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August 28, 2013

Ms. Laura Rainey, P.G.
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Subject: Re-submittal of Addendum No. 7 to the Chemical Data Gap Investigation Work Plan, Phase 3 Soil Chemical Sampling at Area IV for Subarea 8, Santa Susana Field Laboratory

Dear Ms. Rainey:

The United States Department of Energy (DOE) is pleased to re-submit Addendum No. 7 to the Chemical Data Gap Investigation Work Plan, Phase 3 Soil Chemical Sampling at Area IV for Subarea 8. (Addendum No. 7; CDM Federal Programs Corporation, March 2013). The Chemical Data Gap Investigation Work Plan, Phase 3 Soil Chemical Sampling at Area IV (Phase 3 Work Plan; CDM Programs Corporation, April 2012) was approved by DTSC on April 11, 2012. This addendum includes the data gap analysis and the proposed sampling locations and objectives for each sample and reflects the incorporation of DTSC comments and input we received at the technical stakeholder meeting we had on June 11, 2013 and additional DTSC comments received on June 20, 2013 and June 24, 2013. Addendum No.7 was approved by DTSC on June 24, 2013. The approved Addendum No. 7 has been revised to correct sample numbers.

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 believe, true, accurate and complete. If you have any questions regarding this document, please contact me at 805-416-0990.

Sincerely,

Stephanie Jennings
Deputy Federal Project Director

cc: John Jones, DOE
Mark Malinowski, DTSC
Buck King, DTSC

Addendum No. 7 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 8

Prepared for:

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Prepared under:

US Department of Energy
EM Consolidated Business Center
Contract DE-EM0001128
CDM Smith Task Order DE-DT0003515

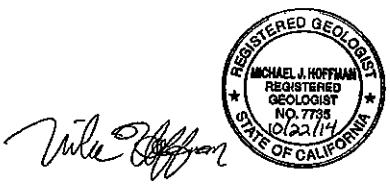
August 2013
Revision 1

Addendum No. 7 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 8

Contract DE-EM0001128
CDM Smith Task Order DE-DT0003515

Revision 1



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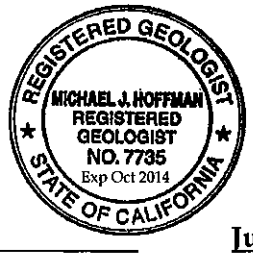

Prepared by: _____ **June 24, 2013**
Michael Hoffman, P.G. **Date**
CDM Smith Geologist

Approved by: _____ **June 24, 2013**
John Wondolleck **Date**
CDM Smith Project Manager

8/23/13

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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 8, 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 8 was completed during

two EPA sampling periods. Soil and sediment samples were collected with EPA within Subarea 8 North during April, May, and June, 2011. Soil and sediment samples were collected within Subarea 8 South September to early 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 8 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 8. Figure 1 of this document illustrates the location of Subarea 8 within Area IV of SSFL. The rationale for sample location and chemical analytes is provided in the document *Subarea 8 Phase 3 Data Gap Analysis Technical Memorandum, Santa Susana Field Laboratory, Ventura County, California* (MWH 2013[1]) (*Subarea 8 Data Gap TM*). The *Subarea 8 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 8 Data Gap TM* (MWH 2013) provide the proposed soil sample locations in Subarea 8. Soil sample locations were identified during data gap analysis as well as from public comments received during the recent Subarea 8 Data Gap Investigation public meeting. Attachment 2 (Table F Subarea 8 Field Tracker) to this Subarea 8 FSP Addendum provides additional information beyond the rationale in Table 1 of the *Subarea 8 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 8, surface and subsurface soil samples will be collected. For surface soil samples, only the top 6-inches of soil (surface soil) will be collected. The majority of sample locations will involve collection of subsurface samples. A direct push

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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.

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 8 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.

CDM Smith will be responsible for all 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 8 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 8 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 only addresses the collection of surface soil and subsurface soil to the bedrock interface using hand augers and the DPT rig. The digging of trenches or test pits, soil sampling of open excavations, and sampling of soil gas or other media will be addressed in future sampling plans.

Sample Analytes

Table 1 of the *Subarea 8 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 8 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.

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 8 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.

Schedule

Soil sampling activities under this FSP Addendum will most likely start the week of June 24, 2013, following DTSC approval of this Subarea 8 FSP Addendum, with the locating and staking of proposed sample locations and utilities clearance. Because sampling will start during migratory bird nesting season, additional biological monitoring will be required. Surface soil sampling will start July 8, and subsurface soil borings (hand-auger and DPT) will start by July 15. It is anticipated that 40 surface samples, 32 shallow hand auger samples, and 32 DPT boring samples will be collected each week.

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.

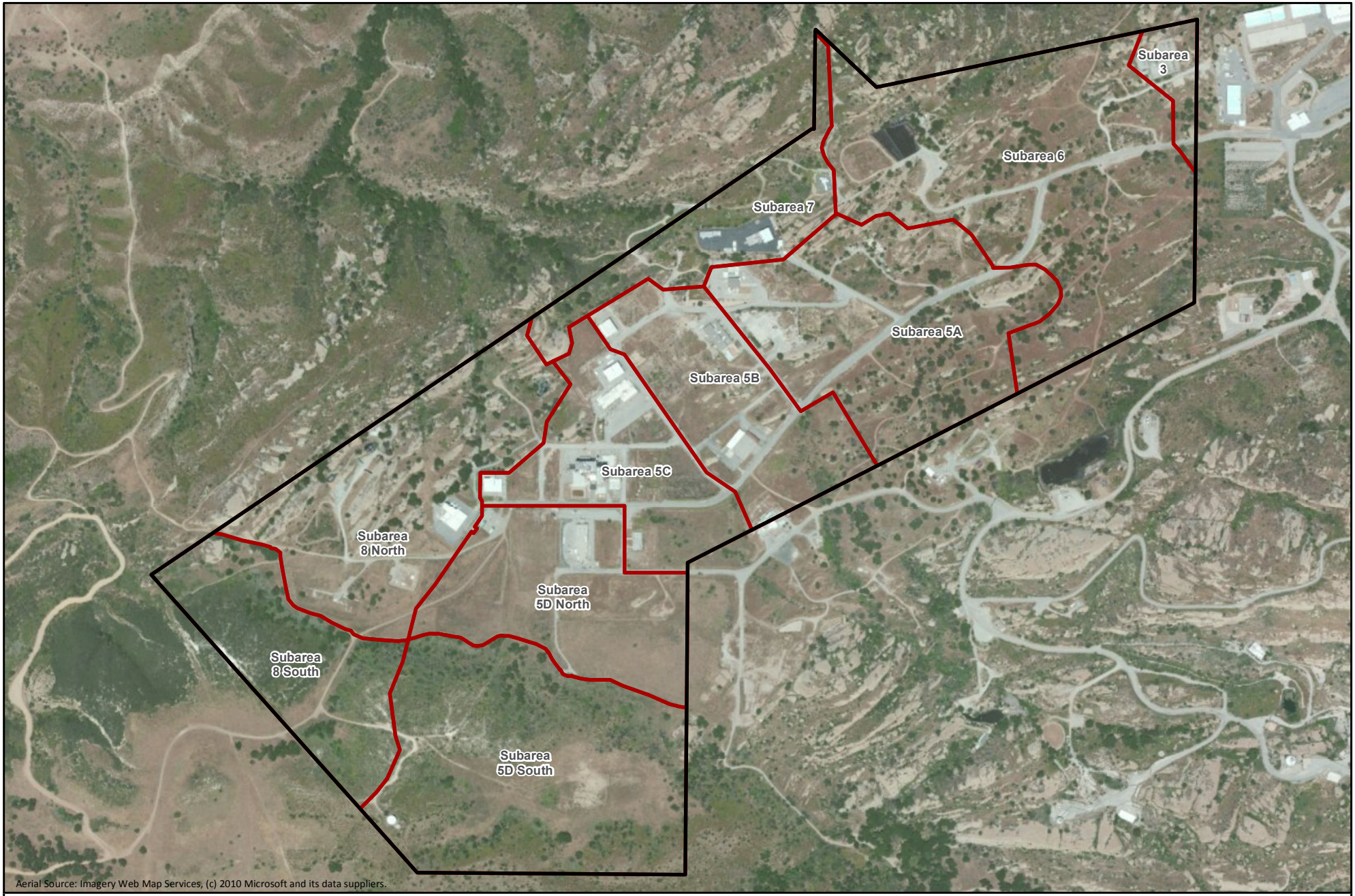
CDM Smith. 2012b. *Master Field Sampling Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California.* April.

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 8 Phase 3 Data Gap Analysis Technical Memorandum Santa Susana Field Laboratory, Ventura County, California.* June.



Subarea Designations
Area IV

Legend

- Area IV Boundary
- Area IV Subarea

0 370 740 1,480 Feet

Santa Susana Field Laboratory
Ventura County, California
Figure 1

CDM Smith

FarmerRA C:_projects\SantaSusana\GIS\MXD\SSFL_Subarea_Designations_AreaIV_Letter.mxd 8/19/2013

Attachment 1

Subarea 8 Phase 3 Data Gap Analysis Technical Memorandum, Santa Susana Field Laboratory, Ventura County, (MWH 2013)

SUBAREA 8 PHASE 3 DATA GAP ANALYSIS
TECHNICAL MEMORANDUM
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Prepared For:

THE UNITED STATES DEPARTMENT OF ENERGY

Prepared By:

MWH Americas, Inc.
618 Michillinda Ave, Suite 200
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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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ATTACHMENTS

Attachment No.

1 DTSC Chemical Look-Up Table, June 2013

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
ESADA	Empire State Atomic Development Authority
FSDF	Former Sodium Disposal Facility
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 8 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 8 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 8 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 8.

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 have been used in the data gap analysis for Subarea 8, and will also be applied for Subareas 5D and the NBZ. 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 8 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 (Figures 1 and 2) 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 8 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 8.

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 Figures 1 and 2. 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 8 DATA GAP ANALYSIS

The data gap analysis for Subarea 8 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 Figures 1 (Soil Matrix in Subarea 8 North), 2 (Soil Matrix in Subarea 8 South), and 3 (Soil Vapor). 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 8 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., 8_DG-544 and 8_DG-547).
- Sampling to address potential impacts beneath lined drainages is proposed by targeting sediment sample locations with results above LUT values. Samples will be collected beneath the drainage lining, with the deepest sample collected above bedrock to assess potential lateral migration along bedrock (e.g., 8_DG-553 and 8_DG-569).
- Adjacent to and outside of the Former Sodium Disposal Facility (FSDF) 2000 Interim Measure excavation boundary, sampling is proposed to characterize native soil for PAHs, n-nitrosodimethylamine (NDMA), phthalates, dioxins, metals, hexavalent chromium, perchlorate, total petroleum hydrocarbon (TPH), PCBs, and biphenyls. Samples will be collected down to bedrock to evaluate potential lateral migration along bedrock (e.g., 8_DG-506, 8_DG-507, and 8_DG-508).
- Potential air dispersion impacts related to burning and treatment activities at the former FSDF Ponds is addressed by sampling undeveloped hillsides and downgradient drainages away from the former ponds in the prevailing wind direction to the northwest (the southeastern direction is predominantly developed with high sampling density already proposed) and toward the southwest due to periodic 'Santa Ana' wind conditions. Six soil sample locations associated with Subarea 8 are proposed to assess this migration pathway (8_DG-521, 8_DG-601, and future sample locations 8_DG-619 through 8_DG-622). Additional sampling to address this pathway will also be proposed in the NBZ Subarea.
- Potential air dispersion impacts related to burning activities at the Building 4100 Trench is addressed by sampling proposed on undeveloped hillsides away from the Building

4100 Trench in the prevailing wind direction to the northwest (the southeastern direction is predominantly developed with high sampling density already proposed). Five soil sample locations associated with Subarea 8 are proposed to assess this migration pathway (e.g., 8_DG-585, 8_DG-588, 8_DG-589, 8_DG-591, and 8_DG-592). Additional sampling to address this pathway will be proposed in the NBZ Subarea during the associated data gap analysis. Sampling was not proposed as part of this TM since existing data in the NBZ is pending validation and will affect sample placement.

- East of the Building 4056 Landfill, lateral step-out sampling is proposed to define the extent of fill (e.g., 8_DG-594, 8_DG-596, and 8_DG-597).
- At the Building 4056 Excavation Pit, additional sampling is not proposed since sufficient sampling has been performed for remedial planning purposes.
- At a former septic tank identified on a facility drawing near Building 4009, investigation using a trench is proposed to address uncertainty regarding location and sampling is proposed to characterize soil beneath the potential former septic tank (i.e., 8_DG-577).
- Adjacent to the former location of UT-4 near Building 4009, investigation using a trench is proposed to locate the former UT-4 vault and collect a sample of native soil at a depth just below the bottom of the vault (i.e., 8_DG-579).
- At the Building 4009 Leach Field, sufficient previous sampling was conducted within the leach fields to characterize soil conditions to the top of bedrock, so no additional sampling is proposed within the footprints of these features. However, lateral sampling is proposed to the north and east of this leach field (i.e., 8_DG-582 and 8_DG-583).
- On the hilltop east of the Empire State Atomic Development Authority (ESADA) area, sampling of the white, caliche-like mineralization is proposed to assess the chemical composition of this material since it may be related to soil sampling results in the vicinity or downslope of this feature (i.e., 8_DG-604 and 8_DG-605).
- Sampling to address potential impacts to groundwater is proposed at several locations (listed below and shown on Figure 3). 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 8 are:
    - FSDF Disposal/Treatment Area, including former Upper and Lower Ponds, and Concrete Pool Area

- Building 4009 Sodium Graphite and Organic Modulated Reactor Vaults, and Former Waste Hold-up Tanks (UT-4 and UT-5)
- Building 4009 Former Fuel Oil Underground Storage Tank (UT-3)
- Building 4009 Leach Field
- Building 4056 Excavation Pit

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 8 Phase 3 Proposed Soil Sample Locations
(1 of 14)

Final Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method																Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs, phthalates, NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	CrVI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	Biphenyls (EPA Method 8270C)	Anions (Cyanides) (EPA Method 9012A)	Tetralin (EPA Method 8270C + TICs)	Inorganics (EPA Method 300.0)	VOC (EPA Method 8260)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
8_DG-501	FSDF	Northeast of FSDF Pistol Range	Soil Boring	0.5	X	X	X	X			X	X	X						X	X	√	Delineates northeastern extent of the FSDF Pistol Range Clearly Contaminated Area. Also serves as a stepout for dioxins and PCBs at FSBS0066 to the northwest, targets confluence of three surface water pathways, and characterizes native soil adjacent to the 2000 Interim Measure excavation. Location selected as a representative drainage location within Subarea 8N to assess the presence of pesticides and herbicides. Bedrock anticipated ~10 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	X		
				10	X	X	X	X			X	X	X						X	X		
8_DG-502	FSDF	North of FSDF Pistol Range	Soil Boring	0.5	X	X	X	X			X								X	X	√	Delineates northern extent of the FSDF Pistol Range Clearly Contaminated Area and stepout for dioxins and PCBs at FSBS0066 to the northeast. Also targets historic dirt road and disturbed soil area adjacent to the 2000 Interim Measure excavation. Bedrock anticipated <10 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		
				10	X	X	X	X			X								X	X		
8_DG-503	FSDF	Southwest of FSDF Pistol Range	Soil Boring	0.5	X	X	X	X			X								X	X		Stepout for dioxins at Sl-135-SA8N to the North and 56SW to the south. Bedrock anticipated <5 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				5	X	X	X	X			X								X	X		
8_DG-504	FSDF	Northeast of FSDF	Soil Boring	0.5	X	X	X	X	X	X	X			X					X	X	√	Characterizes native soil adjacent to the 2000 Interim Measure excavation to confirm boundary of previous excavation. Also serves as a stepout for dioxins at 56SW to the northeast. Biphenyls added due to use in Area IV operations and potential disposal at FSDF. Mobile chemicals added due to proximity to potential groundwater impact location and 2000 Interim Measure addressed perchlorate. 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	X			X				X	X	X		
8_DG-505	FSDF	Northeast of FSDF	Soil Boring	0.5	X	X	X	X			X								X	X	√	Stepout for PCBs, mercury, and dioxins at 92S to the west, mercury at 101BE to the northwest, and PCBs at DTSC-A to the south. Also targets disturbed soil area. 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		
8_DG-506	FSDF	North of FSDF	Soil Boring	0.5	X	X	X	X	X	X	X			X					X	X	√	Characterizes native soil adjacent to the 2000 Interim Measure excavation to confirm boundary of previous excavation. Also serves as a stepout for PCBs and dioxins at 89BW to the northeast. Biphenyls added due to use in Area IV operations and potential disposal at FSDF. Mobile chemicals added due to proximity to potential groundwater impact location and 2000 Interim Measure addressed perchlorate. 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	X			X				X	X	X		
8_DG-507	FSDF	North of FSDF	Soil Boring	0.5	X	X	X	X	X	X	X			X					H	X	√	Characterizes native soil adjacent to the 2000 Interim Measure excavation to confirm boundary of previous excavation, and targets historic dirt road and disturbed soil area. Biphenyls added due to use in Area IV operations and potential disposal at FSDF. Mobile chemicals added due to proximity to potential groundwater impact location and 2000 Interim Measure addressed perchlorate. 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	X			X				X	X	X		
8_DG-508	FSDF	North of FSDF	Soil Boring	0.5	X	X	X	X	X	X	X			X					X	X	√	Characterizes native soil adjacent to the 2000 Interim Measure excavation to confirm boundary of previous excavation. Biphenyls added to general characterization suite due to use in Area IV operations and potential disposal at FSDF. Mobile chemicals added due to proximity to potential groundwater impact location and 2000 Interim Measure addressed perchlorate. 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	X			X				X	X	X		

Table 1
Subarea 8 Phase 3 Proposed Soil Sample Locations
(2 of 14)

Final Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method																Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs, phthalates, NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	CrVI (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	Biphenyls (EPA Method 8270C)	Anions (Cyanides) (EPA Method 9012A)	Tetralin (EPA Method 8270C + TICs)	Inorganics (EPA Method 300.0)	VOC (EPA Method 8260)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
8_DG-509	FSDF	Northeast of FSDF	Soil Boring	0.5	X	X	X	X	X	X	X			X					X	X	√	Characterizes native soil adjacent to the 2000 Interim Measure excavation to confirm boundary of previous excavation, and targets historic dirt road and disturbed soil area. Biphenyls added due to use in Area IV operations and potential disposal at FSDF. Mobile chemicals added due to proximity to potential groundwater impact location and 2000 Interim Measure addressed perchlorate. 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	X			X				X	X	X		
8_DG-510	FSDF	North of FSDF	Soil Boring	0.5	X	X	X	X			X								X	X		Stepout for TPH at SL-122-SA8N to the north and mercury at 101BE to the southwest. Bedrock anticipated <5 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				5	X	X	X	X			X								X	X		
8_DG-511	FSDF	North of FSDF Pistol Range	Soil Boring	0.5	X	X	X	X			X								X	X		Characterizes hillslope northeast of the FSDF Pistol Range. Bedrock anticipated <5 feet bgs. Hold shallow sample for all analysis except TPH and PAHs since previously characterized at nearby sample location. 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		
8_DG-512	B4009 Area	Southeast of FSDF Pistol Range	Soil Boring	0.5	X	X	X	X			X								X	X	√	Stepout for dioxins at SL-091-SA8N. Also targets drainage downslope from ESADA. Bedrock anticipated <5 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	X		
8_DG-513	FSDF	Southeastern Portion of FSDF	Soil Boring	0.5	X	X	X	X	X	X	X			X					X	X	√	Targets the kerosene boiler that was used to power the steam lance and historic dirt road, and characterizes native soil adjacent to the 2000 Interim Measure excavation to confirm boundary of previous excavation. Also delineates the northern extent of the FSDF Southeast Clearly Contaminated Area and serves as a stepout for TPH, dioxins, PCBs, PAHs, lead, and mercury at SL-133-SA8N to the east. Biphenyls added due to use in Area IV operations and potential disposal at FSDF. Mobile chemicals added due to proximity to potential groundwater impact location and 2000 Interim Measure addressed perchlorate. Bedrock anticipated ~10 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					X	X		
				10	X	X	X	X	X	X	X			X				X	X	X		
8_DG-514	FSDF	Southeastern Portion of FSDF	Soil Boring	0.5	X		X	X			X	X	X						X	X	√	Targets the drainage southeast of FSDF constructed to divert surface water east of the 2000 Interim Measure excavation. Also delineates the FSDF Southeast Clearly Contaminated Area to the west and serves as a stepout for TPH, dioxins, PCBs, lead, and mercury at SL-133-SA8N to the east. PCBs and perchlorate previously characterized at adjacent sample FSBS0005. Location selected as a representative drainage location within Subarea 8N to assess the presence of pesticides and herbicides. 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			X	X	X						X	X		
				10	X			X			X	X	X						X	X		
8_DG-515	FSDF	Southeastern Portion of FSDF	Soil Boring	0.5	X	X	X	X		X	X								X	X	√	Delineates eastern extent of the FSDF Southeast Clearly Contaminated Area. Also serves as a stepout for PCBs at PCS-29 and PAHs at PCS-31 to the southwest, and targets historic dirt road. Perchlorate added to general characterization suite due to exceedance in eastern portion of Clearly Contaminated Area. 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		X	H								H	H		
8_DG-516	FSDF	West of FSDF	Soil Boring	0.5	X	X	X	X			X								X	X	√	Targets debris identified during 2008 debris survey. 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		
8_DG-517	FSDF	West of FSDF	Soil Boring	0.5	X	X	X	X	X		X								X	X		Stepout for dioxins, PAHs, PCBs, TPH, cadmium, and mercury at SL-085-SA8N to the northeast and hexavalent chromium at SL-016-SA8S 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	X		X								X	X		

Table 1
Subarea 8 Phase 3 Proposed Soil Sample Locations
(3 of 14)

Final Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method																Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs, phthalates, NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	CrVI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	Biphenyls (EPA Method 8270C)	Anions (Cyanides) (EPA Method 9012A)	Tetralin (EPA Method 8270C + TICs)	Inorganics (EPA Method 300.0)	VOC (EPA Method 8260)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
8_DG-518	FSDF	West of FSDF	Soil Boring	0.5	X	X	X	X	X		X								X	X	√	Stepout for dioxins, phthalates, PCBs, hexavalent chromium, and mercury at SL-016-SA8S to the southeast. Also targets surface water pathway and historic dirt road. Bedrock anticipated ~5 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								X	X		
8_DG-519	FSDF	Southwest of FSDF	Soil Boring	0.5	X	X	X	X			X								X	X		Stepout for TPH at SL-080-SA8N to the northeast. 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		
8_DG-520	FSDF	Southwest of FSDF	Soil Boring	0.5	X	X	X	X			X								X	X	√	Characterizes native soil within disturbed soil area southwest of the 2000 Interim Measure excavation. 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		
8_DG-521	FSDF	West of FSDF	Soil Boring	0.5	X	X	X	X			X								X	X	√	Stepout for TPH at SL-071-SA8N to the southwest and cadmium and mercury at 92-886-1B-1 to the northwest. Location will also assess potential air dispersion impacts related to burning and treatment activities at the former FSDF ponds and is located northwest of FSDF in the prevailing wind direction. Location is one of six locations proposed that will assess this migration pathway, the others include 8_DG-101 and four 'future' samples located west of the Area IV boundary. Two of the future locations are in drainages (8_DG-618 and 8_DG-620) to evaluate the potential for subsequent surface water transport of aerially deposited contaminants. Additional sampling to address this pathway will also be proposed in the Northern Buffer Zone Subarea. Bedrock anticipated <5 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				5	X	X	X	X			X								X	X		
8_DG-522	ESADA	North of ESADA Former Pistol Range	Soil Boring	0.5	X	X	X	X			X								X	X	√	Stepout for dioxins and PAHs at SL-023-SA8N to the north, phthalates and TPH at SL-036-SA8N to the northeast, and dioxins, PAHs, phthalate, cadmium, mercury, and TPH at SL-027-SA8N to the southeast. Also targets historical 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		
				10	H	H	H	H			H								H	H		
8_DG-523	ESADA	North of ESADA	Soil Boring	0.5																	√	Vertical delineation of PCBs and mercury at ESBS0010. Deep sample at this location not previously analyzed for PCBs and mercury. Cyanide added to general characterization suite due to potential association of AST with PDU, and biphenyls added due to use in Area IV operations. Bedrock anticipated ~10 feet bgs. Analyze 5-foot sample for all planned analyses and place deep sample on hold pending results of 5-foot sample.
				5	X	X	X	X			X			X	X				X	X		
				10	H	H	H	H			H			H	H				H	H		
8_DG-524	ESADA	North of ESADA	Soil Boring	0.5																	√	Vertical delineation of PAHs, PCBs, and TPH at ESBS0011. Deep sample at this location not previously analyzed for PAHs, PCBs, and TPH. Cyanide added to general characterization suite due to potential association of AST with PDU, and biphenyls added due to use in Area IV operations. Bedrock anticipated ~10 feet bgs. Analyze 5-foot sample for all planned analyses and place deep sample on hold pending results of 5-foot sample.
				5	X	X	X	X			X			X	X				X	X		
				10	H	H	H	H			H			H	H				H	H		
8_DG-525	ESADA	North of ESADA	Soil Boring	0.5	X	X	X	X			X								X	X	√	Stepout for PCBs and mercury at ESBS0010 to the northwest, PAHs, PCBs, and TPH at ESBS0011 to the north, and PAHs, phthalates, and TPH at ESBS0006 to the southwest. Also targets historic dirt road and disturbed soil area. 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		

Table 1
Subarea 8 Phase 3 Proposed Soil Sample Locations
(4 of 14)

Final Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method																Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs, phthalates, NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	CrVI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	Biphenyls (EPA Method 8270C)	Anions (Cyanides) (EPA Method 9012A)	Tetralin (EPA Method 8270C + TICs)	Inorganics (EPA Method 300.0)	VOC (EPA Method 8260)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
8_DG-526	ESADA	North of ESADA	Soil Boring	0.5	X	X	X	X			X									X	√	Stepout for dioxins, PAHs, phthalates, PCBs, and TPH at SL-022-SA8N to the northwest, PAHs, PCBs, and TPH at ESBS0011 to the west, and dioxins, PAHs, and phthalates at SL-023-SA8N to the east. Also targets historic dirt road and disturbed soil area. 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		
8_DG-527	ESADA	Northwest of ESADA Pistol Range	Soil Boring	0.5	X	X	X	X			X									X	√	Stepout for PAHs, phthalates, and TPH at ESBS0006 to the northwest and phthalates at ESBS0007 to the west. Also targets B4370 (Storage Shed). 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		
8_DG-528	ESADA	North of ESADA	Soil Boring	0.5																	√	Vertical delineation of PAHs, phthalates, and TPH at ESBS0006. Deep sample at this location not previously analyzed for PAHs, phthalates, and TPH. Also targets historic dirt road. Bedrock anticipated ~10 feet bgs. Analyze 5-foot sample and place deep sample on hold pending results of 5-foot sample.
				5	X	X	X	X			X									X		
				10	H	H	H	H			H									H		
8_DG-529	ESADA	North of ESADA	Soil Boring	0.5	X	X	X	X			X									X	√	Stepout for PAHs, phthalates, and TPH at ESBS0006 to the southeast, PCBs and mercury at ESBS0010 to the northeast, and dioxins and phthalates at 10246220 to the North. Also targets historic dirt road and disturbed soil area. 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		
8_DG-530	ESADA	North of ESADA	Soil Boring	0.5	X	X	X	X			X									X	√	Stepout for TPH at SL-012-SA8N to the east, PAHs at ESBS0005 to the south, and dioxins, phthalates, PCBs, mercury at SL-016-SA8N to the north. Also targets historic dirt road and soil disturbance area. Bedrock anticipated ~5 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				5	X	X	X	X			X									X		
8_DG-531	FSDF	Southeast of FSDF	Soil Boring	0.5	X	X	X	X			X									X	√	Characterizes the northwest portion of ESADA. Also targets historic dirt road. Bedrock anticipated ~5 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				5	X	X	X	X			X									X		
8_DG-532	ESADA	Northwest of ESADA	Soil Boring	0.5	X	X	X	X			X									X	√	Characterizes hillslope west of hummocky area identified during the 2008 Debris Survey. Also targets area adjacent to historic dirt road. Bedrock anticipated ~5 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				5	X	X	X	X			X									X		
8_DG-533	ESADA	Northwest of ESADA	Test Pit/Soil Boring	0.5	X	X	X	X			X									X	√	Conduct exploratory test pit to investigate hummocky area identified during 2008 debris survey. Location of test pit will be based on field observation of hummocky terrain. If fill, staining, debris, or other impacts are observed, collect sample targeting top of native soil. Bedrock anticipated ~5 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				5	X	X	X	X			X									X		
8_DG-534	ESADA	Northwest of ESADA	Test Pit/Soil Boring	0.5	X	X	X	X			X									X	√	Same as 8_DG-533.
				5	X	X	X	X			X									X		
8_DG-535	ESADA	Northwest of ESADA	Test Pit/Soil Boring	0.5																	√	Vertical delineation of PAHs in surface sample at ESBS0005 and the deeper sample collected at 4.5 feet bgs sample had a limited analytical suite. Conduct exploratory test pit to investigate hummocky area identified during 2008 debris survey. Location of test pit will be based on field observation of hummocky terrain. If fill, staining, debris, or other impacts are observed, collect sample targeting top of native soil. Bedrock anticipated <10 feet bgs. Analyze 5-foot sample and place shallow and deep samples on hold pending results of 5-foot sample.
				5	X	X	X	X			X									X		
				10	H	H	H	H			H									H		

Table 1
Subarea 8 Phase 3 Proposed Soil Sample Locations
(5 of 14)

Final Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method																Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs, phthalates, NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	CrVI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	Biphenyls (EPA Method 8270C)	Anions (Cyanides) (EPA Method 9012A)	Tetralin (EPA Method 8270C + TICs)	Inorganics (EPA Method 300.0)	VOC (EPA Method 8260)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
8_DG-536	ESADA	Southeast of ESADA	Soil Boring	0.5	X	X	X	X			X									X	√	Characterizes hillslope southwest of B4814. Also serves as a stepout for PCBs, dioxins, cadmium, and zinc at SL-013-SA8N to the northeast and targets historical dirt road. Bedrock anticipated <10 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				5	X	X	X	X			X									X		
				10	H	H	H	H			H									H		
8_DG-537	ESADA	South of ESADA	Soil Boring	0.5	X	X	X	X			X									X	√	Characterizes hillslope south of ESADA Former Storage Yard. Also targets historical dirt road and soil disturbance area. 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		
8_DG-538	ESADA	West of ESADA Former Pistol Range	Soil Boring	0.5	X	X	X	X			X									X	√	Delineates western extent of the ESADA Pistol Range Clearly Contaminated Area. Also serves as a stepout for TPH at SL-010-SA8N to the northwest and targets historic dirt road and disturbed soil area. 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		
8_DG-539A	ESADA	Former Transformer Pole X-35 West of ESADA Pistol Range	Soil Boring	0.5		X														X	√	Previous sample was a composite of four discrete samples with ND result. Transformers in Area IV with previous ND results are being re-sampled with discrete samples. Re-collect samples at four former discrete locations and analyze each sample for PCBs; hold deep samples pending shallow results. Location 8_DG-539B also serves as a stepout for TPH at SL-010 to the west and dioxins, PAHs, PCBs, mercury, and TPH at SL-011-SA8N and phthalate at ESBS0007 to the northwest. Bedrock anticipated <10 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				3		H														H		
8_DG-539B	ESADA	Former Transformer Pole X-35 West of ESADA Pistol Range	Soil Boring	0.5	X	X	X	X			X									X		
				3	X	X	X	X			X									X		
				10	H	H	H	H			H									H		
8_DG-539C	ESADA	Former Transformer Pole X-35 West of ESADA Pistol Range	Soil Boring	0.5		X														X		
				3		H														H		
8_DG-539D	ESADA	Former Transformer Pole X-35 West of ESADA Pistol Range	Soil Boring	0.5		X														X		
				3		H														H		
8_DG-540	ESADA	Northeast of ESADA Former Pistol Range	Soil Boring	0.5	X	X	X	X			X									X	√	Delineates northern extent of the ESADA Pistol Range Clearly Contaminated Area. Also serves as a stepout for dioxins, PAHs, cadmium, and TPH at SL-028-SA8N to the east and 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		
8_DG-541	ESADA	South of ESADA Former Pistol Range	Soil Boring	0.5	X	X	X	X			X									X		Characterizes hillslope south of ESADA former pistol range. 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		
8_DG-542	ESADA	Southeast of ESADA Former Pistol Range	Soil Boring	0.5	X	X	X	X			X	X	X							X	√	Characterizes hillslope adjacent to disturbed soil area. Also targets historic dirt road and surface water pathway from the hillslope south of ESADA to the northeast. Location selected as a representative drainage location within Subarea 8N to assess the presence of pesticides and herbicides. 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		
				15	X	X		X			X	X	X							X		
8_DG-543	ESADA	South of Solar Concentrator Facility	Soil Boring	0.5	X	X	X	X			X									X	√	Characterizes hillslope adjacent to disturbed soil area. 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		
				10	H	H	H	H			H									H		
8_DG-544	ESADA	East of ESADA Former Pistol Range	Trench	0.5	X	X	X	X			X									X	√	Delineates northeastern extent of ESADA Pistol Range Clearly Contaminated Area. Also serves as a stepout for dioxins, PAHs, cadmium, and TPH at SL-028-SA8N to the north and targets terrain conductivity fill anomaly and disturbed soil area. Conduct exploratory trench to investigate the terrain conductivity fill anomaly and the extent of disturbed soil. 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		
				10	H	H	H	H			H									H		

Table 1
Subarea 8 Phase 3 Proposed Soil Sample Locations
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Final Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method																Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs, phthalates, NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	CrVI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	Biphenyls (EPA Method 8270C)	Anions (Cyanides) (EPA Method 9012A)	Tetralin (EPA Method 8270C + TICs)	Inorganics (EPA Method 300.0)	VOC (EPA Method 8260)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
8_DG-545	ESADA	South of Solar Concentrator Facility	Trench	0.5	X	X	X	X			X									X	X	√	Stepout for dioxins, PAHs, and TPH at SL-032-SA8N to the north. Also targets the southern boundary of the soil disturbance area. Conduct exploratory trench to investigate the extent of disturbed soil. 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		
8_DG-546	B4009 Area	South of the Solar Concentrator Facility	Trench	0.5																		√	Conduct exploratory trench to investigate debris area identified during 2008 debris survey. Also targets terrain conductivity anomaly. Fill anticipated based on previous sampling in the area and historical aerial photographs. Excavate until top of native soils encountered. Bedrock anticipated >10 feet bgs. No samples proposed since area previously characterized; collect samples if warranted based on field observations.
				5																			
				10																			
8_DG-547	B4009 Area	Southwest of the Solar Concentrator Facility	Trench	0.5																		√	Conduct exploratory trench to investigate debris area identified during 2008 debris survey. Also targets geophysical point anomaly. Fill anticipated based on previous sampling in the area and historical aerial photographs. Excavate until top of native soils encountered. Bedrock anticipated >10 feet bgs. No samples proposed since area previously characterized; collect samples if warranted based on field observations.
				5																			
				10																			
8_DG-548	B4009 Area	West of the Solar Concentrator Facility	Trench	0.5																		√	Conduct exploratory trench to investigate topographic low spot adjacent to the debris area identified during 2008 debris survey. Also targets terrain conductivity anomaly. Fill anticipated based on previous sampling in the area and historical aerial photographs. Excavate until top of native soils encountered. Bedrock anticipated >10 feet bgs. No samples proposed since area previously characterized; collect samples if warranted based on field observations.
				5																			
				10																			
8_DG-549	B4009 Area	West of Solar Concetrator Facility	Soil Boring	0.5	X	X	X	X			X									X	X	√	Stepout for dioxins, PAHs, and phthalates at SL-023-SA8N to the south. Also targets area adjacent to 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		
				10	H	H	H	H			H									H	H		
8_DG-550	B4009 Area	South of B4056 Landfill	Soil Boring	0.5	X	X	X	X			X									X	X	√	Targets the former lined drainage west of the former solar concentrator facility and completes vertical characterization of soils at SL-041-SA8N. Previous samples at this location analyzed at 4-foot and 9-foot depths. The location is adjacent to SL-046-SA8N, where dioxins, TPH, and PAHs were detected above the screening levels in accumulated sediments within the drainage. 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. Samples collected at 5-foot and 10-foot depths will be analyze for TPH to complete the analytical suite at SL-041-SA8N.
				5							X										X		
				10							X										X		
				15	X	X		X			X									X	X		
8_DG-551	B4009 Area	South of the Solar Concentrator Facility	Soil Boring	0.5	X	X	X	X			X									X	X	√	Targets the former lined drainage south of the former solar concentrator facility. 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		
				10	X	X		X			X									X	X		
				15	X	X		X			X									X	X		
8_DG-552	B4009 Area	East of the Solar Concentrator Facility	Soil Boring	0.5	X	X	X	X			X									X	X	√	Targets the former lined drainage east of the former solar concentrator facility. Also serves as a stepout for TPH (deep) at SL-040-SA8N to the east. 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		
				10	X	X		X			X									X	X		
				15	X	X		X			X									X	X		

Table 1
Subarea 8 Phase 3 Proposed Soil Sample Locations
(7 of 14)

Final Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method																Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs, phthalates, NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	CrVI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	Biphenyls (EPA Method 8270C)	Anions (Cyanides) (EPA Method 9012A)	Tetralin (EPA Method 8270C + TICs)	Inorganics (EPA Method 300.0)	VOC (EPA Method 8260)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
8_DG-553	B4009 Area	Northeast of the Solar Concentrator Facility	Soil Boring	0.5	X	X	X	X			X	X	X						X	X	√	Targets the former lined drainage northeast of the former solar concentrator facility. Location selected as a representative drainage location within Subarea 8N to assess the presence of pesticides and herbicides. 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	X		
				10	X	X		X			X	X	X						X	X		
				15	X	X		X			X	X	X						X	X		
8_DG-554	B4009 Area	Solar Concentrator Facility	Soil Boring	0.5	X	X	X	X			X								X	X	√	Characterizes the operational area on the downslope side of the Concentrator Facility. 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		
8_DG-555	B4009 Area	Solar Concentrator Facility	Soil Boring	0.5	X	X	X	X			X								X	X	√	Targets the location of the former Solar Concentrator Facility. 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		
8_DG-556	B4009 Area	Southwest of the Solar Concentrator Facility	Soil Boring	0.5	X	X	X	X			X								X	X	√	Targets area adjacent to B4425 (storage shed). 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		
8_DG-557A	B4009 Area	Former Transformer Pole X-32 north of Solar Concentrator Facility	Soil Boring	0.5		X														X	√	Previous sample was a composite of four discrete samples with ND result. Transformers in Area IV with previous ND results are being re-sampled with discrete samples. Re-collect samples at four former discrete locations and analyze each sample for PCBs. Bedrock anticipated <5 feet bgs.
				3		H														H		
8_DG-557B	B4009 Area	Former Transformer Pole X-32 north of Solar Concentrator Facility	Soil Boring	0.5		X														X		
				3		H														H		
8_DG-557C	B4009 Area	Former Transformer Pole X-32 north of Solar Concentrator Facility	Soil Boring	0.5		X														X		
				3		H														H		
8_DG-557D	B4009 Area	Former Transformer Pole X-32 north of Solar Concentrator Facility	Soil Boring	0.5		X														X		
				3		H														H		
8_DG-558	B4009 Area	East of the Solar Concentrator Facility	Soil Boring	0.5	X	X	X	X			X								X	X	√	Stepout for dioxins, PAHs, and TPH at SL-040-SA8N to the southwest. Also targets the northwest portion of the estimated area of the drop zone of depleted uranium slugs reportedly dropped in the 1960s identified in the EPA TM and a disturbed soil area. Bedrock anticipated >10 feet bgs. Analyze for TPH in 10-foot and 15-foot sample 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	X		
				10	H	H	H	H			X								H	X		
				15	H	H	H	H			X								H	X		
8_DG-559	B4009 Area	East of the Solar Concentrator Facility	Soil Boring	0.5	X	X	X	X			X								X	X	√	Stepout for dioxins and PCBs at SL-199-SA5DN to the southeast. Also targets the disturbed soil area. 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		
8_DG-560	B4009 Area	Northwest of the Solar Concentrator Facility	Soil Boring	0.5	X	X	X	X			X								X	X	√	Targets the unidentified structure located north of H Street that was identified in historical aerial photo (photo SS-812, no date). Also serves as a stepout for TPH at Sl-089-SA8N to the northeast. 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		
8_DG-561	B4009 Area	West of B4009	Soil Boring	0.5	X	X	X	X			X								X	X	√	Stepout for dioxins and TPH at SL-079-SA8N to the southwest. Also targets area adjacent to the historical dirt road shown in 1980 aerial photo. 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		
8_DG-562	B4009 Area	West of B4009	Soil Boring	0.5	X	X	X	X			X								X	X	√	Stepout for dioxins and TPH at SL-079-SA8N to the northeast. 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		
				10	H	H	H	H			H								H	H		

Table 1
Subarea 8 Phase 3 Proposed Soil Sample Locations
(8 of 14)

Final Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method																Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs, phthalates, NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	CrVI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	Biphenyls (EPA Method 8270C)	Anions (Cyanides) (EPA Method 9012A)	Tetralin (EPA Method 8270C + TICs)	Inorganics (EPA Method 300.0)	VOC (EPA Method 8260)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
8_DG-563	B4009 Area	Northwest of B4009	Soil Boring	0.5	X	X	X	X			X									X	√	Targets historic dirt road and surface water pathway. Bedrock anticipated <5 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		
8_DG-564	B4009 Area	Northwest of B4009	Soil Boring	0.5	X	X	X	X			X	X	X							X	√	Stepout for TPH at SL-102-SA8N to the east and dioxins at SL-090-SA8N to the southwest. Also targets drainage downslope from ESADA. Location selected as a representative drainage location within Subarea 8N to assess the presence of pesticides and herbicides. 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	X			X	X	X							X		
				10	X	X		X			X	X	X							X		
8_DG-565	B4009 Area	Southeast of B4009	Soil Boring	0.5	X	X	X	X			X									X		Stepout for cadmium and mercury at 92-886-2-1 to the northwest. Bedrock anticipated <5 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				5	X	X	X	X			X									X		
8_DG-566	B4009 Area	Southwest of B4009	Soil Boring	0.5	X	X	X	X			X									X	√	Characterizes hillslope south of B4009. Also targets historical 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		
8_DG-567	B4009 Area	South of B4009	Soil Boring	0.5	X	X	X	X			X	X	X							X	√	Characterizes the lined drainage north of Arness Fire Road. Location selected as a representative drainage location within Subarea 8N to assess the presence of pesticides and herbicides. Bedrock anticipated >10 feet bgs. Collect and analyze shallow sample just below the concrete lining, then 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		
				15	X	X		X			X	X	X							X		
8_DG-568	B4009 Area	South of B4009	Soil Boring	0.5	X	X	X	X			X									X	√	Targets the lined drainage south of B4009. Also characterizes the area adjacent to the outside storage along fence observed in aerial photos and area southwest of former UT-3. Bedrock anticipated >10 feet bgs. Collect and analyze shallow sample just below concrete lining, then 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		
				15	X	X		X			X									X		
8_DG-569	B4009 Area	Southwest of B4009	Soil Boring	0.5	X	X	X	X			X									X	√	Targets the lined drainage southwest of B4009. The location is adjacent to SL-108-SA8N, where dioxins, TPH, PAHs, and zinc were detected above the screening levels in accumulated sediments within the drainage. Collect and analyze shallow sample just below concrete lining, then 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		
8_DG-570	B4009 Area	Southwest of B4009	Soil Boring	0.5	X	X	X	X			X									X	√	Characterizes the operational area southwest of B4009. Also targets a 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		
				10	H	H	H	H			H									H		
8_DG-571	B4009 Area	Southwest of B4009	Soil Boring	0.5	X	X	X	X			X									X	√	Characterizes operational area southwest of B4009 and targets the former location of the southern ISI storage trailer and 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		

Table 1
Subarea 8 Phase 3 Proposed Soil Sample Locations
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Final Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method																Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs, phthalates, NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	CrVI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	Biphenyls (EPA Method 8270C)	Anions (Cyanides) (EPA Method 9012A)	Tetralin (EPA Method 8270C + TICs)	Inorganics (EPA Method 300.0)	VOC (EPA Method 8260)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
8_DG-572	B4009 Area	South of B4009	Soil Boring	0.5	X	X	X	X			X									X	√	Characterizes area southwest of former UT-3. Also characterizes operational area south of B4009. Based on proximity to former UT-3, collect samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock. VOCs added due to proximity to potential groundwater impact location. Bedrock anticipated <20 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	H			X									H	X	
				15	H	H	H	H			X									H	X	
				20	H	H	H	H			X								X	H	X	
8_DG-573	B4009 Area	Southeast of B4009	Soil Boring	0.5	X	X	X	X			X									X	X	√	Targets doorway at the southwest portion of B4009 and the location where the former UT-3 fuel pipeline entered B4009. Also characterizes area northwest of former UT-3. Based on proximity to former UT-3, collect samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock. VOCs added due to proximity to potential groundwater impact location. Bedrock anticipated ~15 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	H			X									H	X	
				15	H	H	H	H			X								X	H	X	
8_DG-574	B4009 Area	Southeast of B4009	Soil Boring	0.5	X	X	X	X			X									X	X	√	Characterizes area northeast of former UT-3. Also characterizes operational area southeast of B4009 and targets historic dirt road. Based on proximity to former UT-3, collect samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock. VOCs added due to proximity to potential groundwater impact location. Bedrock anticipated ~15 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	H			X									H	X	
				15	H	H	H	H			X								X	H	X	
8_DG-575	B4009 Area	East of B4009	Soil Boring	0.5	X	X	X	X			X	X	X							X	X	√	Targets the lined drainage east of B4009 and serves as a stepout for TPH (deep) at SL-004-SA5DN to the northeast. Collect sample just below concrete lining. Also targets area adjacent to outside storage along fence observed in aerial photos and northeast of former UT-3. Location selected as a representative drainage location within Subarea 8N to assess the presence of pesticides and herbicides. Bedrock anticipated ~15 feet bgs. Collect and analyze shallow sample just below the concrete lining, then collect and analyze samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock to assess potential vertical migration to bedrock and delineate lateral extent of impacts from former UST.
				5	X	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	
8_DG-576A	B4009 Area	Substation #709 Southeast of B4009	Soil Boring	0.5		X															X	√	Two previous samples were composites of eight discrete locations each with ND results. Transformers in Area IV with previous ND results are being re-sampled with discrete samples. Re-collect samples at four discrete locations surrounding the transformer pad area and analyze each sample for PCBs. Location 8_DG-76B also serves as a stepout for dioxins at SL-001-SA5DN to the east. Based on proximity to former UT-3, collect samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock. VOCs added due to proximity to potential groundwater impact location. Bedrock anticipated ~20 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.
				3		H															H		
8_DG-576B	B4009 Area	Substation #709 Southeast of B4009	Soil Boring	0.5	X	X	X	X			X									X	X		
				3	X	X	X	X			X									X	X		
				10	H	H	H	H			X									H	X		
				15	H	H	H	H			X									H	X		
				20	H	H	H	H			X								X	H	X		
8_DG-576C	B4009 Area	Substation #709 Southeast of B4009	Soil Boring	0.5		X															X	√	
				3		H															H		
8_DG-576D	B4009 Area	Substation #709 Southeast of B4009	Soil Boring	0.5		X															X		
				3		H															H		
8_DG-576E	B4009 Area	Substation #709 Southeast of B4009	Soil Boring	0.5		X															X		
				3		H															H		
8_DG-576F	B4009 Area	Substation #709 Southeast of B4009	Soil Boring	0.5		X															X		
				3		H															H		

Table 1
Subarea 8 Phase 3 Proposed Soil Sample Locations
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Final Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method																Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs, phthalates, NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	CrVI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	Biphenyls (EPA Method 8270C)	Anions (Cyanides) (EPA Method 9012A)	Tetralin (EPA Method 8270C + TICs)	Inorganics (EPA Method 300.0)	VOC (EPA Method 8260)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
8_DG-577	B4009 Area	Northeast of B4009	Trench	0.5	X	X	X	X			X			X		X			X	X	√	Conduct exploratory trench to address uncertainty regarding location of a septic tank identified on a facility drawing. Previous geophysical surveys and soil borings did not find evidence of a septic tank in the location identified on the drawing. Also characterizes the operational area northeast of B4009 and the former location of the northern ISI storage trailer. If fill, staining, debris, or other impacts are observed, collect sample targeting top of native soil. Tetralin and biphenyls added to general characterization suite due to potential use in reactor operations. Bedrock anticipated <10 feet bgs. Collect and analyze deepest sample targeting soil just above bedrock since targeting a septic tank 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		
8_DG-578	B4009 Area	North of B4009	Soil Boring	0.5	X	X	X	X			X			X		X			X	X	√	Targets the location where the former SGR hold-up tank (UT-4) pipeline entered B4009. Also serves as a stepout for PAHs and TPH at L0BS0012 to the northeast. Tetralin and biphenyls added to general characterization suite due to potential use in reactor operations. Bedrock anticipated <10 feet bgs. Collect and analyze deepest sample targeting soil just above bedrock since targeting a subsurface pipeline 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		
8_DG-579	B4009 Area	Northeast of B4009	Trench	0.5	X	X	X	X			X			X		X			X	X	√	Conduct exploratory trench to confirm that UT-4 was removed. UT-4 reportedly removed and the vault filled with concrete. Concrete was encountered during prior attempts to sample the location of UT-4. If a concrete vault encountered, excavate along one side of the vault and collect a sample of native soil at a depth just below the bottom of the vault. Tetralin and biphenyls added to general characterization suite due to potential use in reactor operations. VOCs added due to proximity to potential groundwater impact location. Bedrock anticipated ~10 feet bgs. Collect and analyze deepest sample targeting soil just above bedrock since targeting a UST 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	X		
8_DG-580	B4009 Area	North of B4009	Soil Boring	0.5	X	X	X	X			X			X		X			X	X	√	Targets the location where the SGR hold-up tank (UT-4) pipeline leads to the B4009 Leach Field. Also serves as a stepout for PAHs and TPH at L0BS0012 to the southeast. Tetralin and biphenyls added to general characterization suite due to potential use in reactor operations. Bedrock anticipated ~10 feet bgs. Collect and analyze deepest sample targeting soil just above bedrock since targeting a subsurface pipeline 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		
8_DG-581	B4009 Area	Northeast of B4009	Soil Boring	0.5	X	X	X	X			X								X	X		Stepout for dioxins and TPH at SL-129-SA8N to the northeast and PAHs and TPH at L0BS0012 to the southwest. Also characterizes area downslope of B4009. Bedrock anticipated <10 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X	X	X	X			X								X	X		
				10	H	H	H	H			H								H	H		
8_DG-582	B4009 Area	North of B4009	Soil Boring	0.5	X	X	X	X			X								X	X	√	Stepout for dioxins and TPH at SL-101-SA8N to the northwest, PAHs, antimony, and mercury at L0TS01S03 to the west, antimony and mercury at L0TS01S01 to the southwest, and TPH at L0BS0017 to the southwest. Also characterizes the area to the east of the B4009 Leach Field. VOCs added due to proximity to potential groundwater impact location. Bedrock anticipated ~10 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		
				10	X	X	X	X			X							X	X	X		
8_DG-583	B4009 Area	Northeast of B4009	Soil Boring	0.5	X	X	X	X			X	X	X	X		X			X	X	√	Stepout for dioxins and TPH at SL-101-SA8N to the southeast, TPH at SL-102-SA8N to the southwest, and PAHs, antimony, and mercury at L0TS01S03 to the south. Also targets the surface water pathway downslope of the B4009 Leach Field. Tetralin and biphenyls added to general characterization suite due to potential use in reactor operations. Location selected as a representative drainage location within Subarea 8N to assess the presence of pesticides and herbicides. VOCs added due to proximity to potential groundwater impact location. Bedrock anticipated <10 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		X			X	X		
				10	X	X	X	X			X	X	X	X		X		X	X	X		
8_DG-584	B4009 Area	North of B4009	Soil Boring	0.5	X	X	X	X			X								X	X	√	Targets debris identified during the 2008 debris survey. Bedrock anticipated <10 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X	X	X	X			X								X	X		
				10	H	H	H	H			H								H	H		

Table 1
Subarea 8 Phase 3 Proposed Soil Sample Locations
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Final Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method																Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs, phthalates, NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	CrVI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	Biphenyls (EPA Method 8270C)	Anions (Cyanides) (EPA Method 9012A)	Tetralin (EPA Method 8270C + TICs)	Inorganics (EPA Method 300.0)	VOC (EPA Method 8260)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
8_DG-585	B4009 Area	Southwest of B4056 Landfill	Soil Boring	0.5	X	X	X	X			X									X	X	√	Characterizes hillslope southwest of the B4056 Landfill. Location will also assess potential air dispersion impacts related to burning activities at the B4100 Trench and is located northwest of the B4100 Trench in the prevailing wind direction. Location is one of five locations proposed that will assess this migration pathway, the others include 8_DG-588, 8_DG-589, 8_DG-591, and 8_DG-592. Additional sampling to address this pathway will also be proposed in the Northern Buffer Zone Subarea. Bedrock anticipated <10 feet bgs. If deep soils encountered, collect sample and place on hold pending shallow results.
				5	X	X	X	X			X									X	X		
				10	H	H	H	H			H									H	H		
8_DG-586	B4056 Landfill	South of the B4056 Landfill	Soil Boring	0.5	X	X	X	X			X									X	X	√	Stepout for dioxins, phthalates, and TPH at SL-127-SA8N to the southeast, dioxins at 5C_DG-588 to the south and BHBS1005 to the southeast, dioxins, PAHs, PCBs, TPH, antimony, and mercury at 5C_DG-586 to the southwest, and dioxins and TPH at SL-128-SA8N to the southwest. Also characterizes low spot downslope of B4100 just before surface water enters the drainage. Bedrock anticipated <5 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	X		
8_DG-587	B4009 Area	South of B4056 Landfill	Soil Boring	0.5	X	X	X	X			X									X	X	√	Stepout for dioxins at BHBS1005 and dioxins, antimony, and zinc at 5C_DG-592 to the southwest. Also targets a 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		
8_DG-588	B4056 Landfill	South of B4056 Landfill	Soil Boring	0.5	X	X	X	X		X	X									X	X	√	Location will assess potential air dispersion impacts related to burning activities at the B4100 Trench and is located northwest of the B4100 Trench in the prevailing wind direction. Location is one of five locations proposed that will assess this migration pathway, the others include 8_DG-585, 8_DG-589, 8_DG-591, and 8_DG-592. Additional sampling to address this pathway will also be proposed in the Northern Buffer Zone Subarea. 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	X		
				10	H	H	H	H		H	H									H	H		
8_DG-589	B4056 Landfill	South of the B4056 Landfill	Soil Boring	0.5	X	X	X	X			X									X	X	√	Characterizes the area downslope of the Southern Screening Area and the Roadside Debris Area previously identified in the Group 8 RFI SAP. The Southern Screening Area is a new potential fill area identified ("Loose Earth Fill") in historical drawing that associated the area with the Building 4056 Landfill. Also targets a historic dirt road. Location will assess potential air dispersion impacts related to burning activities at the B4100 Trench and is located northwest of the B4100 Trench in the prevailing wind direction. Location is one of five locations proposed that will assess this migration pathway, the others include 8_DG-585, 8_DG-588, 8_DG-591, and 8_DG-592. Additional sampling to address this pathway will also be proposed in the Northern Buffer Zone Subarea. 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		
8_DG-590	B4009 Area	West of the B4056 Landfill	Soil Boring	0.5	X	X	X				X	X	X								X	√	Characterizes drainage north of B4009 that leads to the administrative boundary. Completes the analytical suite at L0BS0003, which was previously sampled for metals only at 0.5 feet bgs. Location selected as a representative drainage location within Subarea 8N to assess the presence of pesticides and herbicides. 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	X			X	X	X							X	X		
				10	X	X		X			X	X	X							X	X		

Table 1
Subarea 8 Phase 3 Proposed Soil Sample Locations
(12 of 14)

Final Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method																Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs, phthalates, NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	CrVI (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	Biphenyls (EPA Method 8270C)	Anions (Cyanides) (EPA Method 9012A)	Tetralin (EPA Method 8270C + TICs)	Inorganics (EPA Method 300.0)	VOC (EPA Method 8260)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
8_DG-591	B4009 Area	West of the B4056 Landfill	Soil Boring	0.5	X	X	X	X			X									X	X	Characterizes the hillslope west of the B4056 Landfill Clearly Contaminated Area and targets surface water pathway downslope of B4009. Location will also assess potential air dispersion impacts related to burning activities at the B4100 Trench and is located northwest of the B4100 Trench in the prevailing wind direction. Location is one of five locations proposed that will assess this migration pathway, the others include 8_DG-585, 8_DG-588, 8_DG-589, and 8_DG-592. Additional sampling to address this pathway will also be proposed in the Northern Buffer Zone Subarea. 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	√	
				10	X	X		X			X									X	X		
8_DG-592	B4009 Area	West of the B4056 Landfill	Soil Boring	0.5	X	X	X	X			X									X	X	√	Same as 8_DG-591.
				5	X	X	X	X			X									X	X		
				10	X	X		X			X									X	X		
8_DG-593	B4056 Landfill	West of B4056 Landfill	Soil Boring	0.5	X	X	X	X			X									X	X	√	Delineates western extent of the B4056 Landfill Clearly Contaminated Area and targets a low spot within the drainage. Bedrock anticipated <5 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	X		
8_DG-594	B4056 Landfill	Southwest of the B4056 Pit	Soil Boring	0.5	X	X	X	X			X									X	X	√	Delineates eastern extent of the B4056 Landfill Clearly Contaminated Area. Also targets historic dirt road. 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		
8_DG-595	B4056 Landfill	Southeast of the B4056 Pit	Soil Boring	0.5	X	X	X	X			X									X	X		Characterizes the area southeast of the B4056 Pit. 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		
8_DG-596	B4056 Landfill	Northeast of B4056 Landfill	Soil Boring	0.5	X	X	X	X			X									X	X		Delineates the northeastern extent of the B4056 Landfill Clearly Contaminated Area. 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		
8_DG-597	B4056 Landfill	Northeast of B4056 Landfill	Soil Boring	0.5	X	X	X	X			X									X	X		Delineates the northeastern extent of the B4056 Landfill Clearly Contaminated Area. Also, serves as a stepout for TPH at SL-119-SA8N to the southwest. Bedrock anticipated <5 feet bgs. If deep soils encountered, place on hold pending shallow results.
				5	X	X	X	X			X									X	X		
8_DG-598	Hillslope South of ESADA	Southwest of FSDF	Soil Boring	0.5	X																X		Stepout for phthalate at SL-017-SA8S to the northwest. Bedrock anticipated ~5 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				5	X																X		
8_DG-599	Hillslope South of ESADA	Southwest of FSDF	Soil Boring	0.5		X	X														X		Stepout for dioxins and PCBs at SL-018-SA8S to the northeast. Also targets historic dirt road. Bedrock anticipated <10 feet bgs. If deep soils encountered, place on hold pending shallow results.
				5		X	X														X	√	
				10		H	H														H		
8_DG-600	Hillslope South of ESADA	Northwestern Portion of Hillslope	Soil Boring	0.5	X	X	X	X			X									X	X		Characterizes hillslope west of ESADA. Also targets area adjacent to 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	√	
				10	H	H	H	H			H									H	H		

Table 1
Subarea 8 Phase 3 Proposed Soil Sample Locations
(13 of 14)

Final Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method																Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs, phthalates, NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	CrVI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	Biphenyls (EPA Method 8270C)	Anions (Cyanides) (EPA Method 9012A)	Tetralin (EPA Method 8270C + TICs)	Inorganics (EPA Method 300.0)	VOC (EPA Method 8260)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
8_DG-601	Hillslope South of ESADA	Northwestern Portion of Hillslope	Soil Boring	0.5	X	X	X	X			X									X	X	√	Characterizes hillslope west of ESADA. Also targets area adjacent to dirt road. Location will also assess potential air dispersion impacts related to burning and treatment activities at the former FSDF ponds and is located southwest of FSDF in the periodic 'Santa Ana' wind direction. Location is one of six locations proposed that will assess this migration pathway, the others include 8_DG-521 and four 'future' samples located west of the Area IV boundary. Two of the future locations are in drainages (8_DG-618 and 8_DG-620) to evaluate the potential for subsequent surface water transport of aerially deposited contaminants. Additional sampling to address this pathway will also be proposed in the Northern Buffer Zone Subarea. 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		
8_DG-602	Hillslope South of ESADA	Northeastern Portion of Hillslope	Soil Boring	0.5	X	X	X	X			X									X	X	√	Same as 8_DG-600.
				5	X	X	X	X			X									X	X		
				10	H	H	H	H			H									H	H		
8_DG-603	Hillslope South of ESADA	Northwestern Portion of Hillslope	Soil Boring	0.5																		√	Vertical delineation of thallium at BKND-1. Deep sample at this location not previously collected. Bedrock anticipated <10 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				5				X												X	X		
				10				H												H	H		
8_DG-604	Hillslope South of ESADA	Central Portion of Hillslope	Grab	0.5				X												X	X	√	Targets mineralized area near SL-005-SA8S and SL-007-SA8S to provide additional metals and inorganic data to evaluate if the potential source of elevated strontium detections above screening levels on the Subarea 8 Hillslope are related to the mineralization of geologic feature and are naturally occuring (e.g., associated as a trace element in the calcium carbonate). Location will be based on field observation of mineralization. Collect a sample of minerals present on the ground surface and analyze for metals and inorganics.
8_DG-605	Hillslope South of ESADA	Central Portion of Hillslope	Grab	0.5				X												X	X	√	Same as 8_DG-604.
8_DG-606	Hillslope South of ESADA	Eastern Portion of Hillslope	Soil Boring	0.5	X	X	X	X			X									X	X	√	Targets debris identified during 2008 debris survey. Also characterizes hillslope south of the ESADA. 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		
8_DG-607	Hillslope South of ESADA	Eastern Portion of Hillslope	Soil Boring	0.5	X	X	X	X			X	X	X							X	X	√	Characterizes hillslope south of the ESADA. Also serves as a stepout for pesticides at SL-023-SA8S to the southwest and targets dirt road and surface water pathway. Location selected as a representative drainage location within Subarea 8N to assess the presence of pesticides and herbicides. 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	X			X	X	X							X	X		
				10	X	X		X			X	X	X							X	X		
8_DG-608	Hillslope South of ESADA	Eastern Portion of Hillslope	Soil Boring	0.5	X	X	X	X			X									X	X	√	Characterizes hillslope southeast of the ESADA. Also targets historic dirt road and 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	X			X									X	X		
				10	X	X		X			X									X	X		
8_DG-609	Hillslope South of ESADA	Eastern Portion of Hillslope	Soil Boring	0.5	X	X	X	X			X									X	X	√	Characterizes hillslope southeast of the ESADA. Also targets historical 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		
				10	H	H	H	H			H									H	H		
8_DG-610	Hillslope South of ESADA	Eastern Portion of Hillslope	Soil Boring	0.5	X	X	X	X			X	X	X							X	X	√	Characterizes hillslope southeast of ESADA and targets surface water pathway adjacent to historic dirt road. Location selected as a representative drainage location within Subarea 8N to assess the presence of pesticides and herbicides. 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	X			X	X	X							X	X		
				10	X	X		X			X	X	X							X	X		

Table 1
Subarea 8 Phase 3 Proposed Soil Sample Locations
(14 of 14)

Final Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method																Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs, phthalates, NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	CrVI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	Biphenyls (EPA Method 8270C)	Anions (Cyanides) (EPA Method 9012A)	Tetralin (EPA Method 8270C + TICs)	Inorganics (EPA Method 300.0)	VOC (EPA Method 8260)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
8_DG-611	Hillslope South of ESADA	Southern Portion of Hillslope	Test Pit/Soil Boring	0.5	X	X	X	X			X								X	X	√	Characterizes hillslope southeast of the ESADA and targets debris area identified during the 2008 debris survey. Conduct exploratory test pit to investigate debris area. If fill, staining, debris, or other impacts are observed, collect sample targeting top of native soil. Bedrock anticipated <10 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				5	X	X	X	X			X								X	X		
				10	H	H	H	H			H								H	H		
8_DG-612	Hillslope South of ESADA	Southern Portion of Hillslope	Soil Boring	0.5	X	X	X	X			X								X	X	√	Same as 8_DG-609.
				5	X	X	X	X			X								X	X		
				10	H	H	H	H			H								H	H		
8_DG-613	Hillslope South of ESADA	Southern Portion of Hillslope	Soil Boring	0.5	X	X	X	X			X								X	X		Characterizes hillslope southeast of the ESADA. 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		
8_DG-614	Hillslope South of ESADA	Southern Portion of Hillslope	Soil Boring	0.5	X	X	X	X			X								X	X	√	Same as 8_DG-609.
				5	X	X	X	X			X								X	X		
				10	H	H	H	H			H								H	H		
8_DG-615	B4009 Area	Southeast of B4009	Soil Boring	0.5	X	X	X	X			X								X	X		Characterizes area southeast of former UT-3. Based on proximity to former UT-3, collect samples at 5-foot intervals to bedrock with deepest sample collected just above bedrock. VOCs added due to proximity to potential groundwater impact location. Bedrock anticipated <20 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	H			X								H	X	√	
				15	H	H	H	H			X								H	X		
				20	H	H	H	H			X							X	H	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. 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 8 analytical suite for general operations includes primary chemical groups: PAHs, PCB/PCTs, dioxins, metals, and TPH. Tetralin and biphenyls added to general characterization suite if location is near area features potentially related to reactor operations. Inorganics (Nitrite as NO3, fluoride, sulfate, and sulfite) added to general characterization suite for locations evaluating mineralization of geologic features on hillslope south of ESADA.

Acronyms

AST = above-ground storage tank
bgs = below ground surface
Cr(VI) = hexavalent chromium
EPA = Environmental Protection Agency
ESADA = Empire State Atomic Development Authority
FSDF = Former Sodium Disposal Authority
ft = foot or feet
GIS = geographic information system
IM = Interim Measures
ISI = In Service Inspection
ND = not detected above reporting limit
NDMA = n-nitrosodimethylamine
PAH = polyaromatic hydrocarbons
PCB = polychlorinated biphenyls
PCT = polychlorinated terphenyls
PDU = Process Demonstration Unit
RCRA = Resource Conservation and Recovery Act
RFI = RCRA Facility Investigation
SGR = Sodium Graphite Reactor
TEQ = toxicity equivalent quotient
TIC = tentatively identified compound
TPH = total petroleum hydrocarbons
UST = underground storage tank
UT = Underground Tank
VOC = volatile organic compound

Table 2
Subarea 8 Proposed Soil Vapor Sample Locations
(1 of 3)

Location ID	Area	Location Description	Depth (feet bgs)[1]	Data Gap Checklist[2]	Rationale / Comments[3]
8SV_DG-501	FSDF	Northeastern of FSDF	5 10	√	Assesses the potential for upward transport of VOCs from groundwater to backfill soils used in the areas excavated during the 2000 Interim Measure. Location selected is northeast of the Former Lower Pond.
8SV_DG-502	FSDF	Northeastern of FSDF	4.5	√	Assesses the potential for upward transport of VOCs from groundwater to backfill soils used in the areas excavated during the 2000 Interim Measure. Location selected is northeast of the Former Lower Pond. Sample will be collected from a single-depth monitoring point (EPA ID was #73) that was installed within the 2000 Interim Measures excavation area in 2011 as part of Phase 1 sampling. If a lack of vapor flow prohibits the collection of a soil vapor sample at the existing monitoring point, a new location will be installed and sampled.
8SV_DG-503	FSDF	North of FSDF	5 10		Characterizes vapor in native soil adjacent to the 2000 Interim Measure excavation area. Location selected is north of the Former Lower Pond and adjacent to elevated detections of VOCs in a soil sample and soil vapor sample collected within the backfill.
8SV_DG-504	FSDF	North of FSDF	5 10		Characterizes vapor in native soil adjacent to the 2000 Interim Measure excavation area. Location selected is north of the Former Lower Pond and adjacent to elevated detections of VOCs in a soil vapor sample collected within the backfill.
8SV_DG-505	FSDF	Western Portion of FSDF	6 to 9	√	Assesses the potential for upward transport of VOCs from groundwater to backfill soils used in the areas excavated during the 2000 Interim Measure. Location selected is west of the Former Upper Pond and adjacent to elevated dections of VOCs in a soil vapor sample. Sample will be collected from a semi-permanent vapor probe (EPA ID was #59) that was installed within the 2000 Interim Measures excavation area in 2011 as part of Phase 1 sampling.
8SV_DG-506	FSDF	Western Portion of FSDF	7	√	Assesses the potential for upward transport of VOCs from groundwater to backfill soils used in the areas excavated during the 2000 Interim Measure. Location selected is west of the Former Lower Pond. Sample will be collected from a single-depth monitoring point (EPA ID was #58) that was installed within the 2000 Interim Measures excavation area in 2011 as part of Phase 1 sampling. If a lack of vapor flow prohibits the collection of a soil vapor sample at the existing monitoring point, a new location will be installed and sampled.
8SV_DG-507	FSDF	Eastern Portion of FSDF	6	√	Assesses the potential for upward transport of VOCs from groundwater to backfill soils used in the areas excavated during the 2000 Interim Measure. Location selected targets the Former Lower Pond and adjacent to elevated detections of VOCs in a soil vapor sample. Sample will be collected from a single-depth monitoring point (EPA ID was #63) that was installed within the 2000 Interim Measures excavation area in 2011 as part of Phase 1 sampling. If a lack of vapor flow prohibits the collection of a soil vapor sample at the existing monitoring point, a new location will be installed and sampled.
8SV_DG-508	FSDF	Eastern Portion of FSDF	7	√	Assesses the potential for upward transport of VOCs from groundwater to backfill soils used in the areas excavated during the 2000 Interim Measure. Targets the Former Upper Pond. Sample will be collected from a single-depth monitoring point (EPA ID was #54) that was installed within the 2000 Interim Measures excavation area in 2011 as part of Phase 1 sampling. If a lack of vapor flow prohibits the collection of a soil vapor sample at the existing monitoring point, a new location will be installed and sampled.
8SV_DG-509	FSDF	East of FSDF	5 10	√	Characterizes vapor in native soil adjacent to the 2000 Interim Measure excavation area. Location selected is east of the Former Lower Pond.
8SV_DG-510	FSDF	East of FSDF	5 10		Characterizes vapor in native soil adjacent to the 2000 Interim Measure excavation area. Also addresses elevated RLs in a previous sample. Location selected is east of the Former Upper Pond.
8SV_DG-11	FSDF	Southeast of FSDF	5 10	√	Characterizes vapor in native soil adjacent to the perimeter of the 2000 Interim Measure excavation area. Location selected targets the Former Steam Lance.
8SV_DG-512	FSDF	Southern Portion of FSDF	8	√	Assesses the potential for upward transport of VOCs from groundwater to backfill soils used in the areas excavated during the 2000 Interim Measure. Location selected targets the former Concrete Pool. Sample will be collected from a single-depth monitoring point (EPA ID #51) that was installed within the 2000 Interim Measures excavation area in 2011 as part of Phase 1 sampling. If a lack of vapor flow prohibits the collection of a soil vapor sample at the existing monitoring point, a new location will be installed and sampled.
8SV_DG-513	FSDF	South of FSDF	5 10	√	Targets the former pipeline running from former Building 4814 to FSDF identified in a historical drawing. Also address elevated RLs in a previous sample.
8SV_DG-514	FSDF	South of FSDF	5 10	√	Characterizes vapor in native soil adjacent to the 2000 Interim Measure excavation area. Location selected is southwest of the Former Upper Pond.
8SV_DG-515	FSDF	Southwest of FSDF	5 10		Targets the area south of the Former Drum Debris Area.

Table 2
Subarea 8 Proposed Soil Vapor Sample Locations
(2 of 3)

Location ID	Area	Location Description	Depth (feet bgs)[1]	Data Gap Checklist[2]	Rationale / Comments[3]
8SV_DG-516	FSDF	Northeast of FSDF	5 10	√	Targets the drainage downstream of the Former Drum Debris Area.
8SV_DG-517	FSDF	North of ESADA	5 10		Characterizes the area south of FSDF that was graded during the 2000 Interim Measures.
8SV_DG-518	ESADA	North of ESADA	5 10	√	Characterizes the northern portion of the Former ESADA Storage Yard.
8SV_DG-519	ESADA	North of ESADA	5 10	√	Targets the former pipeline running from former Building 4814 to FSDF identified in a historical drawing.
8SV_DG-520	ESADA	North of ESADA	5 10	√	Characterizes the area northwest of the Former ESADA Storage Yard and targets debris identified during 2008 debris survey.
8SV_DG-521	ESADA	Northern Portion of ESADA	5 10	√	Characterizes the central portion of the Former ESADA Storage Yard.
8SV_DG-522	ESADA	ESADA	5 10	√	Characterizes the southern portion of the Former ESADA Storage Yard.
8SV_DG-523	ESADA	ESADA	5 10	√	Targets soil staining observed in a 1980 historical aerial photo.
8SV_DG-524	ESADA	ESADA	5 10		Characterizes the ESADA Former Pistol Range.
8SV_DG-525	B4009 Area	West of the Solar Concentrator Facility	5 10 15	√	Targets the topographic low spot adjacent to the debris area identified during 2008 debris survey. Also targets a terrain conductivity anomaly.
8SV_DG-526	B4009 Area	Southwest of the Solar Concentrator Facility	5 10 15	√	Targets debris identified during a 2008 debris survey.
8SV_DG-527	B4009 Area	South of the Solar Concentrator Facility	5 10 15	√	Targets debris identified during a 2008 debris survey.
8SV_DG-528	B4009 Area	Solar Concentrator Facility	5 10 15	√	Targets the former footprint of the Solar Concentrator Facility.
8SV_DG-529	FSDF	East of FSDF	5 10		Location selected to assess VOCs concentrations where other chemicals have been detected above the LUT values in soil matrix samples.
8SV_DG-530	FSDF	East of FSDF	5 10	√	Targets a drainage and is selected to assess VOCs concentrations where other chemicals have been detected above the LUT values in soil matrix samples.
8SV_DG-531	B4009 Area	West of B4009	5 10	√	Location targets a drainage and is selected to assess VOCs concentrations where other chemicals have been detected above the LUT values in soil matrix samples.
8SV_DG-532	B4009 Area	Northwest of B4009	5 10	√	Characterizes the unlined drainage downstream of B4009 and leach field to assess for potential contaminant migration.
8SV_DG-533	B4009 Area	Northwest of B4009	5 10	√	Same as 8SV_DG-532.
8SV_DG-534	B4009 Area	Northwest of B4009	5 10	√	Targets the B4009 Leach Field and addresses uncertainty regarding which VOC constituents were analyzed and elevated RLs in previous soil vapor sampling.
8SV_DG-535	B4009 Area	North of B4009	5 10	√	Characterizes the area near the B4009 SGR High-bay roll-up door.
8SV_DG-536	B4009 Area	West of B4009	5 10	√	Characterizes the unlined drainage west of B4009.
8SV_DG-537	B4009 Area	West of B4009	5 10	√	Characterizes the area near the B4009 OMR High-bay roll-up door.
8SV_DG-538	B4009 Area	West of B4009	5 10	√	Targets the topographic low spot in the western portion of the B4009 Yard.
8SV_DG-539	B4009 Area	Southwest of B4009	5 10	√	Characterizes the lined drainage southwest of B4009.

Table 2
Subarea 8 Proposed Soil Vapor Sample Locations
(3 of 3)

Location ID	Area	Location Description	Depth (feet bgs)[1]	Data Gap Checklist[2]	Rationale / Comments[3]
8SV_DG-540	B4009 Area	South of B4009	5	√	Characterizes the southern portion of the B4009 Yard and the area southwest of former UT-3.
			10		
			15		
8SV_DG-541	B4009 Area	Southeast of B4009	5	√	Targets doorway at the southwest portion of B4009 and the location where the former UT-3 fuel pipeline entered B4009. Also characterizes the area adjacent to former UT-3.
			10		
			15		
8SV_DG-542	B4009 Area	Southeast of B4009	5	√	Characterizes the lined drainage southeast of B4009 and the area adjacent to former UT-3.
			10		
			15		
8SV_DG-543	B4009 Area	East of B4009	5	√	Characterizes the lined drainage east of B4009.
			10		
			15		
8SV_DG-544	B4056 Landfill	Southeast of the B4056 Landfill	5		Characterizes the southwestern perimeter of the Southern Screening Area.
			10		
8SV_DG-545	B4009 Area	West of the B4056 Landfill	5	√	Targets the drainage downstream of B4009 that leads to the administrative boundary.
			10		
8SV_DG-546	FSDF	North of FSDF	5	√	Targets the drainage downstream of FSDF.
			10		

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 4 for the area listed in "Location Description" (GIS or aerial photo review layers).

3. Seven soil vapor locations (8SV_DG-501, 8SV_DG-502, 8SV_DG-505, 8SV_DG-506, 8SV_DG-507, 8SV_DG-508, and 8SV_DG-512) are proposed at Subarea 8 at areas that were excavated to bedrock during the 2000 Interim Measure at FSDF. Subsequent to the 2000 Interim Measure, VOCs (PCE, cis-1,2-DCE, trans-1,2-DCE, vinyl chloride, 1,2-DCE, and TCE at up to 12,315 ppb in FSSV03 at 7 feet bgs) were previously detected in vapor samples collected from backfill soil in excavated areas. The proposed soil vapor sampling will assess the upward transport of VOCs from groundwater to backfill soils in the excavation area.

Acronyms

bgs = below ground surface
DCE = dichloroethene
DTSC = California Department of Toxic Substances Control
EPA = Environmental Protection Agency
ESADA = Empire State Atomic Development Authority
FSDF = Former Sodium Disposal Facility
GIS = geographic information system
LUT = Look-Up Table
OMR = Organic Moderator Reactor
PCE = tetrachloroethene
RL = reporting limit
SGR = Sodium Graphite Reactor
SOP = standard operating procedures
TCE = trichloroethene
VOC = volatile organic compound

Table 3
Subarea 8 Phase 3 Proposed Sample Locations for Future Collection
(1 of 1)

Final Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method																Data Gap Checklist[3]	Rationale / Comments
					PAHs, phthalates, NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Cr(VI) (EPA Method 7196A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	Biphenyls (EPA Method 8270C)	Anions (Cyanides) (EPA Method 9012A)	Tetralin (EPA Method 8270C + TICs)	Inorganics (EPA Method 300.0)	VOC (EPA Method 8260)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
8_DG-616	Hillslope South of ESADA	Northwestern Portion of Hillslope	Soil Boring	0.5				X											X	X		**Future Location.** Stepout for thallium at BNKD-1 to the northeast. Bedrock anticipated <10 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				5				X											X	X		
				10				H											H	H		
8_DG-617	Hillslope South of ESADA	Western Portion of Hillslope	Soil Boring	0.5				X	X										X	X		**Future Location.** Targets mineralized area southwest of SL-005-SA8S and SL-007-SA8S to provide additional data to evaluate the potential the strontium detections above screening levels on the Subarea 8 Hillslope are related to the geology and are naturally occuring (i.e. the calcium carbonate). Location will be based on field observation of mineralization. Also serves as a stepout for hexavalent chromium at SL-007-SA8S. Samples will be analyzed for metals only, including hexavalent chromium. Bedrock anticipated <10 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				5				X	X										X	X	√	
				10				H	H										H	H		
8_DG-618	Hillslope South of ESADA	Southern Portion of Hillslope	Soil Boring	0.5				X											X	X		**Future Location.** Targets mineralized area southwest of SL-001-SA8S to provide additional metals and inorganic data to evaluate if the potential source of elevated strontium detections above screening levels on the Subarea 8 Hillslope are related to the mineralization of geologic feature and are naturally occuring (e.g., associated as a trace element in the calcium carbonate). Location will be based on field observation of mineralization. Samples will be analyzed for metals and inorganics. Bedrock anticipated <10 feet bgs. If deep soils encountered, sample and place on hold pending shallow results.
				5				X											X	X	√	
				10				H											H	H		
8_DG-619	Hillslope South of ESADA	Western Portion of Hillslope	Soil Boring	0.5	X		X	X											X	X		**Future Location.** Location will also assess potential air dispersion impacts related to burning and treatment activities at the former FSDF ponds and is located southwest of FSDF in the periodic 'Santa Ana' wind direction. Location is one of six locations proposed that will assess this migration pathway, the others include 8_DG-521, 8_DG-601, and three other 'future' samples located west of the Area IV boundary. Two of the future locations are in drainages (8_DG-619 and 8_DG-621) to evaluate the potential for subsequent surface water transport of aerially deposited contaminants. Additional sampling to address this pathway will also be proposed in the Northern Buffer Zone Subarea. Bedrock depth unknown. Collect 10-foot sample and place on hold pending shallow results.
				5	X		X	X											X	X	√	
				10	H		H	H											H	H		
8_DG-620	Hillslope South of ESADA	Western Portion of Hillslope	Soil Boring	0.5	X		X	X											X	X		**Future Location.** Same as 8_DG-619.
				5	X		X	X											X	X	√	
				10	H		H	H											H	H		
8_DG-621	Hillslope South of ESADA	Western Portion of Hillslope	Soil Boring	0.5	X		X	X											X	X		**Future Location.** Same as 8_DG-619.
				5	X		X	X											X	X	√	
				10	H		H	H											H	H		
8_DG-622	Hillslope South of ESADA	Western Portion of Hillslope	Soil Boring	0.5	X		X	X											X	X		**Future Location.** Same as 8_DG-619.
				5	X		X	X											X	X	√	
				10	H		H	H											H	H		

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. 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).

Acronyms

bgs = below ground surface
Cr(VI) = hexavalent chromium
EPA = Environmental Protection Agency
FSDF = Former Sodium Disposal Authority
ft = foot or feet
GIS = geographic information system
NDMA = n-nitrosodimethylamine
PAH = polyaromatic hydrocarbons
PCB = polychlorinated biphenyls
PCT = polychlorinated terphenyls
TIC = tentatively identified compound
TPH = total petroleum hydrocarbons
VOC = volatile organic compound

Table 4
Subarea 8
Data Gap Checklist
(Page 1 of 2)

INFORMATION SOURCE	Subarea 8 Data Gap Evaluation Areas [1]				
	FSDF	B4009 Area	B4056 Landfill Area	ESADA	Hillslope South of ESADA
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)	√	√	√	√	√
Other [3]					
Existing Building Feature Documentation - process info reviewed	NA	√	NA	√	NA
Historical Facility Diagrams - deep feature info reviewed	√	√	√	√	√
Groundwater Impacts / Potential Inputs to Groundwater Evaluated [4]	√	√	√	√	√

Table 4
Subarea 8
Data Gap Checklist
(Page 2 of 2)

Subarea 8 Data Gap Evaluation Areas [1]

INFORMATION SOURCE

	FSDF	B4009 Area	B4056 Landfill Area	ESADA	Hillslope South of ESADA
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 FSDF Area includes the B4604, 4730, 4885, 4886, Upper Pond, Lower Pond, Concrete Pool, Western Debris Area, FSDF Pistol Range, and the area surrounding these buildings and features. The ESADA Area includes the B4314, B4317, B4318, B4370, B4514, B4370, B4814, B4820, ESADA Former Storage Yard, ESADA Pistol Practice Range, and the area surrounding these buildings and features. The Hillslope South of ESADA includes the hillslope south of the ESADA operations area. The B4009 Area includes B4009, B4009 Leach Field, Solar Concentrator Facility, Area IV Weather Station, Astronomical Observatory, and the area surrounding these buildings and features. Samples within the existing footprint of B4009 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 B4056 Landfill Area includes operations area includes the B4056 Landfill, the B4056 excavation, and the area surrounding these features.

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 8, one air dispersion sources was evaluated: the FSDF Lower Pond. Additional future sampling is recommended in Subarea 7 and the NBZ to assess this pathway, but existing data along with newly proposed Phase 3 locations is considered sufficient to assess potential contamination within Subarea 8 from this pathway.

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; validated data from EPA will be reviewed when available. For Subarea 8, 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 7

Subarea 5B

Subarea 5C

Subarea 8 North

Subarea 8 South

Subarea 5D North

ISI Storage

solar facility

Astronomical weather station

Shed

PZ-097 PZ-098 PZ-099 PZ-100 PZ-101 PZ-102 PZ-124

RD-57 RD-33A RD-33B RD-33C RD-65 RD-23 RD-54B RD-54C RD-54A RD-64 RD-22 RD-21 RD-50 RD-74 RD-07 RD-91

RS-54 RS-18 RS-16 RS-23

8_DG-501 8_DG-502 8_DG-503 8_DG-504 8_DG-505 8_DG-506 8_DG-507 8_DG-508 8_DG-509 8_DG-510 8_DG-511 8_DG-512 8_DG-513 8_DG-514 8_DG-515 8_DG-516 8_DG-517 8_DG-518 8_DG-519 8_DG-520 8_DG-521 8_DG-522 8_DG-523 8_DG-524 8_DG-525 8_DG-526 8_DG-527 8_DG-528 8_DG-529 8_DG-530 8_DG-531 8_DG-532 8_DG-533 8_DG-534 8_DG-535 8_DG-536 8_DG-537 8_DG-538 8_DG-539A 8_DG-539B 8_DG-539C 8_DG-539D 8_DG-540 8_DG-541 8_DG-542 8_DG-543 8_DG-544 8_DG-545 8_DG-546 8_DG-547 8_DG-548 8_DG-549 8_DG-550 8_DG-551 8_DG-553 8_DG-554 8_DG-555 8_DG-556 8_DG-557A 8_DG-557B 8_DG-557C 8_DG-557D 8_DG-558 8_DG-559 8_DG-560 8_DG-561 8_DG-562 8_DG-563 8_DG-564 8_DG-565 8_DG-566 8_DG-567 8_DG-568 8_DG-569 8_DG-570 8_DG-571 8_DG-572 8_DG-573 8_DG-574 8_DG-575 8_DG-576A 8_DG-576B 8_DG-576C 8_DG-576D 8_DG-576E 8_DG-576F 8_DG-577 8_DG-578 8_DG-579 8_DG-580 8_DG-581 8_DG-582 8_DG-583 8_DG-584 8_DG-585 8_DG-586 8_DG-587 8_DG-588 8_DG-589 8_DG-590 8_DG-591 8_DG-592 8_DG-593 8_DG-594 8_DG-595 8_DG-596 8_DG-597 8_DG-615

4609 4885 4604 4886 4370 4814 4425 4314 4514 4730 4820 4100 4009 4155 4055 4020 4015 4374 4378 4373 4343A 4343B 4473 4375 4873 4363 4863 4854 4066 4065 4062 4657 4806 4039 4057 4038 4626 4656 4392 4335 4334 4356 4359 4355 4362 4823 4809 4019 4459 4463 4462 4661 4662 4628 4486 4485 4484 4487 4482 4393 4383

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

- <= 1x LUT Values
- 1x - 2x LUT Values
- 2x - 10x LUT Values
- 10x - 100x LUT Values
- > 100x LUT Values

Combined ND / LUT Values

- <= 1x LUT Values
- 1x - 2x LUT Values
- 2x - 10x LUT Values
- 10x - 100x LUT Values
- > 100x LUT Values

Subarea 8 North
Phase 3 Proposed Soil Matrix Sampling Locations and Previous Data Summary
SANTA SUSANA FIELD LABORATORY

Path: T:\projects\rock3\HSA\Working\Subarea 8\HSA_8N_Summary.mxd

Date: 8/5/2013

1 inch = 140 feet

0 140 280 Feet

FIGURE 1

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 5D North

Subarea 8 South

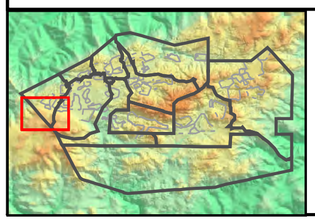
Subarea 5D South

8_DG-598 8_DG-599 8_DG-600 8_DG-601 8_DG-602 8_DG-603 8_DG-604 8_DG-605 8_DG-606 8_DG-607 8_DG-608 8_DG-609 8_DG-610 8_DG-611 8_DG-612 8_DG-613 8_DG-614 8_DG-616 8_DG-617 8_DG-618 8_DG-619 8_DG-620 8_DG-621 8_DG-622

RD-50

4100 4009 4604 4886 4XXX 4020 4468 Solar facility Astronomical 4425 weather station 4514 4370 4814 Shed 4314 4730 4820

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.



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- 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 8 South
Phase 3 Proposed Soil Matrix Sampling Locations and Previous Data Summary

SANTA SUSANA FIELD LABORATORY

Path: T:\projects\rock3\HSA\Working\Subarea 8\HSA_8S_Summary.mxd

Date: 8/1/2013

1 inch = 140 feet

0 140 280 Feet

FIGURE 2

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 7

Subarea 5B

Subarea 5C

Subarea 5D North

Subarea 5D South

Subarea 8 North

Subarea 8 South

BZ-NW

Northern Buffer Zone

Area IV

Area III

Building 4056 Excavation Pit

Building 4009 Sodium Graphite and Organic Modulated Reactor Vaults and Former Waste Hold-Up Tanks (UT-4 and UT-5)

Building 4009 Former Fuel Oil UST (UT-3)

Building 4009 Leach Field

FSDF Disposal/ Treatment Area including former Upper and Lower Ponds and Concrete Pool Area

RD-96 RD-28 RD-24 PZ-120 RD-25 PZ-104 RD-74 PZ-109 PZ-122 RS-16 RD-07 RD-29 RS-27 8SV_DG-545 8SV_DG-544 PZ-005 RD-26 RD-91 PZ-106 PZ-103 PZ-104 RS-17 PZ-105 RD-13 RD-55B PZ-035 RD-55A RD-58C RD-58A RD-58B RD-57 PZ-097 PZ-098 RS-18B RD-33C RD-33A RD-33B 8SV_DG-516 PZ-099 RD-65 8SV_DG-501 8SV_DG-502 8SV_DG-503 8SV_DG-504 8SV_DG-507 RD-23 RS-54 RD-54 RD-22 8SV_DG-505 RS-54 8SV_DG-506 8SV_DG-509 8SV_DG-510 8SV_DG-511 8SV_DG-515 8SV_DG-508 8SV_DG-512 8SV_DG-514 PZ-100 PZ-101 RD-21 8SV_DG-513 8SV_DG-518 8SV_DG-519 8SV_DG-517 8SV_DG-520 8SV_DG-521 RS-23 8SV_DG-522 8SV_DG-523 8SV_DG-524 8SV_DG-526 8SV_DG-527 8SV_DG-525 8SV_DG-528 8SV_DG-529 8SV_DG-530 8SV_DG-531 8SV_DG-532 8SV_DG-533 8SV_DG-534 8SV_DG-535 8SV_DG-536 8SV_DG-537 8SV_DG-538 8SV_DG-539 8SV_DG-540 8SV_DG-541 8SV_DG-542 8SV_DG-543 RD-50

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- Dirt Road
- A/C Paving

Groundwater Wells

- Near Surface
- Chatsworth

Trenches

- Previous
- Proposed

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

Subarea 8
Phase 3 Proposed Soil Vapor Sampling Locations

SANTA SUSANA FIELD LABORATORY

Path: T:\projects\rock3\HSA\Working\Subarea 8\HSA_8_SoilVapor.mxd Date: 8/1/2013

1 inch = 200 feet

0 200 400 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 8

Table F
Field Tracker
Subarea 8

Location Description	Location ID(s)	Explanation and Notes
Samples targeting surface water pathways	8_DG-518 8_DG-542 8_DG-563 8_DG-591 8_DG-592 8_DG-607 8_DG-608 8_DG-610	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, map in GIS.
Samples characterizing native soils near the perimeter of the FSDF 2000 Interim Measures area	8_DG-502 8_DG-504 8_DG-506 8_DG-507 8_DG-508 8_DG-509 8_DG-513	Sampling will target native soil at locations adjacent to excavated and backfilled areas. Samples will be collected down to bedrock to evaluate potential lateral migration along bedrock
Drainage locations near FSDF, B4009, and B4056 Landfill	8_DG-501 8_DG-512 8_DG-514 8_DG-564 8_DG-583 8_DG-586 8_DG-590 8_DG-593	Collect samples in drainage, target areas of sediment collection/deposition. Collect samples to bedrock and analyze all depths to characterize historical deposition over time.
Test Pits or Trenches at Geophysical Anomalies	8_DG-533 8_DG-534 8_DG-535 8_DG-544 8_DG-545 8_DG-546 8_DG-547 8_DG-548 8_DG-611	Excavate test pits or trenches to investigate geophysical anomalies and debris areas identified by EPA. Inspect test pits for signs of backfill, impacts (staining, debris, etc.), piping, or other subsurface infrastructures. At areas previously characterized where fill is anticipated (i.e., 8_DG-546, 8_DG-547, 8_DG-548), excavate until top of native soils encountered and only collect samples if warranted based on field observations. For other situations, collect samples at top of native and just above bedrock to evaluate potential recharge to groundwater.
Sampling Beneath lined Drainages	8_DG-550 8_DG-551 8_DG-552 8_DG-553 8_DG-567 8_DG-568 8_DG-569 8_DG-575	Samples will be collected beneath the drainage lining (if still present), with the deepest sample collected above bedrock to assess potential lateral migration along bedrock.
B4056 Landfill delineation	8_DG-593 8_DG-594 8_DG-596 8_DG-597	Target the native soil adjacent to the B4056 Landfill extent. Map extent of the B4056 Landfill in GIS.

Table F
Field Tracker
Subarea 8

Location Description	Location ID(s)	Explanation and Notes
Trenching locations near UT-4	8_DG-579	Perform trenching to uncover the concrete-filled former UT-4 vault and to collect a sample of native soil at a depth just below the bottom of the vault. Map vault in GIS.
Hilltop east of ESADA	8_DG-604 8_DG-605	Collect sample of white, caliche-like mineralization present at ground surface.
Air dispersion impacts related to burning and treatment activities at the former FSDF ponds	8_DG-521 8_DG-601 8_DG-619 8_DG-620 8-DG-621 8_DG-622	Sample on undeveloped hillsides and downgradient drainages away from the former ponds in the prevailing wind direction to the northwest and the periodic 'Santa Ana' wind direction to the southwest.
Air dispersion impacts related to burning and treatment activities at the former B4100 Trench	8_DG-585 8_DG-588 8_DG-589 8_DG-591 8_DG-592	Sample on undeveloped hillsides or downgradient drainages away from the former B4100 Trench in the prevailing wind direction to the northwest.
FSDF soil vapor samples collected at previously installed vapor probe/points	8SV_DG-502 8SV_DG-505 8SV_DG-506 8SV_DG-507 8SV_DG-508 8SV_DG-512	Collect soil vapor samples at one previously installed semi-permanent vapor probe location (8SV_DG-505) and five previously installed single-depth monitoring points (8SV_DG-502, 8SV_DG-506, 8SV_DG-507, 8SV_DG-508, and 8SV_DG-512). If a lack of vapor flow prohibits the collection of soil sample at the single-depth monitoring points, a new location will be installed and sampled.

Acronyms:
EPA = Environmental Protection Agency
ESADA = Empire State Development Authority
FSDF = Former Sodium Disposal Facility