. Bedrock anticipated ~10 feet bgs. Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					H				H	H		
5D_DG-546	B4363/4353 Area	South of B4363	Soil Boring	0.5	X	X	X	X					X				X	X		Stepout for dioxins at SL-166-SA5DN to the northwest. Bedrock anticipated <15 feet bgs. Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					H				H	H		
5D_DG-547	B4363/4353 Area	South of B4363	Soil Boring	0.5	X	X	X	X					X				X	X	√	Stepout for PAHs at SL-162-SA5DN to the southwest. Also targets the historic dirt road. Bedrock anticipated ~10 feet bgs. Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					H				H	H		
5D_DG-548	B4363/4353 Area	South of B4363	Soil Boring	0.5	X	X	X	X					X				X	X	√	Stepout for PAHs at SL-162-SA5DN to the southeast. Also targets historic dirt road and ground scar identified in the EPA TM. Bedrock anticipated <15 feet bgs. Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					H				H	H		

Table 1
Subarea 5D Phase 3 Proposed Soil Sample Locations
(6 of 11)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method														Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Fluoride (EPA Method 6020A)	Barium (EPA Method 6020A)	Cr(VI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
5D_DG-549	B4363/4353 Area	South of B4363	Soil Boring	0.5	X	X	X	X					X		X		X	X		Targets entrance to B4173. Location also serves as stepout for dioxins (deep), PAHs, phthalates, and pesticides at SL-165-SA5DN to the northwest. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results. Analyze for dioxins in 10-foot sample to stepout from dioxins in 9-foot sample at SL-165-SA5DN, place other analyses on hold pending shallow results.
				5	X	X	X	X					X		X		X	X		
				10	H	H	X	H					H		H		H	X		
5D_DG-550	B4363/4353 Area	South of B4353	Soil Boring	0.5	X	X	X	X					X				X	X		Characterizes the hillslope south of B4353. Bedrock anticipated <15 feet bgs. Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					H				H	H		
5D_DG-551	B4363/4353 Area	South of B4353	Soil Boring	0.5	X	X	X	X	X			X	X		X		X	X		Targets potential drainage along north side of historic dirt road observed in 1960 aerial photo. Also serves as a stepout for dioxins at SL-159-SA5DN to the east and fluroide at SL-160-SA5DN to the northwest. Bedrock anticipated ~10 feet bgs. Collect 10-foot sample and place on hold pending shallow results;**analyze 10-foot sample for fluoride since detected at depth in SL-160-SA5DN**.
				5	X	X		X	X			X	X		X		X	X	√	
				10	H	H		H	X			X	H		H		H	H		
5D_DG-552	B4363/4353 Area	South of B4353	Soil Boring	0.5	X	X	X	X					X		X		X	X		Stepout for dioxins at SL-156-SA5DN to the northeast, SL-157-SA5DN to the north, and SL-159-SA5DN to the southwest. Also targets historic dirt road. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X		X		X	X	√	
				10	H	H		H					H		H		H	H		
5D_DG-553	Subarea 5D South	Northeastern Portion of Hillslope	Soil Boring	0.5	X	X	X	X	X		X	X	X			X	X	X		Characterizes the hillslope south of the B4363/4353 area. Also serves as a stepout for perchlorate, herbicides, hexavalent chromium, and fluoride at SL-040-SA5DS to the southwest and for dioxins at SL-159-SA5DN to the north. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X	X		X	X	X			X	X	X		
				10	H	H		H	X		H	H	H			H	H	H		
5D_DG-554	Subarea 5D South	South of B4353	Soil Boring	0.5	X	X	X	X	X				X		X		X	X		Stepout for fluroide at SL-160-SA5DN to the northwest. Also characterizes the hillslope south of the B4363/4353 area. Bedrock anticipated ~10 feet bgs. Collect 10-foot sample and place on hold pending shallow results;**analyze 10-foot sample for fluoride since detected at depth in SL-160-SA5DN**.
				5	X	X		X	X				X		X		X	X		
				10	H	H		H	X				H		H		H	H		
5D_DG-555	Subarea 5D South	South of B4353	Soil Boring	0.5	X	X	X	X	X				X		X		X	X		Stepout forfluroide at SL-160-SA5DN to the northeast and PAHs at SL-162-SA5DN to the northwest. Also targets historic dirt road. Bedrock anticipated ~10 feet bgs. Collect 10-foot sample and place on hold pending shallow results; **analyze 10-foot sample for fluoride since detected at depth in SL-160-SA5DN**.
				5	X	X		X	X				X		X		X	X	√	
				10	H	H		H	X				H		H		H	H		
5D_DG-556	Subarea 5D South	South of the B4363/4353 Area	Soil Boring	0.5	X	X	X	X	X		X	X	X			X	X	X		Characterizes the hillslope south of the B4363/4353 area. Targets the surface water pathway downslope of the Soil Borrow Area. Also serves as a stepout for perchlorate, herbicides, hexavalent chromium, and fluoride at SL-040-SA5DS. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). **Collect and analyze samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock to assess potential vertical migration to bedrock.**
				5	X	X		X	X		X	X	X			X	X	X		
				10	X	X		X	X		X	X	X			X	X	X	√	
				15	X	X		X	X		X	X	X			X	X	X		
				20	X	X		X	X		X	X	X			X	X	X		
				25	X	X		X	X		X	X	X			X	X	X		
5D_DG-557	Subarea 5D South	South of the B4363/4353 Area	Soil Boring	0.5	X	X	X	X					X				X	X		Characterizes the hillslope south of the B4363/4353 area. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					H				H	H		
5D_DG-558	Subarea 5D South	South of the Pond Dredge Area	Soil Boring	0.5	X	X	X	X					X				X	X		Characterizes the hillslope south of the Pond Dredge area. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					H				H	H		

Table 1
Subarea 5D Phase 3 Proposed Soil Sample Locations
(7 of 11)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method														Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Fluoride (EPA Method 6020A)	Barium (EPA Method 6020A)	Cr(VI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
5D_DG-559	Subarea 5D South	Northeastern Portion of Hillslope	Soil Boring	0.5	X	X	X	X	X				X				X	X		Also serves as a stepout for PAHs, phthalates (deep), and pesticides at SL-180-SA5DN to the north, dioxins and PAHs at SL-181-SA5DN to the northeast, cadmium and molybdenum at SL-184-SA5DN to the northeast, and fluroide (deep) at SL-185-SA5DN to the east. Also targets the historical dirt road. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Analyze for PAHs and fluoride in 10-foot samples to stepout from phthalates in 9-foot sample at SL-180-SA5DN and fluoride in the 9-foot sample at SL-185-SA5DN, place other
				5	X	X		X	X				X				X	X	√	
				10	X	H		H	X				H				H	X		
5D_DG-560	Subarea 5D South	Northeastern Portion of Hillslope	Soil Boring	0.5	X	X	X	X			X		X			X	X	X		Stepout for PAHs, phthalates, herbicides, and hexavalent chromium (deep) at SL-188-SA5DN to the north. Also targets a historic dirt road. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Analyze for hexavalent chromium in 10-foot and 15-foot samples to stepout from hexavalent chromium in 9-foot sample at SL-188-SA5DN, place other analyses on hold pending shallow results.
				5	X	X		X			X		X			X	X	X	√	
				10	X	H		H			X		H			H	H	X		
				15	H	H		H			X		H			H	H	X		
5D_DG_561	Subarea 5D South	South of the Pond Dredge Area	Soil Boring	0.5	X	X	X	X	X				X				X	X		Characterizes the hillslope south of the Pond Dredge area. Also serves as a stepout for fluoride (deep) at SL-201-SA5DN to the northwest. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Analyze for fluoride in 10-foot sample to stepout from fluoride in 9-foot sample at SL-201-SA5DN, place other analyses on hold pending shallow results.
				5	X	X		X	X				X				X	X		
				10	H	H		H	X				H				H	X		
5D_DG-562	Subarea 5D South	South of the Pond Dredge Area	Soil Boring	0.5	X	X	X	X					X				X	X		Characterizes the hillslope south of the Pond Dredge area. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					H				H	H		
5D_DG-563	Subarea 5D South	South of the Pond Dredge Area	Soil Boring	0.5	X	X	X	X					X				X	X		Characterizes the hillslope south of the Pond Dredge area. Also targets area adjacent to the water pipeline. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X	√	
				10	H	H		H					H				H	H		
5D_DG-564	Subarea 5D South	South of the Pond Dredge Area	Soil Boring	0.5	X	X	X	X					X				X	X		Characterizes the hillslope south of the Pond Dredge area. Also targets historic dirt road. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X	√	
				10	H	H		H					H				H	H		
5D_DG-565	Subarea 5D South	South of the Pond Dredge Area	Soil Boring	0.5	X	X	X	X					X				X	X		Characterizes the hillslope south of the Pond Dredge area. Also targets historic dirt road. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X	√	
				10	H	H		H					H				H	H		
5D_DG-566	Subarea 5D South	South of the B4363/4353 Area	Soil Boring	0.5	X	X	X	X					X				X	X		Characterizes the hillslope south of the B4363/4353 area. Also targets area near historical dirt road. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X	√	
				10	H	H		H					H				H	H		
5D_DG-567	Subarea 5D South	Northeast of B4701 (Water Tank)	Soil Boring	0.5	X	X	X	X					X		X	X	X	X		Characterizes the hillslope north of the water tank (B4701) and serves as a stepout for pesticides and herbicides at SL-031-SA5DS. Also targets area adjacent to the water pipeline. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X		X	X	X	X	√	
				10	H	H		H					H		H	H	H	H		

Table 1
Subarea 5D Phase 3 Proposed Soil Sample Locations
(8 of 11)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method														Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Fluoride (EPA Method 6020A)	Barium (EPA Method 6020A)	Cr(VI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
5D_DG-568	Subarea 5D South	Northeast of B4701 (Water Tank)	Soil Boring	0.5	X	X	X	X					X		X	X	X	X	√	Targets the surface water flow pathway downslope of the water tank (B4701). Pesticides and herbicides added to general characterization suite due to results above screening levels in the vicinity. Bedrock anticipated ~20 feet bgs. **Collect and analyze samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock to assess potential vertical migration to bedrock.**
				5	X	X		X					X		X	X	X	X		
				10	X	X		X					X		X	X	X	X		
				15	X	X		X					X		X	X	X	X		
				20	X	X		X					X		X	X	X	X		
5D_DG-569	Subarea 5D South	Northeast of B4701 (Water Tank)	Soil Boring	0.5	X	X	X	X					X				X	X	√	Targets the drainage northeast of the water tank. Also serves as a stepout for PAHs and phthalates at SL-030-SA5DS to the west. Bedrock anticipated <5 feet bgs. **Collect and analyze deepest sample targeting soil just above bedrock to assess potential lateral migration along bedrock.**
				5	X	X		X					X				X	X		
5D_DG-570	Subarea 5D South	Northwest of B4701 (Water Tank)	Soil Boring	0.5	X	X	X	X					X		X	X	X	X	√	Stepout for dioxins, PAHs, PCBs, and herbicides at SL-036-SA5DS to the southeast. Also targets historic dirt road. Bedrock anticipated ~10 feet bgs. Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X		X	X	X	X		
				10	H	H		H					H		H	H	H	H		
5D_DG-571	Subarea 5D South	Southeast of B4701 (Water Tank)	Soil Boring	0.5	X	X	X	X					X		X	X	X	X	√	Stepout for PAHs and herbicides at SL-027-SA5DS to the northwest and perchlorate, pesticides, and silver at SL-028-SA5DS to the northwest. Also targets historic dirt road. Bedrock anticipated <5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X	X		X					X		X	X	X	X		
5D_DG-572	Subarea 5D South	Southeast of B4701 (Water Tank)	Soil Boring	0.5			X								X	X		X		Stepout for dioxins and pesticides at SL-002-SA5DS to the northeast and herbicides at SL-025-SA5DS to the southeast. Bedrock anticipated <5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5											X	X		X		
5D_DG-573	Subarea 5D South	East of B4701 (Water Tank)	Soil Boring	0.5			X								X			X		Stepout for dioxins and pesticides at SL-002-SA5DS to the southwest. Bedrock anticipated <5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5											X			X		
5D_DG-574	Subarea 5D South	East of B4701 (Water Tank)	Soil Boring	0.5	X		X								X	X		X	√	Stepout for dioxins, PAHs, and pesticides at SL-001-SA5DS to the west and herbicides at SL-024-SA5DS to the east. Also targets historic dirt road. Bedrock anticipated <5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X										X	X		X		
5D_DG-575	Subarea 5D South	South of the Soil Borrow Area	Soil Boring	0.5	X											X		X	√	Stepout for herbicides and PAHs at SL-022-SA5DS to the southeast. Targets the a surface water flow pathway. Bedrock anticipated <10 feet bgs. **Collect and analyze deepest sample targeting soil just above bedrock to assess potential vertical migration to bedrock.**
				5	X											X		X		
				10	X											X		X		
5D_DG-576	Subarea 5D South	South of the Soil Borrow Area	Soil Boring	0.5			X						X		X	X		X	√	Stepout for herbicides at SL-024-SA5DS to the west, dioxins, herbicides, and pesticides at SL-004-SA5DS to the northwest, dioxins, herbicides, and TPH at SL-005-SA5DS to the northeast. Also targets the historical dirt road. Bedrock anticipated <5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5									X		X	X		X		
5D_DG-577	Subarea 5D South	South of the Soil Borrow Area	Soil Boring	0.5	X	X	X	X					X				X	X	√	Stepout for TPH at SL-019-SA5DS to the north. Also targets historic dirt road. Bedrock anticipated <5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
5D_DG-578	Subarea 5D South	South of the Soil Borrow Area	Soil Boring	0.5	X		X						X			X		X		Stepout for herbicides at SL-038-SA5DS to the northwest, dioxins and PAHs at SL-006-SA5DS to the southwest, and TPH at SL-019-SA5DS to the south. Bedrock anticipated <5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X								X			X		X		

Table 1
Subarea 5D Phase 3 Proposed Soil Sample Locations
(9 of 11)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method														Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Fluoride (EPA Method 6020A)	Barium (EPA Method 6020A)	Cr(VI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
5D_DG-579	Subarea 5D South	Southeast of the Soil Borrow Area	Soil Boring	0.5			X					X			X			X		Stepout for dioxins and pesticides at SL-017-SA5DS to the northwest and perchlorate at SL-016-SA5DS to the north. Bedrock anticipated ~5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5								X			X			X		
5D_DG-580	Subarea 5D South	Southeast of the Soil Borrow Area	Soil Boring	0.5							X	X					X	X		Stepout for perchlorate at SL-016-SA5DS to the west and hexavelent chromium at SL-015-SA5DS to the northwest. Bedrock anticipated <5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5							X	X					X	X		
5D_DG-581	Subarea 5D South	Southeast of the Soil Borrow Area	Soil Boring	0.5	X						X						X	X		Stepout for benzoic acid at SL-013-SA5DS to the west and hexavalent chromium at SL-015-SA5DS to the southwest. Bedrock anticipated <5 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X						X						X	X		
5D_DG-582	Subarea 5D South	Eastern Portion of Soil Borrow Area	Soil Boring	0.5	X	X	X	X					X			X	X	X	√	Targets the drainage in the eastern portion of the soil borrow area. Also serves as a stepout for herbicides at SL-038 SA5DS to the southwest. Bedrock anticipated ~20 feet bgs. **Collect and analyze samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock to assess potential vertical migration to bedrock.**
				5	X	X		X					X			X	X	X		
				10	X	X		X					X			X	X	X		
				15	X	X		X					X			X	X	X		
				20	X	X		X					X			X	X	X		
5D_DG-583	Subarea 5D South	Northeastern of the Soil Borrow Area	Soil Boring	0.5	X	X	X	X					X				X	X	√	Characterizes the northeastern portion of the Soil Borrow Area. Also targets the historical dirt road. Bedrock anticipated >10 feet bgs (adjacent samples did not encounter bedrock). Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					H				H	H		
5D_DG-589	B4363/4353 Area	South of B4353	Soil Boring	0.5	X	X	X	X					X		X		X	X	√	Targets potential structure at end of historic dirt road identified in 1960 aerial photograph. Collect 10-foot sample and place on hold pending shallow results.
				5	X	X		X					X		X		X	X		
				10	X	X		X					X		X		X	X		
5D_DG-590	Subarea 5D South	Hillslope South of B4353	Soil Boring	0.5					X			X					X	X		Collect sample at former location SL-040-SA5DS to confirm previous perchlorate and fluoride detects slighly above Lookup Table values. Analyze all depths since fluoride detected at depth.
				5					X			X					X	X		
				10					X			X					X	X		
5D_DG-591	B4363/4353 Area	South of B4353	Soil Boring	0.5					X								X	X		Resample fluoride at SL-160-SA5DN to confirm detect slightly above Lookup Table value. Analyze all depths since previous fluoride detect at depth.
				5					X								X	X		
				10					X								X	X		
5D_DG-592	B4363/4353 Area	South of B4353	Soil Boring	0.5					X									X		Stepout for previous low level detect at SL-160-SA5DN. Analyze all depths since previous fluoride detect at depth.
				5					X									X		
				10					X									X		
5D_DG-593	B4363/4353 Area	South of B4353	Soil Boring	0.5					X								X	X		Stepout for previous low level detect at SL-160-SA5DN. Analyze all depths since previous fluoride detect at depth.
				5					X								X	X		
				10					X								X	X		

Table 1
Subarea 5D Phase 3 Proposed Soil Sample Locations
(10 of 11)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method														Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Fluoride (EPA Method 6020A)	Barium (EPA Method 6020A)	Cr(VI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
5D_DG-594	B4363/4353 Area	South of B4353	Soil Boring	0.5					X									X		Stepout for previous low level detect at SL-160-SA5DN. Analyze all depths since previous fluoride detect at depth.
				5					X									X		
				10					X									X		
5D_DG-595	Subarea 5D South	Area IV Borrow Pit	Soil Boring	0.5					X								X	X		Resample fluoride at SL-037-SA5DS to confirm detect slightly above Lookup Table value. Analyze all depths since previous fluoride detect at depth.
				5					X								X	X		
				10					X								X	X		
5D_DG-596	Subarea 5D South	Area IV Borrow Pit	Soil Boring	0.5					X									X		Stepout for previous low level detect at SL-037-SA5DS. Analyze all depths since previous fluoride detect at depth.
				5					X									X		
				10					X									X		
5D_DG-597	Subarea 5D South	Area IV Borrow Pit	Soil Boring	0.5					X								X	X		Stepout for previous low level detect at SL-037-SA5DS. Analyze all depths since previous fluoride detect at depth.
				5					X								X	X		
				10					X								X	X		
5D_DG-598	Subarea 5D South	Area IV Borrow Pit	Soil Boring	0.5					X									X		Stepout for previous low level detect at SL-037-SA5DS. Analyze all depths since previous fluoride detect at depth.
				5					X									X		
				10					X									X		
5D_DG-599	Pond Dredge	Soutwest of Pond Dredge Area	Soil Boring	0.5					X								X	X		Resample fluoride at SL-201-SA5DN to confirm detect slightly above Lookup Table value. Analyze all depths since previous fluoride detect at depth.
				5					X								X	X		
				10					X								X	X		
5D_DG-600	Pond Dredge	Soutwest of Pond Dredge Area	Soil Boring	0.5					X								X	X		Resample fluoride at SL-190-SA5DN to confirm detect slightly above Lookup Table value. Analyze all depths since previous fluoride detect at depth.
				5					X								X	X		
				10					X								X	X		
5D_DG-601	Pond Dredge	Soutwest of Pond Dredge Area	Soil Boring	0.5					X									X		Stepout for previous low level detect at SL-190-SA5DN and SL-201-SA5DN. Location also targets surface water pathway observed in historical aerial photograph (1962-63). Analyze all depths since previous fluoride detect at depth.
				5					X									X		
				10					X									X		
5D_DG-602	Pond Dredge	Soutwest of Pond Dredge Area	Soil Boring	0.5					X								X	X		Resample fluoride at SL-201-SA5DN to confirm detect slightly above Lookup Table value. Analyze all depths since previous fluoride detect at depth.
				5					X								X	X		
				10					X								X	X		
5D_DG-603	Pond Dredge	Eastern Portion of Pond Dredge Area	Soil Boring	0.5					X								X	X		Resample fluoride at SL-185-SA5DN to confirm detect slightly above Lookup Table value. Analyze all depths since previous fluoride detect at depth.
				5					X								X	X		
				10					X								X	X		
5D_DG-604	Pond Dredge	Eastern Portion of Pond Dredge Area	Soil Boring	0.5					X									X		Stepout for previous low level detect at SL-185-SA5DN. Analyze all depths since previous fluoride detect at depth.
				5					X									X		
				10					X									X		
5D_DG-605	Pond Dredge	Eastern Portion of Pond Dredge Area	Soil Boring	0.5					X									X		Stepout for previous low level detect at SL-185-SA5DN. Analyze all depths since previous fluoride detect at depth.
				5					X									X		
				10					X									X		
5D_DG-606`	Pond Dredge	Eastern Portion of Pond Dredge Area	Soil Boring	0.5					X								X	X		Stepout for previous low level detect at SL-185-SA5DN. Analyze all depths since previous fluoride detect at depth.
				5					X								X	X		
				10					X								X	X		

Table 1
Subarea 5D Phase 3 Proposed Soil Sample Locations
(11 of 11)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method														Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Fluoride (EPA Method 6020A)	Barium (EPA Method 6020A)	Cr(VI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
5D_DG-607	B4020 Area	Parking Lot South of B4020	Soil Boring	0.5	X	X	X	X					X				X	X	√	Location targets parking lot area south of B4020 where storage was observed in historical photograph. Also serves as stepout for PAH detects in the area. Previous samples collected at a depth of 10 feet bgs, but bedrock was not encountered. **Advance boring to bedrock and collect samples at all depths.** Since previous detects were shallow, hold samples below 5 feet pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					H				H	H		
				15	H	H		H					H				H	H		
5D_DG-608	B4020 Area	Parking Lot South of B4020	Soil Boring	0.5	X	X	X	X					X				X	X	√	Location targets parking lot area south of B4020 where storage was observed in historical photograph. Also serves as stepout for PAH detects in the area. Previous samples collected at a depth of 10 feet bgs, but bedrock was not encountered. **Advance boring to bedrock and collect samples at all depths.** Since previous detects were shallow, hold samples below 5 feet pending shallow results.
				5	X	X		X					X				X	X		
				10	H	H		H					H				H	H		
				15	H	H		H					H				H	H		
5D_DG-609	B4363/4353 Area	South of B4363	Soil Boring	0.5	X	X	X	X					X				X	X	√	Location targets tank with unknown contents and surface water drainage along L Street. Bedrock anticipated ~5 feet bgs. Collect deepest sample targeting soil just above bedrock and hold analysis pending results at 5 feet.
				5	X	X		X					X				X	X		
				10	X	X		X					X				X	X		

Footnotes
1. Sampling will generally be at 5 foot intervals to bedrock. In areas where fill is encountered or anticipated, samples will be collected from the top of native soil (beneath fill) and soil just above bedrock. Samples collected at 0.5 feet
2. Standard metals analysis includes silver and mercury, but does not include hexavalent chromium.
3. Checkmark in column indicates sample was proposed based on review of information source indicated in Table 4 (Data Gap Checklist) for the area listed in "Location Description" (GIS or aerial photo review layers).
4. The Subarea 5D analytical suite for general operations includes primary chemical groups: PAHs, PCB/PCTs, dioxins, metals, and TPH.

Acronyms

AST = above-ground storage tank
bgs = below ground surface
Cr(VI) = hexavalent chromium
EPA = Environmental Protection Agency
ft = foot or feet
GIS = geographic information system
GPS = global position system
ND = not detected above reporting limit
PAH = polyaromatic hydrocarbon
PCB = polychlorinated biphenyl
PCT = polychlorinated terphenyl
RCRA = Resource Conservation and Recovery Act
RFI = RCRA Facility Investigation
TEQ = toxicity equivalent quotient
TM = techmical memorandum
TPH = total petroleum hydrocarbons
UST = underground storage tank
VOC = volatile organic compound

Table 2
Subarea 5D Proposed Soil Vapor Sample Locations
(1 of 4)

Location ID	Area	Location Description	Depth (feet bgs)[1]	Data Gap Checklist[2]	Rationale / Comments[3]
5DSV_DG-501	B4020 Area	Northwest of B4020	5 10	√	Targets possible open storage area identified in EPA TM.
5DSV_DG-502	B4020 Area	North of B4020	5 10	√	Targets possible open storage area identified in EPA TM.
5DSV_DG-503	B4020 Area	Northeast of B4020	5 10	√	Targets approximate location of historical spill and possible staining identified in EPA TM.
5DSV_DG-504	B4020 Area	North of B4020	5 10	√	Targets approximate location of historical spill and possible staining identified in EPA TM.
5DSV_DG-505	B4020 Area	North of B4020	5 10	√	Targets location of former B4020 fission tanks and other USTs and also addresses elevated RLs in previous sampling.
5DSV_DG-506	B4020 Area	Northwest of B4020	5 10	√	Characterizes area northwest of B4020 and addresses elevated RLs in previous sampling.
5DSV_DG-507	B4020 Area	West of B4020	5 10	√	Characterizes area west of B4020 and addresses elevated RLs in previous sampling.
5DSV_DG-508	B4020 Area	West of B4020	5 10	√	Targets possible open storage area identified in EPA TM and geophysical anomaly. Also addresses elevated RLs in previous sampling.
5DSV_DG-509	B4020 Area	West of B4020	5	√	Targets possible open storage area identified in EPA TM, the area west of the B4020 loading dock, and a terrain conductivity anomaly area.
5DSV_DG-510	B4020 Area	South of B4020	5 10 15	√	Characterizes area south of B4020 and north of the former drainage between J Street and the Parking Area.
5DSV_DG-511	B4020 Area	B4020 Footprint	5 10	√	Targets a former sump in the southern portion of the B4020 basement. Also this location is one of three representative locations which provide overall characterization of fill material used to backfill the B402 post-demolition excavation.
5DSV_DG-512	B4020 Area	B4020 Footprint	5 10 15 20	√	Targets former sump in the central portion of the B4020 basement. Also this location is one of three representative locations which provide overall characterization of fill material used to backfill the B402 post-demolition excavation.
5DSV_DG-513	B4020 Area	B4020 Footprint	5 10 15 20	√	Targets former sump in the northern portion of the B4020 basement near the two former 500-gallon radioactive waste holdup tanks, which reportedly overflowed. Also this location is one of three representative locations which provide overall characterization of fill material used to backfill the B402 post-demolition excavation.
5DSV_DG-514	B4020 Area	East of B4020	5 10 15	√	Targets surface water flow pathway along the west side of 24th Street.
SDSV_DG-515	B4020 Area	East of B4020	5 10 15	√	Targets the location of the former 3,000-gallon radioactive waste holdup tank.
5DSV_DG-516	B4020 Area	East of B4020	5 10 15	√	Targets the B4020 Leach Field.
5DSV_DG-519	B4055 Area	Southwest of B4055	5 10 15	√	Characterizes the area southwest of B4055 and southwest of former fuel-oil tank UT-12 (UT-55).
5DSV_DG-522	B4055 Area	East of B4055	5 10 15	√	Targets the underground pipeline from B4055 to the Former Liquid Waste Holdup System and characterizes the area adjacent to the former lined drainage east of B4055.
5DSV_DG-523	B4055 Area	East of B4055	5 10 15	√	Same as SDSV_DG-22.

Table 2
Subarea 5D Proposed Soil Vapor Sample Locations
(2 of 4)

Location ID	Area	Location Description	Depth (feet bgs)[1]	Data Gap Checklist[2]	Rationale / Comments[3]
5DSV_DG-524	B4055 Area	Northeast of B4055	5		Characterizes the area northeast of B4055.
			10		
			15		
5DSV_DG-526	B4055 Area	Northeast of B4373	5	√	Targets the drainage along the west side of 22nd Street.
			10		
			15		
5DSV_DG-527	B4055 Area	East of B4373	5	√	Targets the area east of B4373, former fuel-oil tank UT-72, and a magnetometer anomaly.
			10		
5DSV_DG-528	B4055 Area	North of B4373	5	√	Characterizes the area north of B4373. Also targets a magnetometer anomaly area.
			10		
			15		
5DSV_DG-529	B4055 Area	B4373 Footprint	5	√	Targets the B4373 Clearly Contaminated Area to assess potential contamination associated with energetics solid rocket fuel. Also addresses elevated RLs in previous sampling.
			10		
5DSV_DG-530	B4055 Area	Southeast of B4373	5	√	Targets the B4373 Leach Field and the B4373 Clearly Contaminated Area.
5DSV_DG-532	B4363/B4363 Area	East of B4353	5	√	Targets the B4353 Leach Field.
			10		
5DSV_DG-533	B4363/B4363 Area	Southeast of B4353	5	√	Targets the drainage southeast of B4353.
5DSV_DG-534	B4363/B4363 Area	South of B4353	5		Characterizes area south of B4353 and the former parking lot.
5DSV_DG-535	B4363/B4363 Area	North of B4353	5	√	Targets drainage north of B4353.
5DSV_DG-536	B4363/B4363 Area	Northeast of B4363	5	√	Targets drainage northeast of B4363 and ground scar identified in the EPA TM.
5DSV_DG-537	B4363/B4363 Area	Northeast of B4363	5	√	Targets drainage northeast of B4363.
5DSV_DG-538	B4363/B4363 Area	Northeast of B4363	5	√	Characterizes area northeast of B4363 and north of the B4363 Leach Field. Also targets ground scar identified in EPA TM.
			10		
5DSV_DG-539	B4363/B4363 Area	Northeast of B4363	5	√	Targets the B4363 Leach Field and ground scar identified in EPA TM.
			10		
5DSV_DG-540	B4363/B4363 Area	East of B4363	5	√	Characterizes area east of B4363 and south of the B4363 Leach Field.
5DSV_DG-541	B4363/B4363 Area	South of B4363	5	√	Targets the drainage on the north side of L Street.
5DSV_DG-542	B4363/B4363 Area	North of B4363	5	√	Targets the B4363 Area 2 Clearly Contaminated Area.
			10		
5DSV_DG-543	B4363/B4363 Area	North of B4363	5	√	Targets the B4363 Area 1 Clearly Contaminated Area.
			10		

Table 2
Subarea 5D Proposed Soil Vapor Sample Locations
(3 of 4)

Location ID	Area	Location Description	Depth (feet bgs)[1]	Data Gap Checklist[2]	Rationale / Comments[3]
5DSV_DG-544	Pond Dredge	Northeastern Portion of Pond Dredge Area	5 10 15	√	Targets the former B4020 parking lot, the former B4020 D&D staging area, and a terrain conductivity area.
5DSV_DG-545	Pond Dredge	Northern Portion of Pond Dredge Area	5 10 15	√	Characterizes the northern portion of the Pond Dredge Area. Also targets a terrain conductivity anomaly and a magnetometer anomaly.
5DSV_DG-546	Pond Dredge	Northwestern Portion of Pond Dredge Area	5 10 15 20 30	√	Characterizes the northwestern portion of the Pond Dredge Area. Also targets the estimated area of the drop zone of depleted uranium slugs reportedly dropped in the 1960s identified in the EPA TM.
5DSV_DG-547	Pond Dredge	Western Portion of Pond Dredge Area	5 10 15 20 30	√	Characterizes the western portion of the Pond Dredge Area. Also targets a terrain conductivity anomaly.
5DSV_DG-548	Pond Dredge	Central Portion of Pond Dredge Area	5 10 15 20 30	√	Characterizes the central portion of the Pond Dredge Area. Also targets terrain conductivity anomaly and a magnetometer anomaly.
5DSV_DG-549	Pond Dredge	Central Portion of Pond Dredge Area	5 10 15 20 30	√	Targets potential drainage along north side of historic dirt road observed in 1960 aerial photo.
5DSV_DG-550	Pond Dredge	Eastern Portion of Pond Dredge Area	5 10 15 20 30	√	Characterizes the eastern portion of the Pond Dredge Area. Also targets light toned material identified in the EPA TM.
5DSV_DG-551	Pond Dredge	Eastern Portion of Pond Dredge Area	5 10 15 20	√	Targets the drainage along the west side of 24th Street, mounded material identified in the EPA TM, and a terrain conductivity anomaly.
5DSV_DG-552	Pond Dredge	Eastern Portion of Pond Dredge Area	5 10 15 20 30	√	Characterizes the eastern portion of the Pond Dredge Area. Also targets mounded material and a terrain conductivity anomaly.
5DSV_DG-553	B4363/B4363 Area	South of B4363	5 10 15	√	Targets ground scar identified in EPA TM.
5DSV_DG-554	B4363/B4363 Area	South of B4353	5	√	Targets possible outside storage area identified in EPA TM.

Table 2
Subarea 5D Proposed Soil Vapor Sample Locations
(4 of 4)

Location ID	Area	Location Description	Depth (feet bgs)[1]	Data Gap Checklist[2]	Rationale / Comments[3]
5DSV_DG-555	B4363/B4363 Area	South of B4353	5	√	Targets a graded area identified in EPA TM.
			10		
			15		
			20		
5DSV_DG-556	B4363/B4363 Area	South of B4353	5	√	Targets medium toned mounded material identified in EPA TM.
			10		
			15		
			20		

Footnotes

1. Soil vapor sampling field protocols still being defined; proposed sampling included in table to be implemented after DTSC approval of Soil Vapor SOP. It is anticipated that soil vapor samples will be collected at 5-foot intervals to a depth of 20 feet bgs, and at 10-foot intervals thereafter to bedrock with the deepest sample targeting soil just above bedrock. All soil vapor samples will be collected and analyzed in accordance with approved procedures in a Soil Vapor SOP. In areas where soils are not deep enough for soil vapor analysis, soil matrix samples will be collected for VOC analysis using EPA Method 8260B if soils are more than 2 feet thick.

2. Checkmark in column indicates sample was proposed based on review of information source indicated in Table 3 for the area listed in "Location Description" (GIS or aerial photo review layers).

Acronyms

bgs = below ground surface
D&D = decontamination and decommissioning
DTSC = California Department of Toxic Substances Control
EPA = Environmental Protection Agency
GIS = geographic information system
RL = reporting limit
SOP = standard operating procedures
VOC = volatile organic compound

Table 3
Subarea 5D Phase 3 Proposed Sample Locations for Future Collection
(1 of 1)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method															Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Fluoride (EPA Method 6020A)	Barium (EPA Method 6020A)	Cr(VI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)	VOCs[2] (SV) (EPA Method 8260B)		
5D_DG-584	B4363/4353 Area	East of B4353	Soil Boring	0.5	X	X	X	X					X		X	X	X	X		√	Future Location. Targets drainage identified in the EPA TM. Locate drainage feature (e.g. rill, topographic low, etc.) and map with GPS prior to collection of samples. Also characterizes area downslope of the B4353 Leach Field and serves as a stepout for dioxins, PAHs, phthalates, pesticides, herbicides, and silver at SL-131-SA5DN to the northwest. Bedrock anticipated <10 feet bgs. **Collect and analyze samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock to assess potential vertical migration to bedrock.**
				5	X	X		X					X		X	X	X	X			
				10	X	X		X					X		X	X	X	X			
5D_DG-585	B4363/4353 Area	Southeast of B4353	Soil Boring	0.5	X	X	X	X					X	X	X		X	X		√	Future Location. Targets one of the two drainages southeast of B4353. Locate drainage feature (e.g. rill, topographic low, etc.) and map with GPS prior to collection of samples. Also serves as a stepout for dioxins, PAHs, phthalates, pesticides, TPH, formaldehyde, cadmium, mercury, and silver at SL-141-SA5DN to the northwest. Bedrock anticipated <10 feet bgs. **Collect and analyze samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock to assess potential vertical migration to bedrock.**
				5	X	X		X					X	X	X		X	X			
				10	X	X		X					X	X	X		X	X			
5D_DG-586	B4363/4353 Area	Southeast of B4353	Soil Boring	0.5	X	X	X	X	X				X		X		X	X		√	Future Location. Targets one of the two drainages southeast of B4353. Locate drainage feature (e.g. rill, topographic low, etc.) and map with GPS prior to collection of samples. Also serves as a stepout for dioxins, PAHs, phthalates, pesticides, and fluoride at SL-143-SA5DN to the northwest. Bedrock anticipated <10 feet bgs. **Collect and analyze samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock to assess potential vertical migration to bedrock.**
				5	X	X		X	X				X		X		X	X			
				10	X	X		X	X				X		X		X	X			
5D_DG-588	B4363/4353 Area	Southeast of B4353	Soil Boring	0.5	X	X	X	X					X		X		X	X		√	Future Location. Targets potential drainage along north side of historic dirt road observed in 1960 aerial photo. **Collect and analyze samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock to assess potential vertical migration to bedrock.**
				5	X	X		X					X		X		X	X			
				10	X	X		X					X		X		X	X			
5DSV_DG-557	B4363/4353 Area	South of B4353	Soil Boring	0.5															X	√	Future Location. Targets one of the two drainages southeast of B4353.
				5															X		
				10															X		
5DSV_DG-558	B4363/4353 Area	South of B4353	Soil Boring	0.5															X	√	Future Location. Targets potential drainage along north side of historic dirt road observed in 1960 aerial photo.
				5															X		
				10															X		

Footnotes
1. Sampling will generally be at 5 foot intervals to bedrock. In areas where fill is encountered or anticipated, samples will be collected from the top of native soil (beneath fill) and soil just above bedrock. Samples collected at 0.5 feet and 5 feet will be analyzed with deeper samples placed on hold pending shallower results, unless otherwise stated. If deeper soils are encountered, additional sampling will be added as needed. Sample intervals may be added or adjusted based on field conditions.
2. Soil vapor sampling field protocols still being defined; proposed sampling included in table to be implemented after DTSC approval of Soil Vapor SOP. It is anticipated that soil vapor samples will be collected at 5-foot intervals to a depth of 20 feet bgs, and at 10-foot intervals thereafter to bedrock with the deepest sample targeting soil just above bedrock. All soil vapor samples will be collected and analyzed in accordance with approved procedures in a Soil Vapor SOP. In areas where soils are not deep enough for soil vapor analysis, soil matrix samples will be collected for VOC analysis using EPA Method 8260B if soils are more than 2 feet thick.
3. Checkmark in column indicates sample was proposed based on review of information source indicated in Table 4 (Data Gap Checklist) for the area listed in "Location Description" (GIS or aerial photo review layers).
4. The Subarea 5D analytical suite for general operations includes primary chemical groups: PAHs, PCB/PCTs, dioxins, metals, and TPH.

Acronyms
AST = above-ground storage tank
bgs = below ground surface
Cr(VI) = hexavalent chromium
EPA = Environmental Protection Agency
ft = foot or feet
GIS = geographic information system
GPS = global position system
ND = not detected above reporting limit
PAH = polyaromatic hydrocarbon
PCB = polychlorinated biphenyl
PCT = polychlorinated terphenyl
RCRA = Resource Conservation and Recovery Act
RFI = RCRA Facility Investigation
TEQ = toxicity equivalent quotient
TM = techmical memorandum
TPH = total petroleum hydrocarbons
UST = underground storage tank
VOC = volatile organic compound

Table 4
Subarea 5D
Data Gap Checklist
(Page 1 of 2)

INFORMATION SOURCE	Subarea 5D Data Gap Evaluation Areas [1]				
	B4020 Area	**B4055 Area**	**Pond Dredge**	**B4353/4363 Area**	**Subarea 5D South**
GIS Base Map Layers					
Tanks (and Sitewide Tank Inventory Table)	√	√	√	√	√
Transformers	√	√	√	√	√
Structures	√	√	√	√	√
Sumps	√	√	√	√	√
Vaults	√	√	√	√	√
Pipes	√	√	√	√	√
Undefined features	√	√	√	√	√
Chemical Use Areas (RFI)	√	√	√	√	√
Streams/ditches	√	√	√	√	√
Leachfields	√	√	√	√	√
Storage Yard Areas	√	√	√	√	√
Roads	√	√	√	√	√
Soil Disturbance (Veg clearance, excavation, grading, etc)	√	√	√	√	√
Migration Pathways					
Surface Water	√	√	√	√	√
Aerial Dispersion [2]	√	√	√	√	√
Subsurface Soil	√	√	√	√	√
Site-wide Infrastructure					
IWW - spray fields	√	√	√	√	√
Natural Gas Pipelines (site-wide approach also in progress)	√	√	√	√	√
Sewer (site-wide approach also in progress)	√	√	√	√	√
Aerial Photo Review					
Historical aerial photographs from 17 years (1953 - 2005)	√	√	√	√	√
EPA Layers					
Gamma Scan	√	√	√	√	√
Potential Gamma Anomalies (PGRAY)	√	√	√	√	√
Tank Points	N/A	N/A	N/A	N/A	N/A
HSA Line Layer (HSA linear features)	N/A	N/A	N/A	N/A	N/A
HSA Photo Layer (HSA aerial photo review features)	√	√	√	√	√
Historical Use Data (chem use, storage, leach fields, releases, interviews, etc.)	√	√	√	√	√
Area IV Conduit (pipelines)	√	√	√	√	√
Geophysical Survey (EM, GPR, TC)	√	√	√	√	√

Table 4
Subarea 5D
Data Gap Checklist
(Page 2 of 2)

INFORMATION SOURCE	Subarea 5D Data Gap Evaluation Areas [1]				
	B4020 Area	B4055 Area	Pond Dredge	B4353/4363 Area	Subarea 5D South
Other [3]					
Existing Building Feature Documentation - process info reviewed	NA	√	NA	NA	NA
Historical Facility Diagrams - deep feature info reviewed	√	√	√	√	√
Groundwater Impacts / Potential Inputs to Groundwater Evaluated [4]	√	√	√	√	√
Site-wide Tank Inventory Table for unlocated tanks (viewed with Tanks Base Map layer)	√	√	√	√	√
EPA Area IV radiological sampling results [5]	√	√	√	√	√
Uncollected EPA Phase 1 sample locations [6]	√	√	√	√	√

√	Feature reviewed during data gaps evaluation
√	Indicates sampling proposed based on reviewed feature
--	No buildings present for inspection
N/A	Information source not available for this subarea

Notes

1. Data gap evaluations were performed over smaller footprints within each subarea. The B4020 Area includes the B4020, B4469, B4323, and the area surrounding these buildings and features. The B4055 Area includes B4055, B4055 Liquid Waste Holdup System, B4155, B4373, B4374, B4848, and the area surrounding these buildings and features. Samples within the existing footprint of B4055 and other existing features are not proposed in this submittal. A data gap evaluation will be performed at those features subsequent to their demolition.The Pond Dredge includes the area south of B4020. The B4353/4363 Area includes B4874, B4375, B4875, B4873, B4363, B4473, B4353, B4854, and the area surrounding these buildings. Subarea 5D South includes the hillslope south of Subarea 5D operational areas and the Area IV borrow pit.

2. Evaluation of air dispersion migration pathways was performed using existing sampling results, or proposing additional sampling as warranted along predominant wind directions (NW), and/or in adjacent drainages. For Subarea 5D, air dispersion sources evaluated include stacks at B4020 and B4055, and potential stack locations at buildings including B4353, B4363, and B4373.

3. Other notes and resources used in the data gap process included data dotmaps, a co-located sampling boring log summary table (including analytical and sample depth info), boring and trench logs from the RFI, EPA boring logs from co-located sampling, filterable dataset, and the EPA HSA document. Previous RFI Group reports were used as a reference on an as-needed basis in evaluation of selected features (e.g. building use descriptions).

4. Feature/area identified that may warrant further consideration of groundwater input sources and threat to groundwater sampling requirements by DTSC and SSFL groundwater teams. Identification based on type of feature (typically, a liquid waste disposal or storage feature), and soil detections of mobile chemicals (e.g., VOCs, NDMA, perchlorate, 1,4-dioxane), and/or multiple chemical detections significantly above LUTs.

5. EPA radiological sampling results summaries included as part of chemical data gap evaluation process. For Subarea 5D, no chemical data gaps identified based only on radiological sampling results.

6. Proposed Phase 1 sampling locations where no radiological sample was collected by EPA (due to refusal, safety concerns, etc.) were evaluated to determine if a chemical data gap still existed, with additional sampling proposed in Phase 3 if a gap was identified.

FIGURES

Drainage courses are approximate based on topography, sample locations and aerial photograph review. Actual locations will be refined based on field reconnaissance during sampling.

BZ-NW

Northern Buffer Zone Area IV

Subarea 8 North

Subarea 8 South

Subarea 5C

Subarea 5B

Subarea 5D North

Subarea 5D South

Area IV

Area III

ISI Storage

solar facility

Astronomical

weather station

Shed

Former Ranch House

Test Stand #4

RD-33C RD-33A RD-33B RD-65 RD-91 RD-23 RD-54B RD-54 RD-54A RD-54C RD-22 RD-64 RD-100 RD-50 RD-13 RD-55B RD-55A RD-58C RD-58A RD-58B

PZ-099 PZ-102 PZ-103 PZ-104 PZ-106 PZ-100 PZ-050 PZ-018 PZ-038 PZ-039 PZ-086 PZ-015 PZ-037 PZ-040

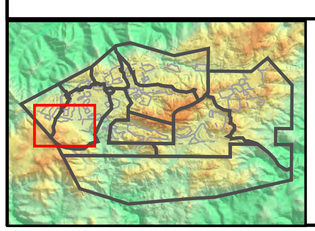
RS-15 RS-17

ES-23 ES-30 ES-28 ES-29 ES-26 ES-17 ES-27 ES-32

HAR-33 HAR-32 HAR-34 HAR-18

5D_DG-501 5D_DG-505 5D_DG-504 5D_DG-502 5D_DG-506 5D_DG-503 5D_DG-509 5D_DG-508 5D_DG-507 5D_DG-510 5D_DG-514 5D_DG-511 5D_DG-512 5D_DG-513 5D_DG-515 5D_DG-599 5D_DG-602 5D_DG-600 5D_DG-601 5D_DG-561 5D_DG-516 5D_DG-560 5D_DG-562 5D_DG-563 5D_DG-558 5D_DG-564 5D_DG-565 5D_DG-566 5D_DG-567 5D_DG-568 5D_DG-569 5D_DG-570 5D_DG-571 5D_DG-573 5D_DG-572 5D_DG-574 5D_DG-576 5D_DG-577 5D_DG-575 5D_DG-578 5D_DG-580 5D_DG-579 5D_DG-581 5D_DG-582 5D_DG-583 5D_DG-596 5D_DG-595 5D_DG-598 5D_DG-597 5D_DG-607 5D_DG-608 5D_DG-520 5D_DG-517 5D_DG-518 5D_DG-603 5D_DG-606 5D_DG-604 5D_DG-605 5D_DG-521 5D_DG-523 5D_DG-522 5D_DG-532 5D_DG-524 5D_DG-528 5D_DG-519 5D_DG-527 5D_DG-525 5D_DG-526 5D_DG-609 5D_DG-540 5D_DG-541 5D_DG-542 5D_DG-545 5D_DG-544 5D_DG-543 5D_DG-546 5D_DG-547 5D_DG-548 5D_DG-559 5D_DG-549 5D_DG-589 5D_DG-555 5D_DG-592 5D_DG-591 5D_DG-594 5D_DG-593 5D_DG-554 5D_DG-556 5D_DG-590 5D_DG-553 5D_DG-588 5D_DG-552 5D_DG-551 5D_DG-550 5D_DG-557 5D_DG-529 5D_DG-535 5D_DG-536 5D_DG-530 5D_DG-531 5D_DG-533 5D_DG-534 5D_DG-537 5D_DG-538 5D_DG-539 5D_DG-584 5D_DG-585 5D_DG-586

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



Base Map Legend

- Administrative Area Boundary
- HSA Subareas
- Clearly Contaminated Areas
- Existing Building or Structure
- Removed Building or Structure
- Ponds
- Excavated Area
- Backfilled Excavation Area
- Pipe
- Leach Field
- Drainage
- Concrete Lined Drainage
- Rock Outcrop
- Dirt Road
- A/C Paving

Groundwater Wells

- Near Surface
- Chatsworth

Trenches

- Previous
- Proposed

The "Combined Analyte" Data Summary includes all chemicals listed in the DTSC Look-up Table (LUT) as well as other chemicals analyzed at the site. The maximum ratio to LUT value was used to color code symbols at each location as shown in the legend. For locations where at least one chemical was detected, the maximum ratio of detected concentration/LUT value was used; otherwise the maximum ratio of MRL/LUT value was used and the location was symbolized as ND. VOCs and TPH are not included in the "combined analyte" comparison since they are typically evaluated separately for characterization and remedial planning.

DataGap Area IV Proposed Samples

- Future Sample Location
- Add to Analytical Suite at Sample Location
- Re-analysis Sample Location (RLs)
- Other Targeted Sample Location
- Tank Sample location
- Stepout/Stepdown Sample location
- Test Pit Location
- Post Demolition Sampling Area

Combined Detect / LUT Values	Combined ND / LUT Values
<= 1x LUT Values	<= 1x LUT Values
1x - 2x LUT Values	1x - 2x LUT Values
2x - 10x LUT Values	2x - 10x LUT Values
10x - 100x LUT Values	10x - 100x LUT Values
> 100x LUT Values	> 100x LUT Values

Subarea 5D
Phase 3 Proposed Soil Matrix Sampling Locations and Previous Data Summary

SANTA SUSANA FIELD LABORATORY

Path: T:\projects\rock3\HSA\Working\Subarea 5D\HSA_5D_Summary.mxd

Date: 8/12/2013

1 inch = 180 feet

0 180 360 Feet

FIGURE 1

Note:
No soil vapor data gap locations proposed in Subarea 5D South.

Drainage courses are approximate based on topography, sample locations and aerial photograph review. Actual locations will be refined based on field reconnaissance during sampling.

Subarea 8 North

Subarea 5C

Subarea 5D North

Subarea 8 South

Subarea 5D South

Area IV

Area III

ISI Storage

Astronomical solar facility

weather station

Test Stand #4

Building 4468 Sump

Building 4020 Leach Field

Building 4055 Vault

Building 4020 Basement and Sumps

Building 4373 Leach Field

Building 4055 Former Fuel Oil UST (UT-12 [UT-55])

Building 4055 Former Radioactive Liquid Waste Hold-up System

Building 4353 Leach Field

Building 4363 Leach Field

PZ-102

PZ-103

PZ-104

PZ-105

RD-13

RD-55A

RD-55B

PZ-036

5DSV_DG-501
5DSV_DG-502
5DSV_DG-503
5DSV_DG-504
5DSV_DG-505
5DSV_DG-506
5DSV_DG-507
5DSV_DG-508
5DSV_DG-509
5DSV_DG-510
5DSV_DG-511
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5DSV_DG-513
5DSV_DG-514
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5DSV_DG-534
5DSV_DG-535
5DSV_DG-536
5DSV_DG-537
5DSV_DG-538
5DSV_DG-539
5DSV_DG-540
5DSV_DG-541
5DSV_DG-542
5DSV_DG-543
5DSV_DG-544
5DSV_DG-545
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5DSV_DG-556
5DSV_DG-557
5DSV_DG-558

4100 4009 4020 4055 4155 4343B 4343A 4373 4374 4375 4461 4462 4468 4473 4485 4484 4487 4482 4383 4393 4628 4015 4425 4854 4863 4873 4363 4865 3794 3777 3265 3274 3261

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

Base Map Legend

- Administrative Area Boundary
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- Clearly Contaminated Areas
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- Removed Building or Structure
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- Excavated Area
- Backfilled Excavation Area
- Pipe
- Leach Field
- Drainage
- Concrete Lined Drainage
- Rock Outcrop
- Dirt Road
- A/C Paving

Groundwater Wells

- Near Surface
- Chatsworth

Trenches

- Previous
- Proposed

- Proposed Soil Vapor Sample Locations
- Futures Soil Vapor Sample Locations
- Area/Feature Identifed as Potential Input Location to Groundwater Contamination
- Post Demolition Sampling Area

Subarea 5D
Phase 3 Proposed Soil Vapor Sampling Locations
SANTA SUSANA FIELD LABORATORY

Path: T:\projects\rock3\HSA\Working\Subarea 5D\HSA_5D_SoilVapor.mxd

Date: 8/12/2013

1 inch = 100 feet

0 100 200 Feet

FIGURE 2

BZ-NW

Northern Buffer Zone Area IV

Subarea 8 North

Subarea 8 South

Subarea 5B

Subarea 5C

Subarea 5D North

Subarea 5D South

Area IV

Area III

Drainage courses are approximate based on topography, sample locations and aerial photograph review. Actual locations will be refined based on field reconnaissance during sampling.

Conduct geophysical survey to evaluate potential leach field location identified during historical interviews (EPA HSA Subarea 5D TM). Excavate exploratory trenches and sample if warranted based on survey results.

ISH Storage

Astronomical solar facility

weather station

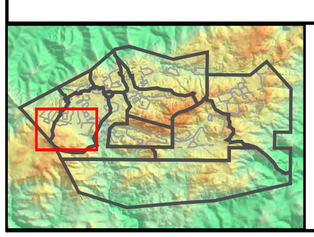
Former Ranch House

Shed

Test Stand #4

RD-33C RD-33B RD-33A RD-22 RD-64 RD-23 RD-54B RD-54C RD-54A RS-54 PZ-099 RD-65 PZ-102 RD-91 RD-100 PZ-100 PZ-101 RD-21 RD-50 RD-13 PZ-103 PZ-104 PZ-105 PZ-106 RS-15 RS-17 PZ-029 PZ-030 PZ-031 PZ-018 ES-23 ES-29 ES-28 ES-30 PZ-050 WS-11 PZ-013 PZ-038 ES-16 RS-09 PZ-039 HAR-33 ES-27 HAR-32 RS-14 RS-33 ES-26 ES-17 PZ-015 ES-32 RD-55B PZ-036 RD-55A HAR-34 HAR-18 PZ-037 RD-58C RD-58A RD-58B PZ-040

4885 4609 4604 4886 4370 4814 4314 4730 4820 4514 4425 4100 4009 4020 4155 4055 4468 4374 4373 4343B 4343A 4015 4375 4473 4863 4873 4363 4865 4854 4486 4485 4484 4483 4487 4383 4393 4611 4463 4462 4461 4628 3108 3271 3264 3227 3109 3905 3252 3251 3600 3916 3XXX 3794 3777 3780 3747 3263 3973 3253 3254 3265 3318 3256 3255 3262 3274 3261 3389



Base Map Legend

- Administrative Area Boundary
- HSA Subareas
- Clearly Contaminated Areas
- Existing Building or Structure
- Removed Building or Structure
- Ponds
- Excavated Area
- Backfilled Excavation Area
- Pipe
- Leach Field
- Drainage
- Concrete Lined Drainage
- Rock Outcrop
- Dirt Road
- A/C Paving

Groundwater Wells

- Near Surface
- Chatsworth

Trenches

- Previous
- Proposed
- Test Pit Location

Figure Legend

- Sanitary Sewer Line
- Proposed Geophysical Survey Area
- Post Demolition Sampling Area

Tank Legend

- Alcohol
- Chemicals
- Coal
- DI Water
- Drinking Water
- Flourine
- GHE
- Helium
- Hydrazine
- Morpholine
- Natural Gas
- Nitrogen
- Other
- Petroleum Fuel/Oil Tank
- R/A Water
- Septic
- Sodium
- Solvent
- TCE
- Unknown
- Water

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

Subarea 5D
Proposed Locations of Geophysical Surveys

SANTA SUSANA FIELD LABORATORY

Path: T:\projects\rock3\HSA\Working\Subarea 5D\HSA_5D_Geophysical.mxd

Date: 8/12/2013

1 inch = 180 feet

0 180 360 Feet

FIGURE 3

ATTACHMENTS

DTSC Chemical Look-Up Table for DOE NASA at SSFL

June 2013

Chemical Constituent	Units	Look-Up Table Value	Basis
Alcohols - EPA Method 8015B			
Ethanol	mg/kg	0.7	BG MRL
Methanol	mg/kg	0.7	BG MRL
Anions - EPA Methods 300.0 / 9056A			
Fluoride	mg/kg	10.2	BTV
Nitrate	mg/kg	22.3	BTV
Cyanide - EPA Method 9012A			
Cyanide	mg/kg	0.6	BG MRL
Dioxin-Furans - EPA Method 1613B			
1,2,3,4,6,7,8-HpCDD	pg/g	see note[1]	---
1,2,3,4,6,7,8-HpCDF	pg/g	see note[1]	---
1,2,3,4,7,8,9-HpCDF	pg/g	see note[1]	---
1,2,3,4,7,8-HxCDD	pg/g	see note[1]	---
1,2,3,4,7,8-HxCDF	pg/g	see note[1]	---
1,2,3,6,7,8-HxCDD	pg/g	see note[1]	---
1,2,3,6,7,8-HxCDF	pg/g	see note[1]	---
1,2,3,7,8,9-HxCDD	pg/g	see note[1]	---
1,2,3,7,8,9-HxCDF	pg/g	see note[1]	---
1,2,3,7,8-PeCDD	pg/g	see note[1]	---
1,2,3,7,8-PeCDF	pg/g	see note[1]	---
2,3,4,6,7,8-HxCDF	pg/g	see note[1]	---
2,3,4,7,8-PeCDF	pg/g	see note[1]	---
2,3,7,8-TCDD	pg/g	see note[1]	---
2,3,7,8-TCDF	pg/g	see note[1]	---
OCDD	pg/g	see note[1]	---
OCDF	pg/g	see note[1]	---
2,3,7,8-TCDD TEQ			
2,3,7,8-TCDD TEQ[1]	pg/g	0.912 (see note[1])	BTV-TEQ
Energetics - EPA Method 8330			
RDX	µg/kg	300	M-L MRL
Formaldehyde - EPA Method 8315A			
Formaldehyde	µg/kg	1,870	BG MRL

DTSC Chemical Look-Up Table for DOE NASA at SSFL

June 2013

Chemical Constituent	Units	Look-Up Table Value	Basis
Herbicides - EPA Method 8151A			
2,4,5-T	µg/kg	1.2	BTV
2,4,5-TP	µg/kg	0.63	BTV
2,4-D	µg/kg	5.8	BTV
2,4-DB	µg/kg	2.4	BG MRL
2,4-DP (Dichloroprop)	µg/kg	2.4	BTV
Dalapon	µg/kg	12.5	BG MRL
Dicamba	µg/kg	1.3	BTV
Dinoseb	µg/kg	3.3	BG MRL
MCPA	µg/kg	761	BTV
MCPP (Mecoprop)	µg/kg	377	BTV
Pentachlorophenol	µg/kg	170	M-L MRL
Metals - EPA Methods 6010B/6020A			
Aluminum	mg/kg	58,600	BTV
Antimony	mg/kg	0.86	BTV
Arsenic	mg/kg	46	BTV
Barium	mg/kg	371	BTV
Beryllium	mg/kg	2.2	BTV
Boron	mg/kg	34	BTV
Cadmium	mg/kg	0.7	BTV
Chromium	mg/kg	94	BTV
Cobalt	mg/kg	44	BTV
Copper	mg/kg	119	BTV
Lead	mg/kg	49	BTV
Lithium	mg/kg	91	BTV
Manganese	mg/kg	1,120	BTV
Molybdenum	mg/kg	3.2	BTV
Nickel	mg/kg	132	BTV
Potassium	mg/kg	14,400	BTV
Selenium	mg/kg	1	BTV
Silver	mg/kg	0.2	BTV
Sodium	mg/kg	1,780	BTV
Strontium	mg/kg	163	BTV
Thallium	mg/kg	1.2	BTV
Vanadium	mg/kg	175	BTV
Zinc	mg/kg	215	BTV
Zirconium	mg/kg	19	BTV
Hexavalent Chromium - EPA Methods 7199/7196A			
Hexavalent Chromium	mg/kg	2	BTV
Mercury - EPA Methods 7471A/7470A			
Mercury	mg/kg	0.13	BG MRL
Methyl Mercury - EPA Method 1630 (Mod)			
Methyl Mercury	µg/kg	0.05	M-L MRL

DTSC Chemical Look-Up Table for DOE NASA at SSFL

June 2013

Chemical Constituent	Units	Look-Up Table Value	Basis
PCBs / PCTs - EPA Method 8082			
Aroclor 1016	µg/kg	17	M-L MRL
Aroclor 1221	µg/kg	33	M-L MRL
Aroclor 1232	µg/kg	17	M-L MRL
Aroclor 1262	µg/kg	33	M-L MRL
Aroclor 1254	µg/kg	17	M-L MRL
Aroclor 1260	µg/kg	17	M-L MRL
Aroclor 1268	µg/kg	33	M-L MRL
Aroclor 1242	µg/kg	17	M-L MRL
Aroclor 1248	µg/kg	17	M-L MRL
Aroclor 5432	µg/kg	50	M-L MRL
Aroclor 5442	µg/kg	50	M-L MRL
Aroclor 5460	µg/kg	50	M-L MRL
Perchlorate - EPA Methods 6850/6860			
Perchlorate	µg/kg	1.63	BTV
Pesticides - EPA Method 8081A			
Aldrin	µg/kg	0.24	BG MRL
Alpha-BHC	µg/kg	0.24	BG MRL
Beta-BHC	µg/kg	0.23	BTV
Chlordane	µg/kg	7	BTV
Delta-BHC	µg/kg	0.22	BTV
Dieldrin	µg/kg	0.48	BG MRL
Endosulfan I	µg/kg	0.24	BG MRL
Endosulfan II	µg/kg	0.48	BG MRL
Endosulfan Sulfate	µg/kg	0.48	BG MRL
Endrin	µg/kg	0.48	BG MRL
Endrin Aldehyde	µg/kg	0.7	BTV
Endrin Ketone	µg/kg	0.7	BTV
Gamma-BHC - Lindane	µg/kg	0.24	BG MRL
Heptachlor	µg/kg	0.24	BG MRL
Heptachlor Epoxide	µg/kg	0.24	BG MRL
Methoxychlor	µg/kg	2.4	BG MRL
Mirex	µg/kg	0.5	BTV
p,p-DDD	µg/kg	0.48	BG MRL
p,p-DDE	µg/kg	8.6	BTV
p,p-DDT	µg/kg	13	BTV
Toxaphene	µg/kg	8.8	BG MRL

DTSC Chemical Look-Up Table for DOE NASA at SSFL

June 2013

Chemical Constituent	Units	Look-Up Table Value	Basis
Semi-Volatiles (SVOCs)/PAHs - EPA Method 8270C(SIM)			
Acenaphthylene	µg/kg	2.5	BG MRL
Anthracene	µg/kg	2.5	BG MRL
Benzo(a)anthracene	µg/kg	see note [2]	---
Benzo(a)pyrene	µg/kg	see note [2]	---
Benzo(b)fluoranthene	µg/kg	see note [2]	---
Benzo(g,h,i)perylene	µg/kg	2.5	BG MRL
Benzo(k)fluoranthene	µg/kg	see note [2]	---
Bis(2-Ethylhexyl)phthalate	µg/kg	61	BTV
Butylbenzylphthalate	µg/kg	100	BTV
Chrysene	µg/kg	see note [2]	---
Dibenz(a,h)anthracene	µg/kg	see note [2]	---
Diethyl phthalate	µg/kg	27	BG MRL
Dimethyl phthalate	µg/kg	27	BG MRL
Di-n-butylphthalate	µg/kg	27	BG MRL
Di-n-octylphthalate	µg/kg	27	BG MRL
Fluoranthene	µg/kg	5.2	BTV
Fluorene	µg/kg	3.8	BTV
Indeno(1,2,3-cd)pyrene	µg/kg	see note [2]	---
Naphthalene	µg/kg	3.6	BTV
Phenanthrene	µg/kg	3.9	BTV
Pyrene	µg/kg	5.6	BTV
1-Methyl naphthalene	µg/kg	2.5	BG MRL
2-Methylnaphthalene	µg/kg	2.5	BG MRL
Acenaphthene	µg/kg	2.5	BG MRL
Benzo(a)pyrene Equivalent			
Benzo(a)pyrene TEQ[2]	µg/kg	4.47 (see note[2])	BTV-TEQ
Other SVOCs			
Benzoic Acid - EPA 8270	µg/kg	660	M-L MRL
N-Nitrosodimethylamine - 8270C(SIM)	µg/kg	10	M-L MRL
Phenol - EPA 8270	µg/kg	170	M-L MRL
TPH - EPA Method 8015			
TPH EFH (C15-C20)[3]	mg/kg	5 (see note[3])	M-L MRL
Terphenyls - EPA Method 8015			
o-Terphenyl	mg/kg	7	M-L MRL

DTSC Chemical Look-Up Table for DOE NASA at SSFL

June 2013

Chemical Constituent	Units	Look-Up Table Value	Basis
VOCs - EPA Method 8260			
1,1-Dichloroethene	µg/kg	5	M-L MRL
1,4-Dioxane - EPA 8260 (SIM)	µg/kg	10	M-L MRL
2-Hexanone	µg/kg	10	M-L MRL
Acetone	µg/kg	20	M-L MRL
Benzene	µg/kg	5	M-L MRL
cis-1,2-Dichloroethene	µg/kg	5	M-L MRL
Ethylbenzene	µg/kg	5	M-L MRL
Hexachlorobutadiene	µg/kg	5	M-L MRL
Methylene chloride	µg/kg	10	M-L MRL
Tetrachloroethene	µg/kg	5	M-L MRL
Toluene	µg/kg	5	M-L MRL
Trichloroethene	µg/kg	5	M-L MRL
Vinyl chloride	µg/kg	5	M-L MRL

Notes:

mg/kg: milligrams per kilogram (parts per million)
µg/kg: micrograms per kilogram (parts per billion)
pg/g: picograms per gram (parts per trillion)
BTV: Background threshold value
BG-MRL: Background method reporting limit
M-L MRL: Multi-Lab method reporting limit
PAH: Polyaromatic hydrocarbon
PCB: Polychlorinated biphenyl
PCT: Polychlorinated terphenyl
RDX: Research Department Explosive
SIM: Selective ion monitoring
SVOC: Semi-volatile organic compound
TEQ: Toxicity equivalency
TPH EFH: Total petroleum hydrocarbon - extractable fuel hydrocarbon
VOC: Volatile organic compound

[1] DTSC applied the World Health Organization's 2,3,7,8-TCDD toxicity equivalence approach for dixoin-furans. To evaluate 2,3,7,8-TCDD equivalence, dixoin-furans need to meet respective background study MRLs.

[2] Benzo(a)pyrene equivalence developed based on sum of carcinogenic PAHs. In order to evaluate Benzo(a)pyrene equivalence, carcinogenic PAHs need to meet respective background study MRLs.

[3] For locations where TPH is the sole contaminant, a cleanup strategy will be considered based on the findings of soil treatability study.

Attachment 2
Table F
Field Tracker
Subarea 5D

Table A
Go Back Tracker
Draft for Review
Revised: August 13, 2013

Location / Action	Explanation
Subarea 5C	
Slightly elevated detections above ISLs	Evaluate concentrations at or slightly above ISLs once final Lookup Table and background values are published.
Elevated RLs	Final check of historical data with elevated RLs to determine that sufficient nearby sampling has been performed and historical data uncertainties resolved.
Remaining Structures	Features located within buildings identified during the Building Feature Survey will be evaluated during demolition and sampling will be performed following building removal when soil is exposed (see Table B for details). Existing buildings/features that will be evaluated during demolition have been identified in proposed sampling location figures as "Post Demo."
B4100	Two phenanthrene detections on east side of B4100 (BHBS1011, BHBS1012) are slightly above the ISL, and are co-located with TPH. These samples targeted a feature and no significant detects were observed. No sampling recommended pending final Lookup Table values.
NDMA	NDMA exceeds the ISL (0.037 µg/kg) for low level Method 1625 at six locations up to 13x (SL-059-SA5C, 0.48 µg/kg), but is below the 8270 LDC of 1.8 µg/kg. Therefore no additional sampling is recommended at this time; however, NDMA occurrence will be re-evaluated after final Lookup Table values have been established. Locations will also be addressed / resampled for formaldehyde at that time, specifically at B4015 Field, B4383 Leach Field Area, B4100, B4065 metals clarifier, and SNAP.
SE portion of B4015 Fill Area	Sample locations are proposed in Area III based on observed extent of fill area, downdrainage, and downslope of existing sample results and will be collected at a future date pending receipt of SHPO approval. These sample locations are identified as "future locations" in proposed sampling location figures.
Sewer / Natural Gas Pipelines	Investigation and proposed sampling strategies for existing sitewide infrastructure including natural gas pipelines and sanitary sewer lines and associated infrastructure are in progress and will be evaluated separately.
Northwest of B100 Trench (within Subarea 8N)	Evaluate aerial dispersion/deposition from burning activities at B100 Trench within Building 4056 landfill annex area. Proposed sampling at landfill annex sufficiently dense to evaluate potential impacts from B100 trench burning activities, although additional surface samples could be added to address this uncertainty. Consider surface/random sampling NW of trench within Subarea 8N. Sampling density in all directions sufficient to evaluate impacts of air dispersion (Subarea 8 locations pending).
B4038	Add post demo location in west portion of B4038 footprint to characterize open storage area.
Potential Laboratory Contaminants	Review laboratory contaminant uncertainties after all new VOC (e.g. methylene chloride) and SVOC (phthalates) data are collected and after background is finalized.
Perchlorate	Confirmation sampling and/or additional stepout/stepdown sampling may be required depending on additional data review of previous Phase 1 results.
EPA Radiological Data	EPA data summaries used for current gap analysis. Phase 1 co-located sampling results and previous RFI data will be re-evaluated following release of final EPA Area IV radiological sampling results for subarea.
Air dispersion from B4055	Sampling density north of Building 4055 within subarea 5C will be evaluated for potential aerial dispersion during the HSA 5D North data gap analysis.
Deep boring data at B4059	Review laboratory analytical data for three deep boring locations at Building 4059 (SNAP).
Radiological sampling at B4015 field	Check radiological sampling results to ensure sampling is performed at east end of B4015 field.
B4015 Demo Documentation	Follow up with Boeing for recent B4015 demolition documentation (feature removal logs, sample results) and evaluate for data gaps.
Subarea 5B	
PCBs at SCTI	Evaluate sporadic PCB detections (up to 41 ppb - 2.0x ISL) in the SCTI area after final Lookup Table values are established.
B4006/B4011 Demo Documentation	Follow up with Boeing for recent B4006/B4011 demolition documentation (feature removal logs, sample results) and evaluate for data gaps.
Air dispersion from stacks at SNAP facilities	Sampling density north of Building 4010, 4012, and B4019 will be evaluated for potential aerial dispersion during the Subarea 7 data gap analysis.

Table A
Go Back Tracker
Draft for Review
Revised: August 13, 2013

Location / Action	Explanation
Subarea 5A	
Potential leach field near B4030	Evaluate soil boring log and trench log information from sampling locations near B4030 for fill or any indication of leach field materials – gravels, terra cotta piping, etc.
Air dispersion from B4024	Sampling density north of Building 4024 will be evaluated for potential aerial dispersion during the Subarea 7 data gap analysis.
Deep boring data near B4073	Review laboratory analytical data for two deep boring locations near Building 4073 (KEWB).
Subarea 6	
Deep boring data near B4143	Review laboratory analytical data for deep boring locations near Building 4143 (SRE).
Analyze morpholine at B4003	Cooling tower documented at B4003. Evaluate morpholine results in samples collected in Subarea 5B to determine if analysis warranted in Subarea 6.
SRE demo activities (2000) soil borrow source	Research soil borrow source location for SRE demolition activities performed in 2000.
Subarea 3	
Recent Subarea 3 analytical results	Obtain analytical results for sampling performed in 2012 from NASA and evaluate for data gaps.
Subarea 7	
Phase 1 Herbicides / Pesticides / PCBs	Verify revised data validation qualifiers and/or reporting limits resulting from 2011/2012 laboratory studies and correct Phase 1 data prior to final Phase 3 data evaluation.
Subarea 8	
B4009 Demo	Follow up with Boeing for upcoming B4009 demolition documentation (feature removal logs, sample results) and evaluate for data gaps.
FSDF Air Dispersion Sampling	Evaluate proposed air dispersion sampling results for FSDF (8_DG-521 and 8_DG-601) within the context of four 'future' air dispersion samples that will be collected west of the Area IV boundary and additional sampling that will be proposed in the NBZ subarea.
FSDF Soil Vapor Sampling	Evaluate need for periodic sampling of semi-permanent SV probe depending on initial Phase 3 data gap sampling results and remedial planning needs
B4100 Trench Air Dispersion Sampling	Evaluate proposed air dispersion sampling results for B4100 Trench (8_DG-585, 8_DG-588, 8_DG5-89, 8_DG-591, and 8_DG-592) within the context of additional sampling that will be proposed in the NBZ subarea.
Subarea 5D	
B4055 Demo	Follow up with Boeing for upcoming B4055 demolition documentation (feature removal logs, sample results) and evaluate for data gaps. Prior to demo, review draft Subarea 5D Data Gap Tech Memo SAP tables for proposed soil and soil vapor locations within the B4055 post demolition footprint.

Note: Table A is a compiled list of action items and issues that require resolution at a future date. The table will be updated and augmented with each subsequent data gap analysis to create a master list. Locations shaded grey indicate go back items that apply to all subareas in Area IV.

Table B
Building Feature Sampling Recommendations for Demolition Program
Subarea 5D
Draft for Review

Feature No.[1]	Feature Type	Description	Sampling Rationale[2]
4055-001	Containment Area	Concrete tank storage area located above the Nuclear Material Storage Vault (Rm 131) along the western portion of B4055. The berm around the containment is 6" high.	Recommend post-demolition soil sampling at one location, targeting the soil directly beneath the containment area and vault. Historical drawings indicate the vault is 7 feet deep. Collect soil samples targeting soil directly beneath the vault floor, at approximately 7.5' bgs and then at 5 foot intervals to bedrock with the deepest sample targeting soil just above bedrock. Analyze for PAHs, dioxins, PCBs, metals, TPH, and pH. Install one soil vapor probe targeting soil beneath the former liquid waste holdup tank system ; collect and analyze samples at 7.5 and 12.5 feet bgs.
4055-002	Drain	Located inside the eastern portion B4055, the drain appears to be affiliated with chemical safety equipment (eye wash, safety shower) in the room. At the time of inspection, the drain and surrounding floor was clean and did not appear to have been used.	Inspect and perform post-demolition soil sampling if staining or other impacts observed. If sampling warranted, target the soil directly beneath the drain / subsurface pipe. Collect samples at 0.5', 5', and 10' bgs. Analyze for PAHs, dioxins, PCBs, metals, TPH, and pH.
4055-003	Sink: Sanitary	Used for sanitary waste conveyance, the sink and drain are located within a small janitorial closet in the northern portion of B4055.	Inspect and perform post-demolition soil sampling if staining or other impacts observed. If sampling warranted, target the soil directly beneath the drain / subsurface pipe. Collect samples at 0.5', 5', and 10' bgs. Analyze for PAHs, dioxins, PCBs, metals, TPH, and pH.
4055-004	Sink: Sanitary	Used for sanitary waste conveyance in the B4055 men's restroom, which also contained two urinals, two toilets, one sink, and one 4-inch floor drain.	Inspect and perform post-demolition soil sampling if staining or other impacts observed. If sampling warranted, target the soil directly beneath the drain / subsurface pipe. Collect samples at 0.5', 5', and 10' bgs. Analyze for PAHs, dioxins, PCBs, metals, TPH, and pH.
4055-005	Sink: Sanitary	Used for sanitary waste conveyance in the B4055 women's restroom, which also contained two toilets, one sink, and one 4-inch floor drain.	Inspect and perform post-demolition soil sampling if staining or other impacts observed. If sampling warranted, target the soil directly beneath the drain / subsurface pipe. Collect samples at 0.5', 5', and 10' bgs. Analyze for PAHs, dioxins, PCBs, metals, TPH, and pH.
4055-006	Sink: Sanitary	Used for sanitary waste conveyance located in restroom in the northern portion of B4055, which also contained one toilets, one sink, and one 4-inch floor drain.	Inspect and perform post-demolition soil sampling if staining or other impacts observed. If sampling warranted, target the soil directly beneath the drain / subsurface pipe. Collect samples at 0.5', 5', and 10' bgs. Analyze for PAHs, dioxins, PCBs, metals, TPH, and pH.
4055-007	Stain	Rust stain identified at the concrete pad associated with former radioactive liquid waste holdup system located southeast of B4055.	Previous soil and soil vapor sampling performed immediately adjacent to the feature at U5BS1070, SL-064-SA5DN, and U5SV1036. PAHs, metals, dioxin TEQ, pesticides, herbicides, and TPH were detected above LUT values. Recommend post-demolition soil sampling at two locations targeting soil directly beneath the former liquid waste holdup system. Historical facility drawings indicate the holdup system depth to be approx. 5' to 7' bgs. Collect sample targeting soil immediately below the bottom of the holdup system concrete containment at approx 5' bgs, and then at 5 foot intervals to bedrock with the deepest sample targeting soil just above bedrock. Analyze PAHs, dioxins, PCBs, metals, TPH, and pH. Intsall one soil vapor location targeting soil directly beneath the former liquid waste holdup tank system; analyze at 5' and 10' bgs.

Table B
Building Feature Sampling Recommendations for Demolition Program
Subarea 5D
Draft for Review

Feature No.[1]	Feature Type	Description	Sampling Rationale[2]
4055-008	Stain	Staining identified near the asphalt and concrete surrounding the functioning air conditioning equipment located outside the southeast portion of B4055. Rust stains surround the equipment and traveled downgradient (south).	Inspect and perform post-demolition soil sampling if staining or other impacts observed. If sampling warranted, target the soil directly beneath the asphalt / concrete. Collect samples at 0.5', 5', and 10' bgs and analyze PAHs, dioxins, PCBs, metals, TPH, and pH.

Notes:

1. Building feature number, type and description are from the Group 5 RFI Sampling and Analysis Plan (CH2M Hill, 2008) and aerial photo review.

2. Soil beneath and around features will be observed and inspected for signs of potential chemical impacts during demolition/removal. Signs of potential impacts to soil include staining, odors, elevated PID readings, and debris. Unless otherwise specificed samples will be analyzed by the general analytical suite for Subarea 7 which includes PAHs, PCBs, dioxins, metals, and TPH.

References

CH2M Hill, 2008. Group 5 – Central Portion of Areas III and IV RCRA Facility Investigation Report Santa Susana Field Laboratory, Ventura County, California. November.

Acronyms

LUT - lookup table
PAH - polyaromatic hydrocarbons
PCB - polychlorinated biphenyls
SL - screening level
TEQ - toxic equivalency quotient
TPH - total petroleum hydrocarbons

Table C
Tank Summary and Tracker
Subarea 5D
Draft for Review

Tank ID	Tank location known?	If no, proposed resolution
4701 (701)	Y	
4702 (702)	Y	
B4055 Radioactive Liquid Waste System (two 1,000-gallon holdup tanks, one 230-gallon receiver tank, and one hot waste clarifier tank located in a subsurface vault)	Y	EPA HSA TM identifies hot waste clarifier as T-1, 230-gal receiver tank as T-2, and 1000-gal holdup tanks as T-3 and T-4.
B4375 Drain Tank	Y	
Building 4373 Septic Tank	N	The septic tank was likely removed with the B4373 leach field. The former leach line likely exited B4373 in the southwest corner. Sufficient sampling has been performed in the area of leach field and septic for characterization.
T-1	N	1,000-gallon stainless steel tank located at B4863 contained DI water and was included in the Sitewide Inventory of Tanks TM. No sampling warranted since contents of tank not related to chemical storage.
T-2	N	2,000-gallon stainless steel tank located at B4863 contained DI water and was included in the Sitewide Inventory of Tanks TM. No sampling warranted since contents of tank not related to chemical storage.
T-5	N	1,500-gallon stainless steel tank located at B4863 contained DI water and was included in the Sitewide Inventory of Tanks TM. No sampling warranted since contents of tank not related to chemical storage.
T-12	N	16,000-gallon stainless steel tank located at B4863 contained DI water and was included in the Sitewide Inventory of Tanks TM. No sampling warranted since contents of tank not related to chemical storage.
T-156	N	10,000-gallon stainless steel tank located at B4863 contained DI water and was included in the Sitewide Inventory of Tanks TM. No sampling warranted since contents of tank not related to chemical storage.
Unknown-AT-HL-1	Y	
Unknown-AT-HL-2	Y	
Unknown-AT-HL-3	Y	
Unknown-AT-HL-4	N	500-gallon carbon steel tank contained diesel fuel and was located at B4020. Included in the Sitewide Inventory of Tanks TM. Existing and proposed sampling in adjacent operational areas sufficient to assess uncertainty of tank location.
Unknown-AT-HL-5	Y	
Unknown-AT-L5-1	Y	
Unknown-AT-L5-2	Y	
Unknown-AT-L5-3	Y	
Unknown-AT-L5-4	Y	
Unknown-AT-L6-1	Y	
Unknown-AT-L6-2	Y	

Table C
Tank Summary and Tracker
Subarea 5D
Draft for Review

Tank ID	Tank location known?	If no, proposed resolution
Unknown-AT-L6-3	Y	
Unknown-AT-L6-4	Y	
Unknown-AT-L6-5	Y	
Unknown-AT-L6-6	Y	
Unknown-AT-L6-7	Y	
Unknown-AT-L6-8	Y	
Unknown-AT-L6-9	Y	
Unknown-AT-L7-1	Y	
Unknown-UT-L6-1	Y	
Unknown-UT-U5-5	N	Tank was identified in Sitewide Inventory of Tanks TM. However, referenced document in TM does not describe the tank. Observe soils beneath slabs and building foundations and inspect for signs of UST during demolition activities.
UT-07	N	Radioactive waste tank formerly located in the northern portion of B4020. The demolition and removal of B4020, including its subsurface structures, was completed in 1998 as part of D&D of the facility. Existing and proposed sampling in adjacent operational areas sufficient to address uncertainty of tank location.
UT-08	Y	
UT-09	Y	
UT-10	Y	
UT-11	Y	
UT-12 (UT-55)	Y	
UT-13	Y	
UT-56	Y	
UT-57	Y	
UT-58	Y	
UT-64	Y	
UT-65	Y	
UT-72	Y	
UT-75	Y	

Notes:
1. Tank identification numbers were taken from the Sitewide Inventory of Tanks Technical Memorandum (CH2M Hill, 2011) and the Group 5 RFI Report (CH2M Hill, 2008).

Table D
Potential Threat to Groundwater Tracker
Subarea 5D
Draft for Review

Location	Explanation
Building 4020 Basement and Sumps	The B4020 basement included three sumps that provided support for the drain subsystem and may warrant additional consideration by groundwater teams for threat to groundwater. During initial construction, the facility radioactive drain was connected to two 500-gallon holdup tanks that were located in the north end of the basement. One of the tanks was designed for high-level waste and the other for low-level waste. Following an incident whereby these tanks overflowed, the system was modified by installing a 3,000-gallon tank in Building 4468 (to the east of B4020) in around 1970, and removing the 500-gallon tanks in 1977. After the new system had been put into place, the contents of these sumps were pumped into the Building 4468 holdup tank. Constituents detected above background/LUT values in soil at or near the B4020 basement include metals (cadmium at up to 0.79 ppm at up to 1 ft bgs and mercury at up to 0.27 ppm at up to 5 ft bgs), PAHs (benzo(g,h,i)perylene, fluoranthene, pyrene, anthracene, and pyrene at up to 110 ppb), BaP TEQ at up to 24.2 at up to 13 ft bgs, SVOCs (butylbenzylphthalate at 260 ppb at 0.5 ft bgs in SL-032-SA-5DN), PCBs (Aroclor 1248 and Aroclor 1254 at up to 120 ppb at 12.5 ft bgs in SL-028-SA5DN) , dioxins (TEQ at up to 1.3 ppt at 0.5 ft bgs), perchlorate at 3.2 ppb at 11 ft bgs in SL-032-SA5DN, pesticides (chlordane at 155 ppb at 0.5 ft bs in SL-024-SA5DN), fluoride at up to 20.7 ppm at 5 ft bgs in SL-032-SA5DN, TPH (diesel and oil range organics at up to 170 ppm at up to 18 ft bgs), and VOCs (methylene chloride at 15 ppb at 5 ft bgs in SL-033-5ADN). One shallow groundwater monitoring well (PZ-103) is located approximately 120 ft northeast of B4020. The nearest deep groundwater monitoring well (RD-13) is located approximately 300 ft southwest of B4020. For the Phase 3 sampling, previous soil sampling within the footprint of the B4020 basement is adequate to characterize soil conditions. The B4020 basement is targeted for soil vapor sampling at three locations within its footprint.
Building 4020 Leach Field	B4020, upon construction, was connected to two septic tanks and a leach field. The leach field included a drain line that exited from the east along 24th street through a 1 1/2-inch drain to a ditch. Though the MARSSIM final status survey report indicated that the leach field and septic tanks were never used, the 1959 construction date of B4020 pre-dates the period that the building was connected to the Area III sewage treatment plant in 1960. Therefore, the leach field may warrant additional consideration by groundwater teams for threat to groundwater and additional sampling needs as a potential liquid waste disposal feature that may have caused focused recharged conditions. The leach field and septic systems were removed in 1997 along with the removal of the liquid waste facility, Building 4468. Constituents detected above background/LUT values in soil at or near the B4020 leach field include metals (cadmium at 0.78 ppm at 0.5 ft bgs in SL-042-SA5DN and hexavalent chromium at 2.1 ppm at 5 ft bgs in SL-041-SA5DN), PAHs (benzo(g,h,i)perylene, pyrene, and fluoranthene, at up to 30 ppb), BaP TEQ at up to 28.2 at up to 5 ft bgs, SVOCs (bis(2-ethylhexyl)phthalate and di-n-octylphthalate at up to 130 ppb at 0.5 ft bgs) PCBs, (Aroclor 1254 at 34 ppb at 0.5 ft bgs in SL-041-SA5DN), dioxins (TEQ at up to 7.3 ppt), pesticides (beta-CHC at 1.1 ppb at 0.5 ft bgs in SL-042-SA5DN), and TPH (diesel and oil range organics at up to 250 ppm). One shallow groundwater monitoring well (PZ-103) is located approximately 180 ft northeast of the B4020 leach field. The nearest deep groundwater monitoring well (RD-13) is located approximately 380 ft southwest of the B4020 leach field. For the Phase 3 sampling, previous soil sampling within the footprint of the leach field is adequate to characterize soil conditions. The leach field is targeted for soil vapor sampling at one location.
Building 4468 Sump	B4468 housed a 3,000-gallon underground waste holdup tank that was connected to B4020. The building also consisted of a 12-foot below-grade structure of poured concrete. During operation, the building was prone to occasional groundwater seepage that would fill the facility sump and overflow onto the floor. Therefore, B4468 may warrant additional consideration by groundwater teams for threat to groundwater since there was potential for liquid waste discharge. Constituents detected above background/LUT values at B4668 include dioxins (TEQ at up to 10.5 ppt at up to 5 ft bgs), fluoride at 12.4 ppm at 5 ft bgs in SL-039-SA5DN, PAHs (acenapthene, anthracene, benzo(g,h,i)perylene, fluoranthene, phenanthrene, and pyrene at up to 430 ppb), Bap TEQ at up to 193 ppb, and TPH (diesel and oil range organics at up to 300 ppm at 12.5 ft bgs). One shallow groundwater monitoring well (PZ-103) is located approximately 130 ft northeast of B4468. The nearest deep groundwater monitoring well (RD-13) is located approximately 425 ft southwest of B4468. For the Phase 3 sampling, previous soil sampling within the footprint of B4468 is adequate to characterize soil conditions. B4468 is targeted for soil vapor sampling at one location within its footprint.
Building 4055 Former Liquid Waste Holdup System Area	The Building 4055 former liquid waste holdup system area may warrant additional consideration by groundwater teams for threat to groundwater. The B4055 drains, service sinks, and laboratory sinks were connected by underground pipe to a radioactive liquid waste system located within a fenced area southeast of the facility. The liquid waste system consisted of consisting of a hot waste clarifier in a 15 x 20 foot subsurface concrete vault, a 230-gallon receiver tank, and two 1,000-gallon holding tanks. The waste system has been removed, but the concrete vault and fence is still in place. Constituents detected above background/LUT values at locations adjacent to the former liquid wasted holdup system include metals (cadmium at 0.87 ppm and mercury at 2.61 ppm at 0.5 ft bgs in SL-064-SA5DN), PAHs (anthracene, benzo(g,h,i)perylene, fluoranthene, phenanthrene, and pyrene at up to 79 ppb), BaP TEQ at 48.6 ppb at 0.5 ft bgs in SL-064-SA5DN, dioxins (TEQ at 19.5 ppt at 0.5 ft bgs in SL-064-SA5DN), herbicides (MCPA at 990 ppb at 0.5 ft bgs in SL-064-SA5DN), pesticides (chlordane at 13 ppb at 0.5 ft bgs in SL-064-SA5DN), and TPH (diesel and oil range organics at up to 240 ppm). One shallow groundwater monitoring well (PZ-105) is located approximately 150 ft southeast of the former liquid waste holdup system area. The nearest deep groundwater monitoring well (RD-13) is located approximately 600 ft southwest of the former liquid waste holdup system area. Soil and soil vapor sampling at the former liquid waste holdup system area is proposed following demolition of the feature.
B4055 Vault	The Nuclear Material Storage Vault, Room 131, was located in the western portion of Building 4055 and was used for storage of Pu-238 in oxide form and uranium dioxide. Though not reported, the subsurface vault may have served as a liquid collection point and therefore may warrant additional consideration by groundwater teams for threat to groundwater. Previous sampling within the footprint of the existing B4055 facility (including the vault) has not been performed. One shallow groundwater monitoring well (PZ-103) is located approximately 200 ft northwest of B4055. The nearest deep groundwater monitoring well (RD-13) is located approximately 500 ft northwest of B4055. Soil and soil vapor sampling at the vault is proposed following demolition of the feature.
UT-12 (UT-55)	UT-12 (UT-55) was a 1,000-gallon capacity UST located outside the southwest area of Building 4055 and stored diesel/fuel oil for onsite activities. During removal in 1986, two soil samples were collected from the tank excavation and found to contain 11,000 ppm and 13,000 ppm TPH. As a result, 45 cubic yards of impacted soil was excavated to bedrock. The former location of UT-12 (UT-55) may warrant additional consideration by groundwater teams for threat to groundwater since there was a known release. Constituents detected in existing soil at or near UT-12 (UT-55) above the background/LUT values include PAHs (fluorene at 4.5 ppb at 7 ft bgs in U5BS1040), TPH (kerosene, diesel, and oil range organics at up to 14,000 ppm) at up to 15 ft bgs, and VOCs (ethylbenzene and toluene at 10 ft bgs). One shallow groundwater monitoring well (PZ-103) is located approximately 200 ft northwest of B4055. The nearest deep groundwater monitoring well (RD-13) is located approximately 500 ft northwest of B4055. For the Phase 3 sampling, previous soil sampling at or near UT-12 (UT-155) is adequate to characterize soil conditions. Soil vapor sampling targeting the former UT is proposed following demolition of the B4055 area.
Building 4353 Leach Field	The B4353 leach field may warrant additional consideration by groundwater teams for threat to groundwater and additional sampling needs since it is a liquid waste disposal feature that may have caused focused recharged conditions. The B4353 leach field was comprised of 200 total linear feet of clay pipe buried at a depth of 2 feet bgs, and received flow from a septic tank located east of B4353. The leach field was removed in 2001. Constituents detected above background/LUT SLs in soil at or near the leach field include dioxins (TEQ at up to 2.3 ppt at 0.5 ppt), metals (silver at up to 13 ppm at up to 3 ft bgs), formaldehyde at 2.8 ppm at 0.5 ft bgs in SL-132-SA5DN, PAHs (acenaphthylene, anthracene, benzo(g,h,i)perylene, fluoranthene, phenanthrene, and pyrene at up to 250 ppm at 0.5 ft bgs), BaP TEQ at up to 110 ppb at 0.5 ft bgs, and TPH (diesel and oil range organics at up to 110 ppm). One shallow groundwater monitoring well (PZ-105) is located approximately 300 ft northwest of the leach field. The nearest deep groundwater monitoring well (RD-55B) is located approximately 350 ft east of the leach field. For the Phase 3 sampling, previous soil sampling within the footprint is adequate to characterize soil conditions. The leach field is targeted for soil vapor sampling at one location within its footprint.

Table D
Potential Threat to Groundwater Tracker
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Building 4363 Leach Field	The B4363 leach field may warrant additional consideration by groundwater teams for threat to groundwater and additional sampling needs since it is a liquid waste disposal feature that may have caused focused recharged conditions. The B4363 leach field was comprised of 200 total linear feet of clay pipe and gravel buried at depths of 4 to 6 feet bgs, and received flow from a 1,500-gallon septic tank located east of B4363. The leach field was removed in 2002. Constituents detected above background/LUT SLs in soil at or near the leach field include metals (cadmium, manganese, and silver at up to 1,590 ppm), PAHs (acenaphthene, anthracene, benzo(g,h,i) perylene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene at up to 360 ppb), BaP TEQ at up to 213 ppb, pesticides (4,4'-DDE, dieldrin, 4,4'-DDD, and 4,4'-DDT at up to 26 ppb at 0.5 ft bgs), TPH (diesel and oil range organics at up to 330 ppm), SVOCs (bis(2-ethylhexylphthalate, di-n-butylphthalate at up to 68 ppb at 0.5 ft bgs), and VOCs (methylene chloride at 16 ppb at 8 ft bgs). One shallow groundwater monitoring well (PZ-105) is located approximately 150 ft northeast of the leach field. The nearest deep groundwater monitoring well (RD-13) is located approximately 500 ft west of the leach field. For the Phase 3 sampling, previous soil sampling within the footprint is adequate to characterize soil conditions. The leach field is targeted for soil vapor sampling at one location within its footprint.
Building 4373 Leach Field	The B4373 leach field may warrant additional consideration by groundwater teams for threat to groundwater and additional sampling needs since it is a liquid waste disposal feature that may have caused focused recharged conditions. The B4373 leach field was comprised of 300 total linear feet of clay pipe and gravel buried at depths ranging from 1 to 2 feet bgs, and received flow from a septic located south of B4373. The leach field was removed in 2000. Constituents detected above background/LUT values in soil at or near the leach field include metals (thallium, cadmium, mercury, and zinc at up to 370 ppm), PAHs (anthracene, benzo(a)perylene, fluoranthene, phenanthrene, and pyrene at up to 210 ppb), BaP TEQ at 76 ppb at 0.5 ft bgs, dioxins (TEQ at up to 198 ppt), pesticides (heptachlor at 0.31 ppb at 0.5 ft bgs in SL-090-SA5DN), and TPH (diesel and oil range organics at up to 480 ppm). One shallow groundwater monitoring well (PZ-105) is located approximately 70 ft southeast of the leach field. The nearest deep groundwater monitoring well (RD-13) is located approximately 700 ft southwest of the leach field. For the Phase 3 sampling, previous soil sampling within the footprint is adequate to characterize soil conditions. The leach field is targeted for soil vapor sampling at one location within its footprint.

Notes:

ft = ft
BaP = benzo(a)pyrene
bgs = below ground surface
DQO = data quality objective
MARSSIM Multi-Agency Radiation Survey and Site Investigation Manual
ppm = parts per million
ppb = parts per billion
ppt = parts per trillion
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
SVOC - semi-volatile organic compound
TEQ = toxicity equivalency quotient
TPH = total petroleum hydrocarbon
VOC = volatile organic compound

Table E
GIS Feature Tracker
Subarea 5D
Draft for Review

Feature	Feature Class	Explanation
B4020 Leach Field	Leachfield	Remove Object ID 182 to reflect that the correct location of the B4020 leach field is located south of B4468, as depicted in Object ID 135.
B4055	Structures	Update status of B4055 and supporting structures to reflect its pending demolition and removal.
Surface Water Flow in southern areas	Surface Water Flow - Historical	Add surface water flow areas along historical dirt round south/southwest of B4020 along Subarea 5D South hillslope, and along dirt road in the northern portion of Pond Dredge. Add historical lined drainages along G and J Streets to the north and south (respectively) of B4020 and B4055.

Table F
Field Tracker
Subarea 5D
Draft for Review

Location Description	Location ID(s)	Explanation and Notes
Samples targeting surface water pathways	5D_DG_502 5D_DG_513 5D_DG_514 5D_DG_515 5D_DG_516 5D_DG_520 5D_DG_522 5D_DG_526 5D_DG_536 5D_DG_551 5D_DG_556 5D_DG_568 5D_DG_569 5D_DG_575	Locations target surface water pathways (not defined drainages). Observe topography in field to collect samples in pathway and low point where surface water would flow during precipitation or surface release. If actual drainage is observed, collect GPS coordinates and map in GIS.
Samples targeting fill extent	5D_DG_507 5D_DG_508 5D_DG_521	Locations assess vertical extent of fill in area. Identify the contact between fill and native soil. In general, collect samples at 5 foot intervals to bedrock, but specifically target the top of native soil (beneath fill) and soil just above bedrock. Sample intervals should be added or adjusted based on field conditions (i.e., depth of native soil).
Test Pits at Geophysical Anomalies	5D_DG_511 5D_DG_517	Excavate test pits to investigate linear geophysical anomalies as potential pipelines identified by EPA. Inspect test pits for signs of backfill, impacts (staining, debris, etc.), piping, or other subsurface infrastructures. Collect samples at top of native and just above bedrock to evaluate depth uncertainty of feature and potential recharge to groundwater.
Drainage in eastern portion of soil borrow area	5D_DG_582	Collect sample in drainage, target areas of sediment collection/deposition. Collect sample to bedrock and analyze all depths to characterize historical deposition over time.
Drainage Transects	5D_DG_530 5D_DG_531 5D_DG_532 5D_DG_533	Samples are proposed across drainage in a transect. Collect samples at 5-foot and 10-foot stepouts on each bank laterally from the drainage (with previous location 5D-126-SA5DN in the middle) and also advance to bedrock.
Drainages in Area III (STL-IV) receiving surface water flow from B4353 operational area	5D_DG-584 5D_DG-585 5D_DG-586	Walk drainage features in the field and collect GPS coordinates to map into GIS. Field map overbanks and depositional areas, and field locate samples based on observations (targeting areas of sediment deposition and overbank deposits.

Table F
Field Tracker
Subarea 5D
Draft for Review

Location Description	Location ID(s)	Explanation and Notes
Fluoride re-analysis and stepout locations	5D_DG-515 5D_DG-590 5D_DG-591 5D_DG-592 5D_DG-593 5D_DG-594 5D_DG-595 5D_DG-596 5D_DG-597 5D_DG-598 5D_DG-599 5D_DG-600 5D_DG-601 5D_DG-602 5D_DG-603 5D_DG-604 5D_DG-605 5D_DG-606	Observer entire soil column during boring and note/log any changes in lithology or grain size in soil content, debris, staining, transition from root zones. Focus attention on observation of any antropogenic activities. Take detailed photographs of soil cores for study/evaluation at a later date.