Addendum No. 6 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 7

Prepared for:

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Master Field Sampling Plan for Chemical Data Gap Investigation
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Contract DE-EM0001128
CDM Smith Task Order DE-DT0003515

"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."

Prepared by: _____ **March 20, 2013**
Michael Hoffman, P.G. **Date**
CDM Smith Geologist

Approved by: _____ **March 20, 2013**
John Wondolleck **Date**
CDM Smith Project Manager

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Introduction

This document supports implementation of the soil sampling program described in 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 2012a). 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). The Master FSP includes field Standard Operating Procedures (SOPs) describing the details of sampling activities and sample management at SSFL. For all samples collected at locations within Subarea 7, 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

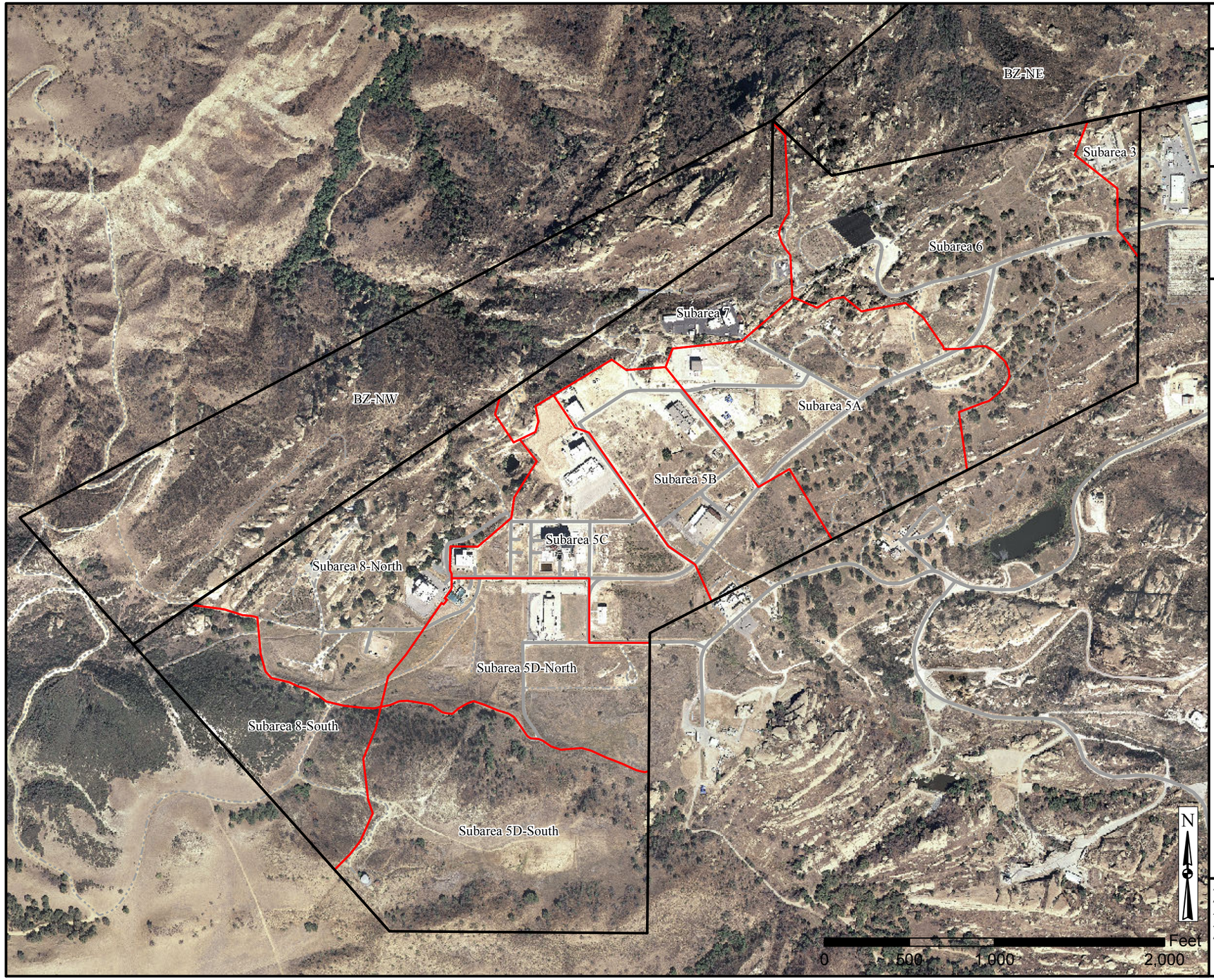
The AOC between DTSC and DOE was signed on December 6, 2010. The AOC is a legally binding order that describes the characterization of Area IV and Northern Buffer Zone soils/sediments and further defines DOE's obligations in relation to radiologic and chemical cleanup of soils within these areas. It 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 7 was completed in November 2011. Phase 2 (random co-located sampling with EPA in the Northern Buffer Zone) was completed in April 2011.

Phase 3 of the AOC is the data gap investigation, 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 *Work Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California* (CDM 2010b) (Phase 3 Work Plan). The purpose of the data gap investigation is to identify

Santa Susana
Field Laboratory Site Ventura County, California

Figure 1
Subarea Designation
Santa Susana Field Laboratory

U.S. EPA Region 9



Legend

- Subarea
- Area IV & Northern Buffer Zones

Centerline Roads

- Primary
- Secondary
- Tertiary

Filepath: Y:/Santa_Susana/EP9038/SubArea_SurveySection/Overall/Subarea_Designation_20101221.mxd
Project: EP9038
Edited By: PL 20101221
Source: CIRGIS 2007, HGL 2010

HGL HydroGeoLogic, Inc

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 investigation.

The Phase 3 sampling within Subarea 7 is governed by the Phase 3 Work Plan and its elements including the Master FSP, Phase 3 Quality Assurance Project Plan (CDM Smith 2012c) (QAPP), Worker Health and Safety Plan (CDM Smith 2012d), and the Phase 3 SSFL SOPs (attachments to the Master FSP and QAPP). These documents are incorporated into this FSP Addendum by reference.

Purpose of FSP Addendum

This FSP Addendum addresses Phase 3 sampling in Subarea 7. Figure 1 of this document illustrates the location of Subarea 7 within Area IV of SSFL. The rationale for sample location and chemical analytes is provided in the document *Subarea 7 Phase 3 Data Gap Analysis Technical Memorandum, Santa Susana Field Laboratory, Ventura County, California* (MWH 2013[1]) (*Subarea 7 Data Gap TM*). The *Subarea 7 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. Figure 1 of the *Subarea 7 Data Gap TM* (MWH 2013) provides the proposed soil sample locations in Subarea 7. All sample locations were identified through the data gap analysis. Attachment 2 (Table F Subarea 7 Field Tracker) to this Subarea 7 FSP Addendum provides additional information beyond the rationale in Table 1 of the *Subarea 7 Data Gap TM* for sample locations that target three different conditions that will be encountered in the field. This information will be useful during sample staking and collection.

For Subarea 7, 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 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.

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

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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.

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 7 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 2012a).

Table 1 of the *Subarea 7 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. The sampling of soil gas or other media will be addressed in a future sampling plan.

Sample Analytes

Table 1 of the *Subarea 7 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 7 Data Gap TM* (MWH 2012) 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 7 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 April 1, 2013, following DTSC approval of this Subarea 7 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 April 8, and subsurface soil borings (hand-auger and DPT) will start by April 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. *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. 2012b. *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. 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.

MWH 2013. *Subarea 7 Phase 3 Data Gap Analysis Technical Memorandum Santa Susana Field Laboratory, Ventura County, California.* March.

Attachment 1

Subarea 7 Phase 3 Data Gap Analysis Technical Memorandum, Santa Susana Field Laboratory, Ventura County, (MWH 2013)

SUBAREA 7 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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March 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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Project Manager

Mark Sherwin, P.G. 7874
Senior Technical Lead

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Program Director

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ACRONYMS AND ABBREVIATIONS

AOC	Administrative Order on Consent
DOE	Department of Energy
DQO	Data Quality Objective
DTSC	Department of Toxic Substances Control
EPA	Environmental Protection Agency
GIS	geographic information system
HGL	Hydrogeologic, Inc.
HSA	historical site assessment
ISL	interim screening level
MFSP	Master Field Sampling Plan
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
RMHF	Radioactive Materials Handling Facility
SSFL	Santa Susana Field Laboratory
TIC	tentatively identified compound
TM	technical memorandum
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 7 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 7 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 7 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 7.

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 Data Gap Analysis 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

[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.

data gap investigation 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 will be an iterative process. At this time in the data gap analysis process, data are 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). 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 December 2012, DTSC completed a comprehensive chemical soil background study which established a background dataset for SSFL environmental programs that includes values for metals, dioxins, and other chemicals not included in the 2005 study. The background dataset was not finalized by DTSC until near the completion of the data gap analysis for Subarea 7, and as a result, the new background values were not used for the evaluation described in this TM. To maintain consistency in the Phase 3 data gap approach for Area IV, ISLs (using 2005 background values) will be used as the basis for proposing data gap samples in the three remaining Area IV subareas (Subareas 5D, 8, and the NBZ). 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 (incorporating 2012 background 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 available results from EPA's radiological investigation activities (e.g., radionuclide sampling results, gamma surveys, geophysical surveys, aerial photograph interpretations), prior RFI data, the Phase 1 co-located sample results, and historical information on activities within Area IV.

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

- Comparing existing soil sampling results to ISL 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 ISL criteria. The ISLs reflect either existing 2005 soil background concentrations for metals and dioxins[2] or analytical reporting limits for chemicals that do not have 2005 background concentrations. Table 2-1 in the Master Phase 3 Work Plan (CDM, 2012a) lists the ISL values currently being used for the data gap analysis.

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 ISL values for all chemicals analyzed at each sample location using a computer algorithm. The algorithm calculates the ratio of the soil concentration to the ISL 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 ISL is displayed. The GIS uses a color-coded system to display the soil concentration relative to the ISL value. For example, soil concentrations that are at or below the ISL value are displayed as a blue symbol. Locations where the soil concentration exceeds the ISL are displayed as yellow, orange, magenta, or red, depending on the degree of exceedance of the ISL 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).

[2] As described above, DTSC recently completed the 2012 soil background study that established a new background dataset and includes additional chemicals not analyzed in the 2005 study. In a few instances, the data gap sample rationale may refer to the 2012 background values; however, such references are expected to be limited and used where 2005 and 2012 values are substantially different. A final data gap analysis will use DTSC-approved Chemical Look-up Table values (when published) for data screening and identification of any additional chemical data gaps.

Sampling results in the database are 'filtered' to determine which chemicals are above ISLs, 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 ISLs. In some cases where detected chemical concentrations slightly exceed ISL values, Phase 3 step-out sampling is not proposed in this Data Gap Analysis TM, but will be subject to an additional data gap review once the final AOC Look-Up Table values are made available. Similarly, sampling to address elevated reporting limits in historical data is not proposed in all areas of Subarea 7 in this Data Gap Analysis 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 after final Look-Up Table values are established and in the context of recent sampling results.

The GIS display of the ISL-compared sampling results is used to evaluate potential sampling locations. In areas where detected concentrations exceed ISLs, previous sampling data are evaluated to determine if the lateral or vertical extent of the exceedance is limited by other sampling results below ISLs 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 or cleanup decisions. 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 significant exceedances of ISL 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 removed 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 ISLs?

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 7.

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 Data Gap Analysis 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 TM. 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 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 ISLs. 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 Data Gap Analysis 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 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 Data Gap Analysis TM.

3.0 SUBAREA 7 DATA GAP ANALYSIS

The data gap analysis for Subarea 7 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) and 2 (Soil Vapor), and Figures 1 (Soil Matrix) and 2 (Soil Vapor). Table 3 presents the lines of evidence evaluation summary for

this subarea, with checkmarks indicating what information resulted in proposed data gap samples.

Previous data gap analyses have involved unique application of DQOs or specific sampling approaches which were described in respective Data Gap Analysis TMs. However, this portion of Area IV has had extensive sampling already performed as part of the RFI or implemented as part of Phase 1 co-located sampling with EPA, and thus, most of the samples proposed within Subarea 7 are to provide data to laterally and/or vertically delineate previously detected results. In addition, the operational areas at Building 4133 and the Radioactive Materials Handling Facility (RMHF), which constitute a significant portion of the subarea, were identified as areas that will be further investigated and sampled according to forthcoming demolition and closure plans. Therefore, no additional information regarding sampling approaches beyond those provided in specific rationale in the sampling tables is included in this TM.

Sampling to address potential impacts to groundwater is proposed at several locations (listed below and shown on Figure 2). Proposed sampling at these locations includes vertical sampling to top of bedrock (including VOC analysis in the deepest samples collected) and soil vapor sampling. In addition, further evaluation by the groundwater team is recommended for mobile chemicals detected in soil in the vicinity of these features, including VOCs, perchlorate, hexavalent chromium, nitrate, and n-nitrosodimethylamine (NDMA). The potential features/locations identified in Subarea 7 are:

- Building 4021 Leach Field
- Building 4022 Waste Storage Vaults
- Shield Test Irradiation Reactor Vault
- RMHF Catch Basin

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 7 Phase 3 Proposed Soil Sample Locations
(1 of 4)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method														Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Cr(VI) (EPA Method 7196A)	Energetics (EPA Method 8330A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Morpholine (EPA Method 8260 TIC)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
7_DG-500	B4133 Area	Hillside north of B4133	Soil Boring	0.5	X	X	X	X				X					X	X	√	Location targets surface water pathway along road downslope from elevated dioxin and TPH detections. Bedrock anticipated less than 5 feet bgs. If deeper soil encountered, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-501	B4133 Area	Hillside north of B4133	Soil Boring	0.5	X	X	X	X				X					X	X	√	Location targets surface water pathway along road downslope from elevated dioxin and TPH detections. Bedrock anticipated less than 5 feet bgs. If deeper soil encountered, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-502	B4133 Area	Hillside northwest of B4133	Soil Boring	0.5	X	X	X	X				X					X	X	√	Location targets area of cleared vegetation observed in aerial photographs during EPA HSA; also targets surface water pathway/road downslope of elevated dioxin and TPH detects southwest of B4686 (SRE Temporary Waste Storage Area). Shallow bedrock anticipated. If deeper soils are present collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-503	B4133 Area	Hillside north of B4133	Soil Boring	0.5	X	X	X	X				X			X		X	X	√	Stepout for dioxins and pesticides to the southeast; also targets magnetometer anomaly. Shallow bedrock anticipated (less than 5 feet bgs). If deeper soil is present, collect sample just above bedrock and hold pending shallow results.
				5	X	X	X	X				X			X		X	X		
7_DG-504	B4133 Area	Northwest of B4133	Soil Boring	0.5	X	X	X	X				X			X		X	X	√	Stepout for PCBs, dioxins and pesticides detected to the east. Shallow bedrock. If deeper soil is encountered, collect and hold sample just above bedrock pending shallow results.
				5	X	X	X	X				X			X		X	X		
7_DG-505	B4133 Area	Northwest of B4133	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout for TPH detect to the south; also targets area of cleared vegetation observed in aerial photographs during EPA HSA. Shallow refusal anticipated. If deeper soil present, collect and hold sample just above bedrock pending shallow results.
				5	X	X	X	X				X					X	X		
7_DG-506	B4133 Area	Northeast of B4021 Leach Field	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout for elevated TPH to the northwest and east. Bedrock anticipated less than 5 feet bgs. If deep soil encountered, collect and hold sample just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-507	RMHF Area	Northeast of B4021 Leach Field	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout in surface water pathway downslope from TPH and dioxins. Shallow bedrock anticipated (approximately 5 feet bgs); however potential for deeper soils due to sediment deposition/collection. If deeper soils encountered, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		
				10	X	X	X	X				X					X	X		
7_DG-508	B4133 Area	Hillslope west of B4133	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout for upslope dioxins and TPH. Shallow bedrock anticipated (less than 5 feet bgs). If deeper soil is present, collect sample above bedrock and hold pending shallow results.
				5	X	X	X	X				X					X	X		
7_DG-509	B4133 Area	Hillslope west of B4133	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout in surface water pathway downslope from PAHs, dioxins, metals, and TPH. Shallow bedrock refusal anticipated. If deeper soil is present, collect 10 foot sample and hold pending shallow results.
				5	X	X	X	X				X					X	X		
7_DG-510	B4133 Area	Hillslope west of B4133	Soil Boring	0.5	X	X	X	X				X			X		X	X	√	Stepout in surface water pathway downslope of PAHs, PCBs, TPH, dioxins, metals, and pesticides; defines extent of Area West of B4133 Clearly Contaminated Area. Hold deep sample pending shallow results.
				5	X	X	X	X				X			X		X	X		
				10	H	H	H	H				H			H		H	H		
7_DG-511	B4133 Area	Hillslope west of B4133	Soil Boring	0.5	X	X	X	X				X			X		X	X	√	Stepout to delineate downslope extent of clearly contaminated area (PAHs, PCBs, dioxins, TPH, and pesticides); also stepout for TPH, dioxins, and metals to the west. Hold deep sample pending shallow results.
				5	X	X	X	X				X			X		X	X		
				10	H	H	H	H				H			H		H	H		
7_DG-512	RMHF Area	Northeast of B4021 Leach Field	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout in surface water pathway downslope of TPH detects. Shallow bedrock anticipated (approximately 5 feet bgs); however potential for deeper soils due to sediment deposition/collection. If deeper soils encountered, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		
				10	X	X	X	X				X					X	X		
7_DG-513	B4133 Area	Hillslope east of B4133 (above SRE asphalt-lined ditch)	Soil Boring	0.5	X	X	X	X				X			X		X	X	√	Stepout for PCBs, dioxins, and TPH on hillslope east of B4133 area. Location delineates potential migration downslope into asphalt-lined ditch surrounding SRE. Analyze pesticides since detected in drainage. Shallow bedrock refusal anticipated. If deeper soils are present, collect and analyze sample just above bedrock.
				5	X	X	X	X				X			X		X	X		
7_DG-514	B4133 Area	Southeast of B4133	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout for PCBs, TPH, and dioxins. Shallow bedrock refusal anticipated. If deeper soils are present, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-515	B4133 Area	Northeast of Interim Storage Facility	Soil Boring	0.5	X	X	X	X				X			X		X	X		Stepout downslope from dioxin and TPH detections at the ISF. Shallow bedrock refusal anticipated (less than 5 feet bgs). If deeper soils are present, collect and analyze sample just above bedrock.
				5	X	X	X	X				X			X		X	X		
7_DG-516	B4133 Area	Southwest corner of B4133	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout upslope of PAHs, PCBs, and dioxins, and downslope from TPH detections in B4133 operational area. Hold deep sample pending shallow results.
				5	X	X	X	X				X					X	X		
				10	H	H	H	H				H					H	H		
7_DG-517	B4133 Area	Downslope of Interim Storage Facility	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout from dioxins to the west. Bedrock anticipated at approximately 5 feet bgs. If deeper soil is present, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		

Table 1
Subarea 7 Phase 3 Proposed Soil Sample Locations
(2 of 4)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method														Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Cr(VI) (EPA Method 7196A)	Energetics (EPA Method 8330A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Morpholine (EPA Method 8260 TIC)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
7_DG-518	B4133 Area	West of B4133	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout for PAHs, PCBs, dioxins, metals and TPH; also targets geophysical anomaly. Shallow bedrock refusal anticipated. If deeper soil is present, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-519	B4133 Area	West of B4133	Soil Boring	0.5	X	X	X	X				X					X	X		Location targets surface water pathway downslope from B4133 area. Shallow bedrock observed in the area (less than 5 feet bgs); collect 10-foot sample and hold pending shallow results.
				5	X	X	X	X				X					X	X		
7_DG-520	B4133 Area	Hillslope southwest of B4133	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout in surface water pathway downslope from dioxins and TPH. Bedrock anticipated at less than 5 feet bgs. If deeper soils present, collect 10-foot sample and hold pending shallow results.
				5	X	X	X	X				X					X	X		
7_DG-521	B4133 Area	West of Interim Storage Facility	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout for PCBs, dioxins, TPH, and pesticides. Bedrock anticipated at approx. 5 feet bgs. If deeper soil is present, collect and analyze deeper sample just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-522	RMHF Area	East of B4044	Soil Boring	0.5	X	X	X	X				X			X		X	X	√	Location targets surface water pathway upslope from elevated PAHs, PCBs, dioxins, TPH, and pesticides. Shallow bedrock refusal anticipated.
				5	X	X	X	X				X			X		X	X		
7_DG-524	RMHF Area	Paved road entering RMHF	Soil Boring	0.5	X	X	X	X				X					X	X	√	Location targets entrance to RMHF and addresses potential storage (historical photograph provided by public stakeholder showed storage/staging in area). Shallow bedrock anticipated (less than 5 feet bgs). If deep soil encountered, collect sample just above bedrock and hold pending shallow results.
				5	X	X	X	X				X					X	X		
7_DG-525	RMHF Area	Southeast of the B4021 Leach Field	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout downslope of PAHs, dioxins, and TPH in the RMHF asphalt swale (RMHF Northern Fenceline Clearly Contaminated Area). Bedrock anticipated less than 5 feet bgs. If deep soil encountered, collect and analyze sample just above bedrock to assess potential migration from swale.
				5	X	X	X	X				X					X	X		
7_DG-526	RMHF Area	South of the B4021 Leach Field	Soil Boring	0.5	X	X	X	X				X					X	X	√	Same as 7_DG-525.
				5	X	X	X	X				X					X	X		
7_DG-527	RMHF Area	Northwest of the B4021 Leach Field	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout downslope of TPH at the leach field excavation area. Shallow bedrock anticipated. If deep soil encountered, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-528	RMHF Area	North of drainage and RMHF hillslope	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout upslope of dioxins in drainage; also addresses area downslope of TPH detect on hillside. Shallow bedrock anticipated (5 feet bgs or less). If deeper soil is present, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-529	RMHF Area	Hillslope north of B4664	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout for elevated TPH; location also addresses potential surface water migration pathway from B4021 leach field and the debris area north of B4664. Shallow bedrock anticipated. If deep soil encountered, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-530	RMHF Area	Hillslope north of RMHF	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout downslope from elevated detects for PAHs, TPH, and dioxins in the asphalt swale (RMHF Northern Fenceline Clearly Contaminated Area) and TPH in the debris area north of B4664 to the east. Shallow bedrock anticipated (less than 5 feet bgs). If deep soil encountered, collect and analyze sample just above bedrock to assess potential migration from swale.
				5	X	X	X	X				X					X	X		
7_DG-531	RMHF Area	Hillslope north of RMHF	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout for elevated PAHs, TPH, and dioxins downslope of the RMHF asphalt swale, and Northern Fenceline Clearly Contaminated Area. Shallow bedrock anticipated (5 feet bgs or less). If deeper soil is present, collect and analyze sample just above bedrock to assess potential migration from swale.
				5	X	X	X	X				X					X	X		
7_DG-532	RMHF Area	Hillslope north of RMHF	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout for elevated PAHs, dioxins, metals and TPH in the asphalt swale (RMHF Northern Fenceline Clearly Contaminated Area) and TPH in the debris area north of B4075 to the west; also characterizes area downslope of the RMHF asphalt swale (RMHF Northern Fenceline Clearly Contaminated Area). Shallow bedrock anticipated (less than 5 feet bgs). If deep soil encountered, collect and analyze sample just above bedrock to assess potential migration from swale.
				5	X	X	X	X				X					X	X		
7_DG-533	RMHF Area	Hillslope north of B4075	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout downslope of TPH in the debris area north of B4075; also characterizes area downslope from asphalt swale and RMHF Northern Fenceline Clearly Contaminated Area. Shallow bedrock anticipated. If deep soil encountered, collect and analyze sample just above bedrock to assess potential migration from swale.
				5	X	X	X	X				X					X	X		
7_DG-534	RMHF Area	Hillslope northwest of RMHF	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout for elevated TPH in the debris area north of B4075; also characterizes area downslope from RMHF swale and Northern Fenceline Clearly Contaminated Area. Shallow bedrock anticipated (5 feet bgs or less). If deeper soil is present, collect and analyze sample just above bedrock to assess potential migration from swale.
				5	X	X	X	X				X					X	X		
7_DG-535	RMHF Area	Northeast of catch basin	Soil Boring	0.5	X	X	X	X				X					X	X		Location targets surface water pathway from catch basin along road and addresses potential migration of PAHs, TPH, and dioxins detected upgradient. Bedrock anticipated less than 5 feet bgs. If deep soil encountered, collect and analyze just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-536	RMHF Area	Northeast of RMHF Catch Basin	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout for elevated PAHs, TPH and dioxins in RMHF Catch Basin Clearly Contaminated Area; location positioned in surface water pathway to addresses potential surface water migration from the catch basin. Shallow bedrock anticipated (5 feet bgs or less). If deeper soil is present, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		

Table 1
Subarea 7 Phase 3 Proposed Soil Sample Locations
(3 of 4)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method														Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Cr(VI) (EPA Method 7196A)	Energetics (EPA Method 8330A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Morpholine (EPA Method 8260 TIC)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
7_DG-537	RMHF Area	Hillslope northwest of RMHF	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout for elevated PAHs, dioxins, metals, and TPH downslope of the RMHF asphalt swale, and Northern Fenceline Clearly Contaminated Area. Shallow bedrock anticipated (5 feet bgs or less). If deeper soil is present, collect and analyze sample just above bedrock to assess potential migration from swale.
				5	X	X	X	X				X					X	X		
7_DG-538	RMHF Area	Northeast of RMHF Catch Basin	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout for elevated PAHs, TPH and dioxins and defines northwest extent of RMHF Catch Basin Clearly Contaminated Area. Shallow bedrock anticipated (less than 5 feet bgs).
				5	X	X	X	X				X					X	X		
7_DG-539	RMHF Area	North of B4028	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout for TPH and metals at B4028 and provides representative data downslope of the RMHF southern slope. If deeper soils encountered, collect 10-foot sample and analyze to assess chemical migration due to surface water runoff from RMHF asphalt area.
				5	X	X	X	X				X					X	X		
				10	X	X	X	X				X					X	X		
7_DG-540	RMHF Area	B4811	Soil Boring	0.5		X	X		X				X				X	X	√	Location targets the previously sampled cooling tower formerly located at B4811. Analyze for corrosion inhibitors to characterize former cooling tower; dioxins and PCB analyses added to complete general characterization of the area.
				5		X	X		X				X				X	X		
7_DG-541	RMHF Area	South of RMHF Catch Basin	Soil Boring	0.5	X	X	X	X				X					X	X	√	Location targets the pipeline leading from the RMHF Catch Basin to the discharge inlet to the south and also serves as a stepout for dioxins and metals to the north. Shallow bedrock anticipated (less than 5 feet bgs). If deep soil encountered, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-542	RMHF Area	Southwest of B4028	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout for TPH and metals at B4028 to the northeast, PAH to the east, and dioxins and metals to the northwest; location is in area that is downslope of B4028 area. Shallow bedrock anticipated (less than 5 feet bgs).
				5	X	X	X	X				X					X	X		
7_DG-543A	RMHF Area	Former substation southeast of B4028	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 resampled with discrete samples. Recollect samples at four former discrete locations and analyze each sample for PCBs; hold deep samples pending shallow results.
				3		H												H		
7_DG-543B	RMHF Area	Former substation southeast of B4028	Soil Boring	0.5		X												X		
				3		H												H		
7_DG-543C	RMHF Area	Former substation southeast of B4028	Soil Boring	0.5		X												X		
				3		H												H		
7_DG-543D	RMHF Area	Former substation southeast of B4028	Soil Boring	0.5		X												X		
				3		H												H		
7_DG-544	RMHF Area	South of B4028	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout for TPH and metals at B4028 to the north, and PAH to the northwest and east. Shallow bedrock anticipated.
				5	X	X	X	X				X					X	X		
7_DG-545A	RMHF Area	Former transformer pole southwest of RMHF	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 resampled with discrete samples. Recollect samples at former discrete locations and analyze each sample for PCBs; hold deep samples pending shallow results. Note: The fourth discrete location is being targeted by proposed data gap sample 5A_DG-502 which includes PCB analysis; therefore only three discrete samples are being proposed for reanalysis as part of this SAP.
				3		H												H		
7_DG-545B	RMHF Area	Former transformer pole southwest of RMHF	Soil Boring	0.5		X												X		
				3		H												H		
7_DG-545C	RMHF Area	Former transformer pole southwest of RMHF	Soil Boring	0.5		X												X		
				3		H												H		
7_DG-546	RMHF Area	Southwest of RMHF southern slope Clearly Contaminated Area	Soil Boring	0.5			X											X		Location completes analytical suite for dioxins at previous location RMBS0149.
				5			X											X		
7_DG-547	RMHF Area	South of the RMHF southern fenceline	Soil Boring	0.5	X	X	X	X				X					X	X		Defines extent of RMHF Southern Fenceline Clearly Contaminated Area (PAH, PCBs, dioxins, metals, and TPH).
				5	X	X	X	X				X					X	X		
7_DG-548	RMHF Area	North of RMHF Catch Basin	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout for elevated PAHs, TPH and dioxins and defines northern extent of RMHF Catch Basin Clearly Contaminated Area. Shallow bedrock anticipated (less than 5 feet bgs). If deep soil encountered, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-549	RMHF Area	Northwest of RMHF Catch Basin	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout for elevated PAHs, TPH, metals, and dioxins and defines northwest extent of RMHF Catch Basin Clearly Contaminated Area. Shallow bedrock anticipated (less than 5 feet bgs). If deep soil encountered, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-551	RMHF Area	Southwest of RMHF Catch Basin	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout for elevated PAHs, TPH, and dioxins to the northeast and provides delineation of the western extent of the RMHF Catch Basin Clearly Contaminated Area. Shallow bedrock refusal anticipated (5 feet bgs or less). If deeper soils are present, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-552	RMHF Area	West of RMHF Catch Basin	Soil Boring	0.5	X	X	X	X				X					X	X	√	Stepout for dioxins to the northwest; location also targets historical dirt road. Bedrock anticipated less than 5 feet bgs. If deep soil encountered, collect and analyze sample just above bedrock.
				5	X	X	X	X				X					X	X		
7_DG-553	Slope North of SNAP Operations Area	West of RMHF Catch Basin	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout for metals, dioxins, and TPH. PAHs and PCBs added to complete the standard analytical suite since location adjacent to historical dirt road. Bedrock anticipated less than 5 feet bgs; if deeper soils are present, collect 10-foot sample and hold pending shallow results.
				5	X	X	X	X				X					X	X		

Table 1
Subarea 7 Phase 3 Proposed Soil Sample Locations
(4 of 4)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method														Data Gap Checklist[3]	Rationale / Comments[4]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals[2] (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Cr(VI) (EPA Method 7196A)	Energetics (EPA Method 8330A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Morpholine (EPA Method 8260 TIC)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
7_DG-554	Slope North of SNAP Operations Area	Eastern portion of area downslope of SNAP operations area	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout for PAHs, dioxins, and TPH detected along the fenceline north of the SNAP operations area. Locations assess potential contaminant migration from SNAP operational area. Shallow bedrock anticipated (less than 5 feet).
				5	X	X	X	X				X					X	X		
7_DG-555	Slope North of SNAP Operations Area	Downslope of SNAP operations area at B4013	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout for PAHs, dioxins, and TPH detected along the fenceline north of the SNAP operations area. Locations assess potential contaminant migration from SNAP operational area. Shallow bedrock anticipated (less than 5 feet).
				5	X	X	X	X				X					X	X		
7_DG-557	Slope North of SNAP Operations Area	Central portion of area downslope of SNAP operations area	Soil Boring	0.5	X	X	X	X				X					X	X		Location targets surface water pathway downslope of SNAP operational area. Shallow bedrock anticipated.
				5	X	X	X	X				X					X	X		
7_DG-558	Slope North of SNAP Operations Area	Central portion of area downslope of SNAP operations area	Soil Boring	0.5	X	X	X	X				X					X	X		Same as 7_DG-557.
				5	X	X	X	X				X					X	X		
7_DG-559	Slope North of SNAP Operations Area	Downslope of SNAP operations area at B4019	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout for PAHs, PCBs, dioxins, and TPH detected along the fenceline north of the SNAP operations area. Locations assess potential contaminant migration from SNAP operational area. Shallow bedrock anticipated (less than 5 feet).
				5	X	X	X	X				X					X	X		
7_DG-560	Slope North of SNAP Operations Area	Downslope of SNAP operations area at B4059	Soil Boring	0.5	X	X	X	X				X					X	X		Stepout for PAHs, dioxins, and TPH detected along the fenceline north of the SNAP operations area. Locations assess potential contaminant migration from SNAP operational area. Shallow bedrock anticipated (less than 5 feet).
				5	X	X	X	X				X					X	X		
7_DG-561	Slope North of SNAP Operations Area	Western portion of area downslope of SNAP operations area	Soil Boring	0.5	X	X	X	X				X					X	X		Same as 7_DG-557.
				5	X	X	X	X				X					X	X		
7_DG-562	RMHF Area	Hill Slope Southeast of B4028	Soil Boring	0.5	X	X	X	X				X					X	X	√	Location targets area adjacent to sewer manhole. Shallow soil anticipated (5 feet or less bgs).
				5	X	X	X	X				X					X	X		

Footnotes

1. Sampling will generally be at 5 foot intervals to bedrock. In areas where fill is encountered or anticipated, samples will be collected from the top of native soil (beneath fill) and soil just above bedrock. Samples collected at 0.5 feet 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 3 (Data Gap Checklist) for the area listed in "Location Description" (GIS or aerial photo review layers).

4. The Subarea 7 analytical suite for general operations includes primary chemical groups: PAHs, PCB/PCTs, Metals, and TPH. The corrosion inhibitor suite is proposed in operational areas associated with or located downslope from cooling tower operations and includes analysis for formaldehyde and NDMA to address hydrazine use, hexavalent chromium, and arsenic.

Acronyms

bgs = below ground surface
Cr(VI) = hexavalent chromium
EPA = Environmental Protection Agency
ft = foot or feet
Hg = mercury
HSA = Historical Site Assessment
ISF = Interim Storage Facility
PCB = polychlorinated biphenyls
ND = non-detect
PAH = polyaromatic hydrocarbons
PCB = polychlorinated biphenyls
PCT = polychlorinated terphenyls
RMHF = Radioactive Materials Handling Facility
SNAP = Systems for Nuclear Auxiliary Power
TIC = temporary identified compound
TPH = total petroleum hydrocarbons
ISF = Interim Storage Facility

Table 2
Subarea 7 Proposed Soil Vapor Sample Locations
(1 of 1)

Location ID	Area	Location Description	Depth (feet bgs)[1]	Data Gap Checklist[2]	Rationale / Comments
7SV_DG-501	B4133 Area	West of Building 4133 Operational Area	5	√	Location targets Clearly Contaminated Area west of B4133 and characterizes area for runoff from operational area; also addresses elevated RLs in previous samples in the area.
			10		
7SV_DG-502	RMHF Area	Building 4021 Leach Field	5		Location addresses elevated RLs at previous sample locations (RMSV0032/RMSV0033).
			10		
7SV_DG-503	RMHF Area	West of RMHF Catch Basin	5	√	Location characterizes former RMHF catch basin; positioned in localized area where sufficient soil is present for soil vapor sampling based on previous soil data.
			10		
7SV_DG-504	RMHF Area	South of Building 4028	5	√	Location targets trench for cooling water supply to Building 4028 and characterizes area based on operations (heat transfer) in southwest portion of B4028.
			10		
7SV_DG-505	RMHF Area	East of Building 4028	5	√	Location targets area northwest of and downslope from sewer manhole at SETF operational area; positioned in localized area where sufficient soil is present for soil vapor sampling based on previous soil data.
			10		
7SV_DG-506	RMHF Area	Southeast of Building 4028	5		Location targets southeast corner of Building 4028; positioned in localized area where sufficient soil is present for soil vapor sampling based on previous soil data.
			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 3 for the area listed in "Location Description" (GIS or aerial photo review layers).

Acronyms

bgs = below ground surface
DTSC = California Department of Toxic Substances Control
EPA = Environmental Protection Agency
RL = reporting limit
RMHF = Radioactive Materials Handling Facility
SAP = sampling and analysis plan
SETF = SNAP (Systems for Nuclear Auxilary Power) Environmental Test Facility
SOP = standard operating procedures
VOC = volatile organic compound

Table 3
Subarea 7
Data Gap Checklist
(Page 1 of 1)

INFORMATION SOURCE	Subarea 7 Data Gap Evaluation Areas [1]		
	B4133 Area	RMHF Area	Slope of SNAP Operations Area
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
HSA Line Layer (HSA linear features)	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
Historical Facility Diagrams - deep feature info reviewed	√	√	√
Groundwater Impacts / Potential Inputs to Groundwater Evaluated [4]	√	√	√
Site-wide Tank Inventory Table for unlocated tanks (viewed with Tanks Base Map layer)	√	√	√
EPA Area IV radiological sampling results [5]	√	√	√
Uncollected EPA Phase 1 sample locations [6]	√	√	√

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

Notes

1. Data gap evaluations were performed over smaller footprints within each subarea. B4133 Area includes B4133, B4654, and the area surrounding these buildings. Samples within the existing footprint of B4133 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 RMHF Area includes the B4021 Leachfield, RMHF Catch Basin, B4028, and the area surrounding these buildings and features. The Slope North of SNAP Operations includes the hillslope north operations area for the SNAP program in Subareas 5B and 5C. The RMHF operations area within the fence line is considered part of the RMHF Area. However, for this submittal, a data gap evaluation for operations within the fence line is limited to potential impacts to the surrounding area (e.g., hillslope, Building 4021 Leach Field). A data gap evaluation or that area will be performed subsequent to the demolition of the buildings and features within that area.

2. Evaluation of air dispersion migration pathways was performed using existing sampling results, or proposing additional sampling as warranted along predominant wind directions (NW-SE), and/or in adjacent drainages. For Subarea 7, three air dispersion sources were evaluated: stacks at B4664 and west of B4022, and the incinerator at B4664. Additional future sampling may be recommended in the future to asess this pathway, once the demolition of RMHF is completed, but existing data along with newly proposed Phase 3 locations is considered sufficient to assess potential contamination with Subarea 6 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 signficantly above ISLs.

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 7, no chemical data gaps indicated based only on radiological sampling results although chemical sampling were proposed at areas with radiological trigger level exceedances within the RMHF Area.

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 6

Subarea 7

Subarea 5A

Subarea 5B

Subarea 5C

Edison Building

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
- Surface Water Divide
- Rock Outcrop
- Dirt Road
- A/C Paving

Groundwater Wells

- Near Surface
- Chatsworth

Trenches

- Previous
- Proposed

For the "Combined Analyte" Data Summary, ratios of dioxin TEQ (2,3,7,8-TCDD TEQ), perchlorate, energetics, herbicides, pesticides, metals, NDMA, PAHs, and PCB/PCT results to respective DOE Interim Screening Levels (ISLs) were calculated. The maximum ratio 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 detected concentration/ISL ratio was used; otherwise the maximum RL/ISL ratio was used and the location was symbolized as ND. Locations for which detected concentrations or RLs are below both the ISL and LDC are shown as green. The chemicals included in the "combined analyte" comparison were selected to provide a single, integrated representation of primary, commonly detected chemicals for trend evaluation. Dioxin congeners, VOCs, TPH, glycols/alcohols, and formaldehyde are not included in the "combined analyte" comparison.

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 / LDC

- <1x LDC

Combined ND / LDC

- < 1x LDC

Combined Detect / ISL

- < 1x ISL
- 1x to 2x ISL
- 2x to 10x ISL
- 10x to 100x ISL
- > 100x ISL

Combined ND / ISL

- < 1x ISL
- 1x ISL to 2x ISL
- 2x ISL to 10x ISL
- 10x ISL to 19x ISL

LDC = Lower Display Criteria
ISL = Interim Screening Level

Subarea 7
Phase 3 Proposed Soil Matrix Sampling Locations and Previous Data Summary
SANTA SUSANA FIELD LABORATORY

Path: T:\projects\rock3\HSA Working\Subarea 7\HSA_7_Summary.mxd

Date: 1/10/2013

1 inch = 130 feet

0 100 200 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 6

Subarea 7

Subarea 5A

Subarea 5B

Subarea 5C

Edison Building

B4021 Leach Field

RMHF Catch Basin

B4022 Waste Storage Vaults

STIR Reactor Vault

7SV_DG-501

7SV_DG-502

7SV_DG-503

7SV_DG-504

7SV_DG-505

7SV_DG-506

RD-19 RD-25 RD-34B RD-34A RD-34C RD-63 RS-28 RD-30 RD-27 RD-87 RD-94 RD-88 RD-90 RD-97 RD-95 RD-96 RD-26 RD-24 RD-25 RD-83 RD-85 RD-17

PZ-121 PZ-120 PZ-108 PZ-041 PZ-110 PZ-124 PZ-161 PZ-160 PZ-150

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

Base Map Legend

- Administrative Area Boundary
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For the "Combined Analyte" Data Summary, ratios of dioxin TEQ (2,3,7,8-TCDD TEQ), perchlorate, energetics, herbicides, pesticides, metals, NDMA, PAHs, and PCB/PCT results to respective DOE Interim Screening Levels (ISLs) were calculated. The maximum ratio 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 detected concentration/ISL ratio was used; otherwise the maximum RL/ISL ratio was used and the location was symbolized as ND. Locations for which detected concentrations or RLs are below both the ISL and LDC are shown as green. The chemicals included in the "combined analyte" comparison were selected to provide a single, integrated representation of primary, commonly detected chemicals for trend evaluation. Dioxin congeners, VOCs, TPH, glycols/alcohols, and formaldehyde are not included in the "combined analyte" comparison.

Proposed Area IV Data Gap Locations

- Proposed Soil Vapor Sample Locations
- Area/Feature Identified as Potential Input Location to Groundwater Contamination

Subarea 7 Phase 3 Proposed Soil Vapor Sampling Locations

SANTA SUSANA FIELD LABORATORY

Path: T:\projects\rock3\HSA\Working\Subarea 7\HSA_7_SoilVapor.mxd

Date: 1/10/2013

1 inch = 130 feet

0 100 200 Feet

N

FIGURE 2

Attachment 2
Table F
Field Tracker
Subarea 7

Table F
Field Tracker
Subarea 7
Draft for Review

Location Description	Location ID(s)	Explanation and Notes
Samples targeting surface water pathways	7_DG-500 7_DG-501 7_DG-502 7_DG-503 7_DG-507 7_DG-509 7_DG-510 7_DG-512 7_DG-519 7_DG-520 7_DG-522 7_DG-561	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.
Characterization of soils on southeastern perimeter of RMHF operational area	7_DG-524	Investigate soil depths by conducting several hand auger borings in the area west/southwest and the area north/northeast of the RMHF entrance (7_DG-524) to assess whether sufficient soil exists to collect stepout sampling for definition of the extent of the RMHF Northern and Southern Fenceline Clearly Contaminated Areas. Map rock outcrops and soil depths in both areas. If depth to bedrock is greater than 2 feet bgs, collect an additional sample in each area: one location 25 feet southwest of 7_DG-524 and one location 75 feet north/northwest at depths of 0.5 feet and just above bedrock for PAH, PCB, dioxin, metals and TPH analysis.
Drainages north of SNAP	7_DG-557 7_DG-558	Collect samples in drainage, target areas of sediment collection/deposition. Collect samples to bedrock and analyze all depths to characterize historical deposition over time.