Energy Technology Engineering Center
4100 Guardian Street, Suite 160
Simi Valley, CA 93063

January 8, 2014

Ms. Laura Rainey, P.G.
DOE SSFL Project Manager
Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, CA 90630

Subject: Addendum No. 10 to Master Field Sampling Plan for Chemical Data Gap Investigation Phase 3 Go-Back Soil Chemical Sampling at Area IV Santa Susana Field Laboratory, Subareas 5B, 5C, and 3/6.

Dear Laura:

Attached to this email is Addendum No. 10 to the Chemical Data Gap Investigation Work Plan, Phase 3 Go-Back Soil Chemical Sampling at Area IV for Subareas 5B, 5C and 3/6. (Addendum No. 10; CDM Federal Programs Corporation, January, 2014). 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. This version reflects the incorporation of all DTSC comments and the stakeholder input we received at the technical stakeholder meeting we had on October 29, 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 that 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.

DOE requests approval of the above sampling plan.

Sincerely,

Stephie Jennings
Deputy Federal Project Director
U.S. Department of Energy

cc: Mr. John Jones, DOE
Mr. Buck King, DTSC
Mr. Richard Hume, DTSC
Mr. Mark Malinowski, DTSC
Mr. David Dassler, Boeing
Mr. John Wondolleck, CDM Smith
Ms. Dixie Hambrick, MWH

Addendum No. 10 to
Master Field Sampling Plan for Chemical Data Gap Investigation
Phase 3 Go-Back Soil Chemical Sampling at Area IV
Santa Susana Field Laboratory
Ventura County, California

Subareas 5B, 5C, and 3/6

Prepared for:

Department of Energy
Energy Technology and Engineering Center
P.O. Box 10300
Canoga Park, California 91309

Prepared by:

CDM Federal Programs Corporation (CDM Smith)
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Prepared under:

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

January 2014
Revision 1

Addendum No. 10 to
Master Field Sampling Plan for Chemical Data Gap Investigation
Phase 3 Go-Back Soil Chemical Sampling at Area IV
Santa Susana Field Laboratory
Ventura County, California

Subareas 5B, 5C, and 3/6

Contract DE-EM0001128
CDM Smith Task Order DE-DT0003515

Exp Oct 2014

Prepared by: _____ **January 8, 2014**
Michael Hoffman, P.G. **Date**
CDM Smith Geologist

Approved by: _____ **January 8, 2014**
John Wondolleck **Date**
CDM Smith Project Manager

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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 Area IV Subareas 5B, 5C, and 3/6 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
- 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 (NBZ) soils/sediments and further defines DOE's obligations in relation to radiologic and chemical cleanup of soils within these areas. It stipulates that during phases 1 and 2 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. The prior sampling with EPA within Area IV was conducted during October 2010 through November 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, incorporated the results of co-located soil samples collected during phases 1 and 2 of the AOC, and multiple lines of evidence as described in the Phase 3 Work Plan (CDM 2012a). The purpose of the Phase 3 data gap analysis was to identify additional soil chemical data needed to support the Soil Remedial Action Implementation Plan for Area IV.

An additional data gap analysis, termed the "Go-Back Data Gap Analysis", evaluated the completeness of the Phase 1, 2 and 3 soil sampling and RFI datasets in completing site characterization. The sampling that will be performed under this FSP Addendum is based on the results of the final data gap analysis. The methodology for the "Go-Back Data Gap Analysis" is described in the document *Final Phase 3 Data Gap Analysis for Subareas 5B, 5C, 3/6, and 7,Technical Memorandum, Santa Susana Field Laboratory, Ventura County, California* (MWH 2013[1]) (*Go-Back 1 Data Gap TM*), which is included as Attachment 1 to this FSP Addendum.

The "Go-Back" soil sampling within Subareas 5B, 5C, and 3/6 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 Go-Back sampling within Subareas 5B, 5C, and 3/6. The final data gap analysis determined that no additional samples were needed within Subarea 7 (MWH 2013). Figure 1 of this document illustrates the location of all subareas within Area IV of SSFL. The rationale for sample location and chemical analytes is provided in the document *Go-Back 1 Data Gap TM* (MWH 2013). The *Go-Back 1 Data Gap TM* includes Tables 4A for Subarea 5B, Table 4B for Subarea 5C, and Table 4C for Subareas 3/6 providing the sampling rationale for each location. Figure 4 of the *Go-Back 1 Data Gap TM* (MWH 2013) provides the proposed soil sample locations in the Subareas 5B and 5C, and Figure 5 for Subareas 3/6. Soil sample locations were identified during the Go-Back data gap analysis as well as from public comments received during the December 2013 Go-Back 1 public meeting. Tables 1, 2, and 3 of the *Go-Back 1 Data Gap TM* provide additional information for sample rationale, analytes, and locations for the additional soil sampling. Information on specific field conditions and sample locations will be necessary as part of sample point staking and soil collection.

For the Go-Back 1 exercise, surface and subsurface samples will be collected. For surface soil samples, only the top 6-inches of soil (surface soil) will be collected. Many

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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.

of the sample locations will involve collection of subsurface samples. A direct push technology (DPT) rig will be used to sample subsurface soil at all locations except those inaccessible due to terrain constraints. Borings located in areas inaccessible to the DPT rig will be sampled using a hand auger and slide hammer as described in Phase 3 SSFL SOP 3. All borings will be drilled to the target depth specified in Tables 4A, 4B, and 4C of the *Go-Back 1 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 the physical collection of all samples per the procedures and controls specified in the Master FSP. CDM Smith will be responsible for the hand auger and DPT rig sampling aspects of the field sampling program. 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 Tables 4A, 4B, and 4C 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 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. A CDM Smith sample coordinator will be responsible for sample preparation and shipment to an analytical laboratory under contract with CDM Smith. Soil samples collected by CDM Smith will be analyzed for chemical analytes identified in Tables 4A, 4B, and 4C of the *Go-Back 1 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).

Tables 4A, 4B, and 4C of the *Go-Back 1 Data Gap TM* also identify 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.

Sample Analytes

Table 4A for Subareas 5B, Table 4B for Subarea 5 C, and Table 4C for Subareas 3/6 of the *Go-Back 1 Data Gap TM* (MWH 2013) provide 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 Tables 4A, 4B, and 4C. 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 Tables 4A, 4B and 4C of the *Go-Back 1 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 4A, 4B, and 4C prepared for shipment to the laboratory. These tables also identify the chemical analyses proposed for each depth interval.

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

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

Test Pit/Trench Soil Sampling

Test pits and/or trenches will be excavated using a back hoe directed by MWH. A CDM Smith geologist and sampler will collect soil from test pit sidewalls or from the back-hoe bucket per Phase 3 SSFL SOP 5. The geologist will be responsible for

logging the test pit and describing soil samples. A CDM Smith sample coordinator will be responsible for sample preparation and shipment to an analytical laboratory under contract with CDM Smith. Test pit sampling will occur after January 2014 during part of an Area IV sampling event involving most Subareas.

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

For any locations where PID instrument readings remain above measured background readings, there is an odor, or the soil appears to be stained with hydrocarbons, samples will be collected at the sample depth interval and analyzed for VOCs, 1,4-dioxane, and total petroleum hydrocarbons-gasoline range organics (TPH-GRO) using Encore samplers, in addition to the target analytes specified in Tables 4A, 4B, and 4C of the *Go-Back 1 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 January 13, 2014, following DTSC approval of this FSP Addendum. Sample locations will be marked by the site geologist in advance of sampling. It is anticipated that all soil boring locations will be sampled during the week of January 13. The digging of

test pits/trenches will be scheduled in the future to accommodate sampling of all relevant subareas during a single event.

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.

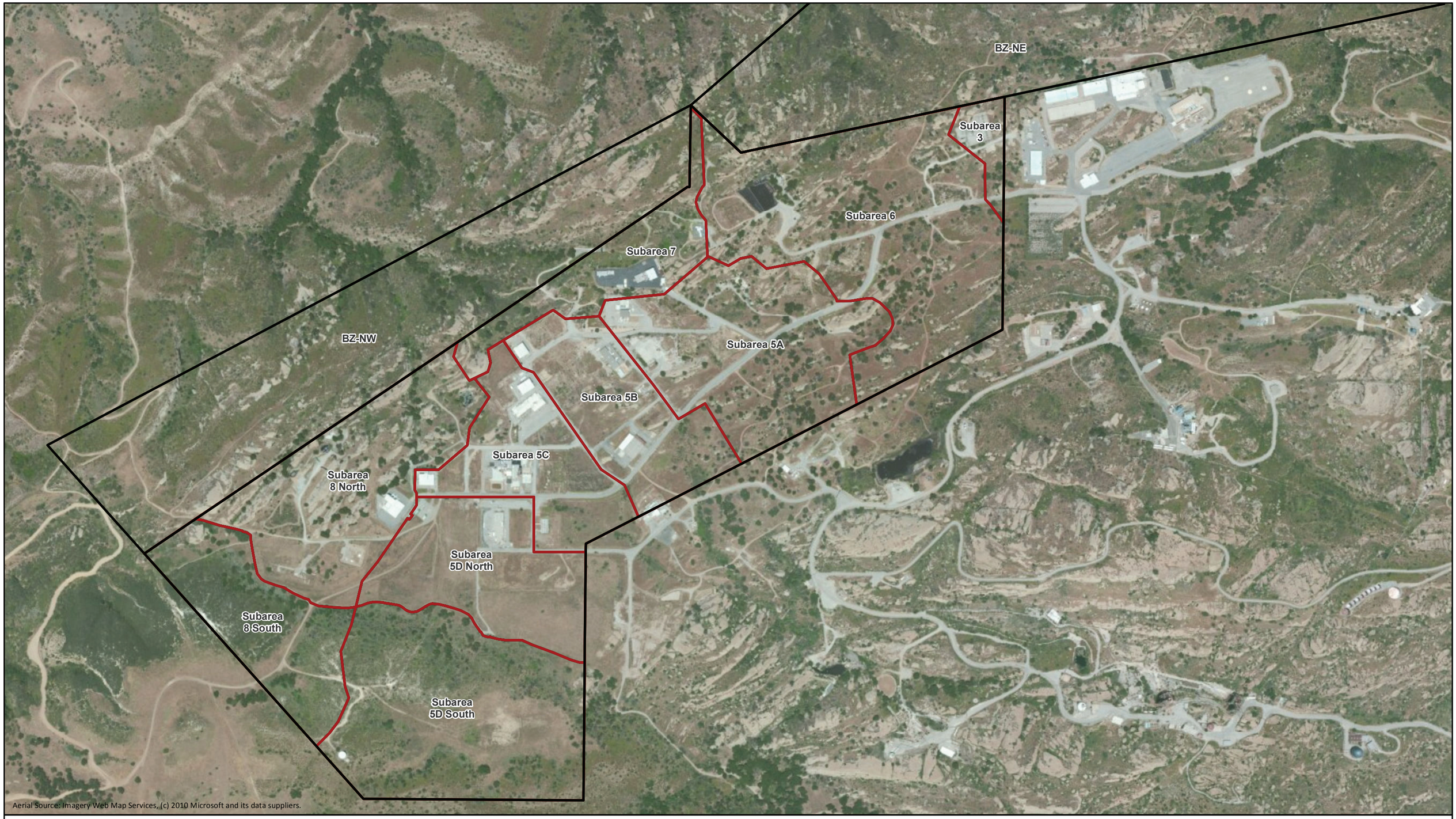
CDM Smith. 2012b. *Master Field Sampling Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California.* April.

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. *Final Phase 3 Data Gap Analysis for Subareas 5B, 5C, 3/6, and 7, Technical Memorandum Santa Susana Field Laboratory, Ventura County, California. (Go-Back 1 Data Gap TM).* December.



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

Legend

Area IV & Northern Buffer Zone

Area IV Subarea

Subarea Designations
Area IV

0 300 600 1,200 Feet

Santa Susana Field Laboratory
Ventura County, California
Figure 1

CDM Smith

FarmerRA C:_projects\SantaSusana\GIS\MXD\SSFL_Subarea_Designations_AreaIV_11x17.mxd 8/16/2013

Attachment 1

Final Phase 3 Data Gap Analysis for Subareas 5B, 5C, 3/6, and 7 Technical Memorandum, Santa Susana Field Laboratory, Ventura County, (MWH 2013)

FINAL PHASE 3 DATA GAP ANALYSIS FOR SUBAREAS 5B, 5C, 3/6, AND 7
TECHNICAL MEMORANDUM
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

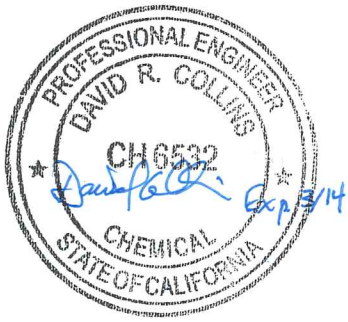
Prepared For:

THE UNITED STATES DEPARTMENT OF ENERGY

Prepared By:

MWH Americas, Inc.
618 Michillinda Ave, Suite 200
Arcadia, CA 91007

December 2013



Alex Fischl
Subarea Data Gap Manager

David Collins, P.E. CH6532
Project Manager

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TABLES

Table No.

FIGURES

Figure No.

ATTACHMENTS

Attachment No.

ACRONYMS AND ABBREVIATIONS

AOC	Administrative Order on Consent
CCA	Clearly Contaminated Area
DOE	Department of Energy
DQO	Data Quality Objective
DTSC	Department of Toxic Substances Control
EPA	Environmental Protection Agency
GIS	geographic information system
ISL	interim screening level
LUT	Look-Up Table
MFSP	Master Field Sampling Plan
MRL	method reporting limit
MWH	MWH Americas, Inc.
NBZ	Northern Buffer Zone
PAH	polyaromatic hydrocarbon
PCB	polychlorinated biphenyl
PRA	Preliminary Remediation Area
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RL	reporting limit
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 final Phase 3 chemical data gap analysis performed by MWH Americas, Inc. (MWH) for the U.S. Department of Energy (DOE) for Subareas 5B, 5C, 3/6, and 7 within Area IV 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 Area IV and the Northern Buffer Zone (NBZ), 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 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 final chemical data gap analysis, followed by a summary of the evaluation results for Subareas 5B, 5C, 3/6, and 7. Specifically, it describes final data gaps that remain after completion of the initial Phase 3 sampling performed for these subareas. Since this TM presents rationale for completion of the Phase 3 sampling, background information provided in earlier TMs has been summarized to allow focus on the final data gap evaluation process.

2.0 DATA GAP ANALYSIS PROCESS

The AOC requires a chemical data gap investigation to identify locations within Area IV and 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, 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."

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). A 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

DQOs are the framework for the data gap analysis process and are presented in Section 4.0 of the MFSP (CDM Smith, 2012).

The DTSC Chemical Look-up Table (LUT) values provide the AOC standard for remediation and are therefore used in the Phase 3 data gap analysis. The LUT values were established by DTSC in June 2013 for the chemicals most frequently detected within Area IV (Attachment 1). The June 2013 Look-up Table includes all background constituents and additional chemicals of interest to DTSC. A second part of the Chemical Look-up Table is currently being prepared by DTSC, and will reflect required method reporting limits (MRLs) for the remaining chemicals being investigated at the site. Since the second part of the Look-up Table has not yet been issued, MRLs achievable by several analytical laboratories for the remaining chemicals were used as the comparison values in the data gap analysis. Once issued by DTSC, the data gap analysis process will use the LUT values based on MRLs.

The Phase 3 data gap analysis is an iterative process. Initially, all available chemical data, including Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) results and Phase 1 and 2 chemical data, information regarding historical activities, and results from EPA's investigation activities (e.g., radionuclide sampling results, gamma surveys, geophysical surveys, aerial photograph interpretations) were evaluated. Data gaps were identified by performing the following evaluation steps:

- Comparing existing soil sampling results to screening criteria[1] to identify additional sample locations needed to define the extent of contamination (based on criteria exceedance) and/or chemical concentration gradients;
- 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.

Additional information regarding each of these steps is described in previous Data Gap TMs.

Using the evaluation steps above, data gaps were identified and an initial Phase 3 Data Gap sampling plan was developed for each subarea. The plans were reviewed by DTSC, shared with public stakeholders, finalized to address DTSC and public input, and approved by DTSC prior to field work. Implementation of the initial Phase 3 data gap sampling plans began in Spring 2012, and are still in progress. Following completion of the initial Phase 3 sampling and data validation for each subarea, an evaluation is being performed to ensure that the DQOs were met and identify any remaining data needs for remedial planning. Because DOE is re-visiting the

[1] Interim screening levels (ISLs) were used for data screening prior to DTSC issuing Chemical Look-up Table (LUT) values in June 2013 as described in previous data gap TMs.

Area IV subareas for final data needs, this step is being called a 'Go-Back' evaluation. If data gaps are identified during this process using the recently obtained initial Phase 3 data and LUT values, a Final Phase 3 Data Gap TM will be prepared and implemented. The final data gap evaluation is being performed for several subareas at a time since data collection and validation are complete. This document is the Final Phase 3 Data Gap TM is for Subareas 5B, 5C, 3/7, and 7.

As described in the initial Phase 3 Data Gap TMs, at the completion of Phase 3 sampling, all available chemical data will be evaluated and summarized in the Final Data Summary Report.

The following sections describe the approach used to identify final data gaps since data from initial Phase 3 samples have been analyzed, validated, and screened using LUT values. The additional data gap analysis steps include:

- Identifying Preliminary Remediation Areas (PRAs) and assessing whether they are adequately defined both laterally and vertically.
- Re-evaluating data needs for site-wide features or sampling requirements that were tracked throughout the data gap process in a 'Go-Back' table to determine whether they are adequately characterized and can proceed to remedial planning.

2.1 IDENTIFICATION OF PRELIMINARY REMEDIATION AREAS

Prior to Look-up Table development as part of the data gap analysis process, DOE and DTSC previously identified areas most likely requiring remediation called "Clearly Contaminated Areas." Sample locations in these areas contained a high frequency and number of chemicals with significantly elevated concentrations. Clearly Contaminated Areas (CCAs) are shown on maps in this TM with pink shading.

Once LUT values were established, DOE began identifying areas called 'Preliminary Remediation Areas' (PRAs) where soil sample results exceed the LUT values. PRAs are being identified to include areas with a common suite of chemicals exceeding the LUT values and/or a similar depth of exceedance. Per the AOC, remediation planning will be required for chemicals that are 'contiguous and emanating from' Area IV or the NBZ; thus, PRAs are identified to extend offsite or into other SSFL Administrative Areas (e.g., Area III) if similar chemicals exceeding the LUT values were detected downgradient within migration pathways (typically a drainage or surface water pathway). Both chemicals exceeding LUT values and average depths are being tracked for each PRA for remedial planning purposes. PRAs are shown on maps in this TM with purple shading.

PRAs identified herein are considered preliminary because some sample data are still pending collection and/or validation, soil treatability studies are ongoing, and DTSC has not yet issued

the second part of the Look-up Table (MRL-based values). PRAs may require further sampling to better define either the lateral extent or vertical extent (depth) of chemical exceedance(s), which are important for estimating the soil volume that may require remediation. In a few cases, additional sampling is proposed as part of this TM to complete assessment of specific geophysical or chemical use features (e.g., pipelines, leach fields) within a PRA that may have had a release of chemicals different than surrounding sample results. Also, PRAs do not account for potential areas of sensitive habitat or cultural resources; these environmentally sensitive areas will be evaluated during remedial planning. PRAs will be finalized after Phase 3 sampling is complete and documented in the Final Data Summary Report.

2.2 EVALUATION OF SITE-WIDE FEATURES AND OTHER SAMPLING REQUIREMENTS

Throughout the data gap process, site-wide features and other sampling requirements were tracked for re-evaluation once the LUT values were established and initial Phase 3 sampling results were obtained. The items requiring follow-up were summarized in a 'Go-Back' table at the end of each subarea's data gap analysis. Some items were global in nature and apply to all subareas; others were subarea-specific. As part of the final data gap analysis, these 'Go-Back' items are being checked and evaluated to identify any outstanding data gap sampling needs. The following briefly describes the global items being tracked as part of the final data gap analysis process.

Site-Wide Features: Site-wide infrastructure systems, including the sewer system, water conveyance systems, and natural gas pipelines cross subarea boundaries and were tracked as 'Go-Back' items to ensure complete characterization at the end of the process. Each of these site-wide features may have resulted in chemical releases to soil either by (1) discharge of wastewater from industrial operations (sewer and water conveyance systems), or (2) degradation of mastic wrap containing polychlorinated biphenyls (PCBs) and polyaromatic hydrocarbons (PAHs) (natural gas pipelines). During initial Phase 3 sampling, portions of these systems were targeted for sampling (e.g., a sewer line exit from a building, a drainage ditch that also served as a wastewater conveyance feature overlying a subgrade sewer pipeline). During the final data gap analysis, existing data near site-wide infrastructure systems are assessed to identify if any additional sampling is required to complete characterization of these features for remedial planning.

Sample Reporting Limits (RLs): Within each subarea, some sample RLs are elevated above LUT values. The distribution of these elevated RLs are assessed in the final data gap analysis to ensure that current data are adequate for remedial planning. Typically, elevated sample RLs occur sporadically throughout the PRA and are interspersed with numerous samples with acceptable RLs and/or low-level detected concentrations, and as such, are considered acceptable for remedial planning. In most cases, elevated sample RLs have not

resulted in additional sampling recommendations since acceptable RLs are present for most chemicals, or because the chemicals will be included in the PRA confirmation sample suite during remediation.

Laboratory Contaminants: Laboratory contaminants are chemicals used in analytical laboratories as part of routine procedures (e.g., acetone, methylene chloride, bis-2-ethylhexyl phthalate). These chemicals may be reported in a sample result due to laboratory activities, not due to onsite operations. Since they may be reported in a sample above LUT values, they would either require resampling to confirm their presence/absence, or be tracked as a chemical for the PRA and addressed by the planned confirmation sampling suite during remediation. For the final data gap analysis, laboratory contaminants are typically resampled if identified outside of a PRA, but not resampled if within a PRA since they will be added to the PRA confirmation sampling suite.

Perchlorate: Perchlorate characterization completeness is being evaluated since two analytical methods have been used for laboratory analysis, one with lower RLs than the other. The more typical analytical procedure for perchlorate frequently has RLs that exceed the LUT value. However, perchlorate was not commonly used in Area IV, was infrequently detected, and sufficient low-RL non-detected results exist within the PRAs to complete characterization. Where detected, perchlorate is added to the chemical list for a PRA. In some cases, final data gap sampling for perchlorate may be recommended to confirm its presence/absence before finalizing the PRA's list of exceedance chemicals.

Deep Boring Results: EPA drilled several deep soil borings throughout Area IV, and these sample results were not available for the initial Phase 3 data gap analysis for some subareas. The deep boring data are now being screened against LUT values as part of the final data gap analysis.

Building Demolition: A few buildings have been demolished since the initial Phase 3 sampling was conducted. During demolition, soil conditions were monitored by an onsite geologist. Building features that may have contained or used chemicals were inspected, and soil conditions throughout the demolition footprint observed. The final data gap analysis includes review of building demolition records and targets Phase 3 samples where significant building features (e.g., a deep subgrade storage vault) were located or where stained soils were observed.

Initial Phase 3 Implementation Review: Initial Phase 3 field sampling information is reviewed to evaluate characterization completeness for remedial planning considering geophysical surveying results, proximity to targeted chemical use features, adequacy of analytical analyses, and depth to bedrock and/or soil fill conditions. Specifically:

- Geophysical Surveying: In some initial Phase 3 sampling areas, geophysical surveying was proposed prior to sampling to better target locations for suspected fill or other chemical use features. In these cases, the geophysical survey results are reviewed and final data gap sampling locations proposed.

- Uncollected Samples or Missing Analyses: A few samples proposed in the previous Phase 3 data gap sampling plans could not be collected due to safety issues such as proximity to active utility pipelines or transformers, because they were located in biological or cultural sensitive areas, or because they required trenching. In a few other cases, requested analyses were inadvertently omitted or deemed unacceptable based on validation. As part of the final data gap analysis, these locations were checked to evaluate if those sample requirements had been met by surrounding results, or whether a data gap still exists. If a data gap is identified, then sampling or additional investigation (e.g., excavation of trenches or test pits) are proposed to obtain data required for remedial planning.

- Depth of Bedrock or Fill Soils: Initial Phase 3 boring logs are reviewed to identify depth of bedrock or fill soils locations to ensure sufficient information for remedial planning. If the depth of LUT exceedances is not adequately characterized in areas of fill soils or where the depth to bedrock is uncertain, final data gap sampling is proposed.

A checklist has been developed and is used by the data gap team, along with the chemical data and PRAs, to confirm each 'Go-Back' item is addressed as part of the final data gap analysis.

2.3 FINAL DATA GAP ANALYSIS PROCESS SUMMARY

The final data gap analysis process builds on previous Phase 3 data gap efforts by including recent sampling results and screening available analytical data against LUT values to identify PRAs. A systematic process is applied that incorporates the evaluation of data, features, and components tracked during the initial Phase 3 data gap analysis to ensure that characterization is adequate for remedial planning.

The outcome of this data gap analysis process is the identification of final soil sampling requirements for Phase 3, including sampling rationale, locations, depths, and proposed analytical suites. Soil 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[2]).

[2] Soil vapor sampling is not included in this TM since initial Phase 3 soil vapor sampling has not yet been conducted.

The analytical parameters proposed for step-out or step-down sampling locations are based on chemicals with results exceeding LUT values, in conjunction with data needs identified by historical operational chemical use, review of migration pathways, and other lines of evidence. Proposed sample spacing is based on operations and potential releases, the magnitude and gradients of existing chemical data, and site conditions (e.g., soil depth, bedrock occurrence).

The data gap analysis also identifies additional investigation techniques for some areas to aid in sample location selection. As in previous Phase 3 data gap efforts, trenching and test pit excavation is proposed to observe soil conditions prior to sampling. In some cases (e.g., along drainages), field reconnaissance or mapping is needed to refine proposed sampling locations. The sampling rationales included in this TM specify these additional investigative techniques where applicable. As discussed above, geophysical surveys were conducted as part of the initial Phase 3 data gap field work, and those results are being used to aid in final data gap location selection.

The information presented in this TM, along with supporting geographic information system (GIS) and analytical information, has been 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 has been incorporated into the proposed sampling included in this TM.

3.0 FINAL DATA GAP ANALYSIS FOR SUBAREAS 5B, 5C, 3/6, AND 7

The final data gap analysis for Subareas 5B, 5C, 3/6, and 7 was performed following the process outlined above and using the DQOs presented in Section 4 of the MFSP (CDM Smith, 2012). The status of 'Go-Back' tracking items for these subareas is summarized in Table 1, and the data gap checklist is provided in Table 2. Site-wide infrastructure data evaluations are presented on Figures 1, 2, and 3 for the sewer system, natural gas pipelines, and water conveyance system, respectively. Sampling status and DQO evaluation of proposed, but uncollected samples for Subareas 5B, 5C, and 3/6 are presented in Tables 3A, 3B, and 3C, respectively. There were no uncollected samples for Subarea 7.

The proposed final data gap soil matrix sampling is presented in Tables 4A and 4B, and on Figure 4 for Subareas 5B and 5C, and in Table 4C and on Figure 5 for Subareas 3/6. Phase 3 sampling is complete for Subarea 7, with no final data gaps identified for remedial planning.

The following is a summary of the final data gap sampling proposed for Subareas 5B, 5C, and 3/6 based on applying the process described above. More detailed, sample-specific rationales for these (and all) areas are provided in Tables 4A, 4B, and 4C.

- Some initial Phase 3 proposed sample locations were not implemented since they occur adjacent to active transformers or utilities, within an environmentally sensitive area, or

because the planned sampling was a trench or test pit (schedule constraints did not allow implementation of trenches/test pits during prior Phase 3 field work).

  - In most cases, results from nearby samples or samples in similar areas are used to meet the previously proposed sample DQOs for remedial planning, and the unsampled locations are included in PRAs since surrounding sample results exceed LUT values.
  - In a few cases, as described below, where trenches or test pits targeted chemical use features such as a leach field or pipeline that could impact the lateral or vertical extent and/or chemical list of a PRA, trenches and test pits are included for final data gap sampling.

- Some initial Phase 3 proposed sample locations were not implemented since they were contingent on geophysical surveying to be conducted prior to sampling; in these cases, final data gap sampling is proposed based on geophysical survey results. In particular, this situation occurred southeast of the Building 4056 Landfill where a 'loose fill' area was identified in historical records. This investigation area has been referred to as the 'B4056 Landfill Annex' area. Based on the recent geophysical survey results, trenching is proposed at four locations to investigate the potential fill and magnetometer anomalies identified in the area (i.e., 5C_DG-646, 5C_DG-651, 5C_DG-653, and 5C_DG-655).
- Trenching and test pits are proposed along a fuel pipeline to evaluate potential chemical release of hydrocarbons (i.e., 5B_DG-693, 5B_DG-699, and 5B_DG-707).
- At geophysical anomaly locations in areas requiring further characterization, test pits or trenches are proposed to evaluate potential subsurface features associated with each anomaly and to inspect soil conditions prior to collecting a soil sample (e.g., 6_DG-569 and 6_DG-686).
- Sampling in Area III is proposed to evaluate if LUT exceedances are contiguous and emanating from Area IV by targeting sampling within surface water migration pathways (e.g., 5C_DG-748 and 5C_DG-749).
- Sampling is proposed within PRAs where the vertical extent of exceedances is not sufficiently defined for remedial planning by existing data, or where soil thickness along a subsurface pipeline is uncertain (e.g., 5C_DG-755 and 5B_DG-837).
- Sampling at Building 4006 and Building 4011 is proposed to evaluate deep building features and soil staining observed during demolition activities (e.g., 5B_DG-838 through 5B_DG-840).

4.0 REFERENCES

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

TABLES

Table 1
Go Back Tracker Status
Final Phase 3 Data Gap Analysis
Subareas 5B, 5C, 3/6, and 7
(1 of 4)

Location / Action	Explanation	Status After First Round of Phase 3 Sampling
	Subarea 5C	
Slightly elevated detections above ISLs	Evaluate concentrations at or slightly above ISLs once final Look-up Table and background values are published.	No further action required. Current screening and development of PRAs and final data gap sampling is performed using LUT values.
Elevated RLs	Final check of historical data with elevated RLs to determine that sufficient nearby sampling has been performed and historical data uncertainties resolved.	Sufficient low level detects below LUT values, as well as LUT exceedances, exist within the subareas to address uncertainty regarding potential releases masked by elevated MRLs for some chemicals. For Subareas 5B, 5C, 3/6, and 7, either the entire area or the vast majority of the area has been identified as PRAs with a broad suite of COCs, including those chemicals with elevated MRLs (see below). No further sampling is needed to address the elevated MRLs since sufficient data currently exists for remedial planning. DOE will document the COCs (including those with elevated MRLs where waranted) in the Data Summary Report for remedial planning, and will include these COCs for post-remediation confirmation sampling. Summary of action: PRAs to include elevated MRL COCs, DOE will include elevated MRL COCs in confirmation sampling plans. > SVOCs/ PAHs: included in most PRAs in Subareas 5B, 5C, 3/6, and 7 > PCBs: included in most PRAs in Subareas 5B, 5C, 3/6, and 7 > Pesticides: included in some PRAs in Subareas 5B, 5C, 3/6 and 7 > Herbicides: included in some PRAs in Subareas 5B, 5C, 3/6 and 7 > Perchlorate: included in few PRAs in Subareas 5C, 6, and 7
Remaining Structures	Features located within buildings identified during the Building Feature Survey will be evaluated during demolition and sampling will be performed following building removal when soil is exposed. Existing buildings/features that will be evaluated during demolition have been identified in proposed sampling location figures as "Post Demo."	Final data gap sampling is planned at select features as listed below in demolished buildings within the subareas. If future demolition of remaining structures occur before the remediation project, additional characterization needs will be obtained during remedial planning. > Subarea 5B - Building 4006 post demo sampling includes 3 locations (removed dry well and storage wells). - Building 4816 post demo sampling includes 1 location where stained soil was observed. - Building 4011 post demo sampling includes 1 location where stained soil was observed. > Subarea 5C - none (no anomalous soil conditions or deep features present at B4015 demo area) > Subareas 3/ 6 - none (no demo activities) > Subareas 7 - none (no demo activities)
B4100	Two phenanthrene detections on east side of B4100 (BHBS1011, BHBS1012) are slightly above the ISL, and are co-located with TPH. These samples targeted a feature and no significant detects were observed. No sampling recommended pending final Look-up Table values.	No action required; detects above LUT values and no sampling required for remedial planning.
NDMA	NDMA exceeds the ISL (0.037 µg/kg) for low level Method 1625 at six locations up to 13x (SL-059-SA5C, 0.48 µg/kg), but is below the 8270 LDC of 1.8 µg/kg. Therefore no additional sampling is recommended at this time; however, NDMA occurrence will be re-evaluated after final Look-up Table values have been established. Locations will also be addressed / resampled for formaldehyde at that time, specifically at B4015 Field, B4383 Leach Field Area, B4100, B4065 metals clarifier, and SNAP.	NDMA is included in the current LUT issued by DTSC and being included where detected for remedial planning (LUT value 10 ug/kg). If some existing MRLs are elevated they are being addressed as indicated in Item 1 above regarding elevated MRLs. Sufficient formaldehyde sampling has also been performed in Subarea 5C for remedial planning and will be included where appropriate based on detections or elevated MRLs as COCs for the PRAs.
SE portion of B4015 Fill Area	Sample locations are proposed in Area III based on observed extent of fill area, downdrainage, and downslope of existing sample results and will be collected at a future date pending receipt of SHPO approval. These sample locations are identified as "future locations" in proposed sampling location figures.	DOE plans on collecting the 'future' samples identified in Area III during this final data gap phase of sampling in downslope and down-drainage locations to assess if Look-up Table exceedances have migrated from Area IV. A select few 'Future' sampling locations are not planned for sampling at this time since they were proposed to delineate lateral extent not associated within a migration pathway (details provided in Tables 2A and 3A). Also, 'Future' locations planned for other subareas have been already collected during initial Phase 3 sampling (see below).

Table 1
Go Back Tracker Status
Final Phase 3 Data Gap Analysis
Subareas 5B, 5C, 3/6, and 7
(2 of 4)

Location / Action	Explanation	Status After First Round of Phase 3 Sampling
Subarea 5C continued		
Sewer / Natural Gas Pipelines	Investigation and proposed sampling strategies for existing sitewide infrastructure including natural gas pipelines and sanitary sewer lines and associated infrastructure are in progress and will be evaluated separately.	A review of existing data mapped within 15 feet of either side of the sanitary sewer, natural gas, and water distribution pipelines was performed. Summary of action: > Subarea 5B - none (sufficient data exist for PRA planning purposes) > Subarea 5C - Added one location adjacent to a sanitary sewer pipeline (5C_DG-755) > Subarea 3/6 - none (sufficient data exist for PRA planning purposes) > Subarea 7 - none (sufficient data exist for PRA planning purposes)
Northwest of B100 Trench (within Subarea 8N)	Evaluate aerial dispersion/deposition from burning activities at B100 Trench within Building 4056 landfill annex area. Proposed sampling at landfill annex sufficiently dense to evaluate potential impacts from B100 trench burning activities, although additional surface samples could be added to address this uncertainty. Consider surface/random sampling NW of trench within Subarea 8N. Sampling density in all directions sufficient to evaluate impacts of air dispersion (Subarea 8	No further action required. Phase 3 sampling proposed in Subarea 8N.
B4038	Add post demo location in west portion of B4038 footprint to characterize open storage area.	Demolition not completed. Sampling will be performed either post-demo or during remdiation as part of confirmation sampling.
Potential Laboratory Contaminants	Review laboratory contaminant uncertainties after all new VOC (e.g. methylene chloride) and SVOC (phthalates) data are collected and after background is finalized.	Potential laboratory contaminants are included in the Chemical LUT and are being screened as part of the dataset. If these detections occur within a PRA, they will be added to the COC list and included in confirmation sampling plans. In areas outside PRAs, sporadic detections of laboratory contaminants will be proposed for sampling to resolve this uncertainty. Summary of action: > Subarea 5B - none (all detects above LUTs within PRAs) > Subarea 5C - none (all detects above LUTs within PRAs) > Subarea 3/6 - none (all detects above LUTs within PRAs) > Subarea 7 -none (all detects above LUTs within PRAs)
Perchlorate	Confirmation sampling and/or additional stepout/stepdown sampling may be required depending on additional data review of previous Phase 1 results.	Perchlorate is included in the Chemical LUT and is being screened as part of the dataset. If perchlorate detections occur within a PRA, it will be added to the COC list and included in confirmation sampling plans. In areas outside PRAs, sporadic detections of perchlorate will be proposed for sampling to resolve this uncertainty. Summary of action: > Subarea 5B - none (all detects within PRAs) > Subarea 5C - none (all detects within PRAs) > Subarea 3/6 - none (all detects within PRAs) > Subarea 7 - none (all detects within PRAs)
EPA Radiological Data	EPA data summaries used for current gap analysis. Phase 1 co-located sampling results and previous RFI data will be re-evaluated following release of final EPA Area IV radiological sampling results for subarea.	A separate radiological data gap evaluation and sampling effort will be performed to supplement EPA's radiological investigation. Radiological and chemical sampling results will be presented in the Data Summary Report for remedial planning including waste disposal requirements. No action required for final chemical data gap analysis.
Air dispersion from B4055	Sampling density north of Building 4055 within subarea 5C will be evaluated for potential aerial dispersion during the HSA 5D North data gap analysis.	No action required since adequate sampling previously performed in Subarea 5C, and entire operational area identified as PRAs.
Deep boring data at B4059	Review laboratory analytical data for three deep boring locations at Building 4059 (SNAP).	Completed. Exceedances of PCBs and TPH detected down to 56 feet bgs in the 3 borings; SNAP excavation area identified as a PRA.
Radiological sampling at B4015 field	Check radiological sampling results to ensure sampling is performed at east end of B4015 field.	Area will be evaluated as part of radiological data gap evaluation. No action for final chemical data gap analysis.
B4015 Demo Documentation	Follow up with Boeing for recent B4015 demolition documentation (feature removal logs, sample results) and evaluate for data gaps.	Demolition report states no soil staining observed and no deep or previously unknown features identified. No sampling proposed.
Initial Phase 3 Implementation Review	Initial Phase 3 field sampling information is reviewed to evaluate characterization completeness for remedial planning considering geophysical surveying results, proximity to targeted chemical use features, adequecy of analytical analyses, and depth to bedrock and/or soil fill conditions.	Initial Phase 3 data for subareas 5B, 5C, 3/6, and 7 were reviewed: > Subarea 5B - see Tables 3A and 4A for status of uncollected and proposed soil samples, respectively. > Subarea 5C - see Tables 3B and 4B for status of uncollected and proposed soil samples, respectively. > Subarea 3/6 - see Tables 3C and 4C for status of uncollected and proposed soil samples, respectively. > Subarea 7 - none (all samples collected and no additional data gaps identified)

Table 1
Go Back Tracker Status
Final Phase 3 Data Gap Analysis
Subareas 5B, 5C, 3/6, and 7
(3 of 4)

Location / Action	Explanation	Status After First Round of Phase 3 Sampling
Subarea 5B		
PCBs at SCTI	Evaluate sporadic PCB detections (up to 41 ppb - 2.0x ISL) in the SCTI area after final Look-up Table values are established.	PCBs are detected above LUT values sporadically throughout the SCTI area. SCTI is within PRAs and PCBs will be listed as a COC and included by DOE in the confirmation sampling plan.
B4006/B4011 Demo Documentation	Follow up with Boeing for recent B4006/B4011 demolition documentation (feature removal logs, sample results) and evaluate for data gaps.	Completed. Post-demolition sampling described below: - Building 4006 post demo sampling includes 3 locations (removed dry well and storage wells). - Building 4011 post demo sampling includes 1 location where stained soil was observed.
Air dispersion from stacks at SNAP facilities	Sampling density north of Building 4010, 4012, and B4019 will be evaluated for potential aerial dispersion during the Subarea 7 data gap analysis.	No action required. Samples to address the aerial dispersion pathway were added during initial Phase 3 data gaps, and existing sample density in Subarea 7 and the NBZ is sufficient for characterization.
Subarea 5A		
Potential leach field near B4030	Evaluate soil boring log and trench log information from sampling locations near B4030 for fill or any indication of leach field materials – gravels, terra cotta piping, etc.	Evaluation pending.
Air dispersion from B4024	Sampling density north of Building 4024 will be evaluated for potential aerial dispersion during the Subarea 7 data gap analysis.	Evaluation pending.
Deep boring data near B4073	Review laboratory analytical data for two deep boring locations near Building 4073 (KEWB).	Evaluation pending.
Subarea 6		
Deep boring data near B4143	Review laboratory analytical data for deep boring locations near Building 4143 (SRE).	Completed. Exceedances of PAHs, PCBs, dioxins, metals (Pb, Hg), TPH, and perchlorate detected down to 27 feet bgs in three of the four deep borings; SRE reactor excavation area identified as a PRA.
Analyze morpholine at B4003	Cooling tower documented at B4003. Evaluate morpholine results in samples collected in Subarea 5B to determine if analysis warranted in Subarea 6.	Morpholine detected in 4 of 336 samples in Subarea 5B at concentrations ranging from 25 to 160 ppb. No additional analysis warranted in Subarea 6.
SRE demo activities (2000) soil borrow source	Research soil borrow source location for SRE demolition activities performed in 2000.	Confirmed with Boeing that Area IV soil borrow area used as source for top cover soils; removed soils replaced back into excavation.
Subarea 3		
Recent Subarea 3 analytical results	Obtain analytical results for sampling performed in 2012 from NASA and evaluate for data gaps.	Subarea 3 is almost entirely within PRA or will be evaluated following demolition of the SCE substation. No action required for final data gap analysis.
Subarea 7		
Phase 1 Herbicides / Pesticides / PCBs	Verify revised data validation qualifiers and/or reporting limits resulting from 2011/2012 laboratory studies and correct Phase 1 data prior to final Phase 3 data evaluation.	Finalization of revised MRLs performed by CDM and reflected in DOE dataset; DTSC reviewing CDM TM. No action required for final data gap analysis as explained above regarding elevated MRLs.
Subarea 8		
B4009 Demo	Follow up with Boeing for upcoming B4009 demolition documentation (feature removal logs, sample results) and evaluate for data gaps.	Evaluation pending.
FSDF Air Dispersion Sampling	Evaluate proposed air dispersion sampling results for FSDF (8_DG-521 and 8_DG-601) within the context of four 'future' air dispersion samples that will be collected west of the Area IV boundary and additional sampling that will be proposed in the NBZ subarea.	Evaluation pending.
FSDF Soil Vapor Sampling	Evaluate need for periodic sampling of semi-permanent SV probe depending on initial Phase 3 data gap sampling results and remedial planning needs.	Evaluation pending.
B4100 Trench Air Dispersion Sampling	Evaluate proposed air dispersion sampling results for B4100 Trench (8_DG-585, 8_DG-588, 8_DG5-89, 8_DG-591, and 8_DG-592) within the context of additional sampling that will be proposed in the NBZ subarea.	Evaluation pending.

Table 1
Go Back Tracker Status
Final Phase 3 Data Gap Analysis
Subareas 5B, 5C, 3/6, and 7
(4 of 4)

Location / Action	Explanation	Status After First Round of Phase 3 Sampling
Subarea 5D		
B4055 Demo	Follow up with Boeing for upcoming B4055 demolition documentation (feature removal logs, sample results) and evaluate for data gaps. Prior to demo, review draft Subarea 5D Data Gap Tech Memo SAP tables for proposed soil and soil vapor locations within the B4055 post demolition footprint.	Evaluation pending.

Note: This table is a compiled list of action items and issues that were identified during the first round of Phase 3 subarea data gap analyses. Locations shaded grey indicate go back items that apply to all subareas in Area IV. The table includes the current status of the action items and identifies if the issue has been resolved or if further action is necessary.

Table 2
Data Gap Analysis Checklist
Final Phase 3 Data Gap Analysis
Subareas 5B, 5C, 3/6, and 7

Phase 3 Data Gap Information Source	Subarea 5B	5C	6/3	7
Initial Phase 3 Implementation Review				
Uncollected Phase 3 Samples[1]	√	√	√	√
Proposed Analytical Suites Not Analyzed / Rejected Data	√	√	√	√
Proposed vs Actual Locations[2]	√	√	√	√
Refusal on Fill[3]	√	√	√	√
Review Targeted Location Findings[4]	√	√	√	√
Geophysical Survey Results	√	√	N/A	N/A
Building Demo Findings	√	√	N/A	N/A
Phase 3 Data Gap Tech Memo Tracking Tables				
Table A - Go Back Tracker	√	√	√	√
Elevated Reporting Limits	√	√	√	√
Sewer / Natural Gas / Water Distribution Pipelines	√	√	√	√
Potential Laboratory Contaminants	√	√	√	√
Perchlorate	√	√	√	√
EPA Radiological Data[5]	N/A	N/A	N/A	N/A
Aerial Dispersion from Area IV Sources	√	√	√	√
Deep Boring Data	√	√	√	√
Phase 1 Pesticides/Herbicides/PCBs	√	√	√	√
Table B - Building Feature Tracker	√	√	√	√
Table C - Tank Tracker	√	√	√	√
Table D - GW Tracker	√	√	√	√
Table E - GIS Tracker[6]	√	√	√	√
Table F - Field Tracker	√	√	√	√
Evaluation of Preliminary Remediation Areas				
Lateral and Vertical Extent Sufficiently Defined	√	√	√	√
Chemical Drivers Sufficiently Defined	√	√	√	√
Boundary Evaluation Complete (Contiguous and Emanating)	√	√	√	√

Key

√	Information source reviewed during final data gap evaluation; no further sampling is warranted.
√	Information source reviewed during final data gap evaluation; additional sampling is proposed based on review.
N/A	Information source not available for this subarea.

Notes

1. Some samples were not implemented since located near active transformers or utilities, within an environmentally sensitive area, within an area proposed for geophysical surveying at the time of sampling, or because the planned sampling type was a trench or test pit. The need for data at these locations to sufficiently characterize the lateral and vertical extent of the PRAs was evaluated.

2. The actual locations of some borings were different than proposed due to sampling constraints (e.g., thin soils, rock outcrops, vegetation, utilities), features observed in the field (e.g., actual drainage swale location or sediment collection areas within drainage), or GPS/human error. Actual location were evaluated to confirm that data quality objectives were met.

3. Some locations had refusal on fill and deeper soil samples were not collected. The need for deeper data at these locations to sufficiently characterize the lateral and vertical extent of the PRAs was evaluated and confirmed that DQOs were met.

4. Data at specific targeted features (e.g., underground tanks, dry wells, drainage swales, surface water pathways, fill areas, etc.) was reviewed to confirm characterization completeness and no further sampling is warranted.

5. A separate radiological data gap evaluation and sampling effort will be performed to supplement EPA's radiological investigation with finding presented in the Phase 3 Data Summary Report. No action required for chemical final data gap SAPs.

6. GIS tracker has been updated based on field activities (e.g., demolition observations, geophysical surveys, and mapping of drainages). Updates wil be completed prior to publication of Data Summary Report.

Table 3A
Status of Uncollected Subarea 5B Soil Sample Locations
Final Phase 3 Data Gap Analysis
(1 of 4)

Location ID	Area	Location Description	Sample Type	Depth (ft bgs)	Analytical Method																		Rationale / Comments[1]	Rationale for Not Implementing[2]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Cr(VI) (EPA Method 7196A)	Glycols (EPA Method 8015B)	Alcohols (EPA Method 8015B)	Energetics (EPA Method 8330A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	VOCs (SV) (EPA Method 8260B)	VOCs (SM) (EPA Method 8260B)	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)		
5B_DG-501A	B4019 Area	Transformer 4719 North of Building 4019	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.	Location not implemented as part of the first round of Phase 3 data gap sampling due to the targeted transformer being active. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined
				3		H																H		
5B_DG-501B	B4019 Area	Transformer 4719 North of Building 4019	Soil Boring	0.5		X																X		
				3		H																H		
5B_DG-501C	B4019 Area	Transformer 4719 North of Building 4019	Soil Boring	0.5		X																X		
				3		H																H		
5B_DG-501D	B4019 Area	Transformer 4719 North of Building 4019	Soil Boring	0.5		X																X		
				3		H																H		
5B_DG-527	B4010 Area	Tank Pit West of B4012	Trench	0.5	X	X	X	X	X					X	X			X			X	X	Excavate exploratory trench to characterize former tank pit identified in historical facility drawing in the EPA HSA. Determine sample locations with trench based on field observation (staining, debris, etc.). If fill is observed, collect on sample at the top of native and one sample just above bedrock to address migration pathway along bedrock.	Location not implemented as part of the first round of Phase 3 data gap sampling because sampling type was a trench. Location is within PRA. 5B_DG-836 and 5B_DG-837 will be collected during final data gap sampling and will sufficiently characterize vertical extent of PRA.
				5	X	X	X	X	X					X	X			X			X	X		
				10	X	X	X	X	X					X	X			X			X	X		
5B_DG-542[3]	B4010 Area	Building 4710	Soil Boring	0.5																			Stepout to delineate PAHs, PCBs, dioxins, metals, TPH at depth (SL-020-SA5B analyzed at 0.5 ft. only) and the western extent of the identified contamination area (evaluates fill presence and contamination between the two fill areas). Analyze at depth due to detections in adjacent samples along mapped septic line and potential for soil movement and former presence of deep features (e.g., vaults).	VOC sampling was not implemented as part of the first round of Phase 3 data gap sampling since refusal was encountered prior to proposed depth of analysis. Soil vapor locations 5BSV_DG-511, -512, -513, -514, and -516 are proposed to characterize potential groundwater input locations in the area and will be sufficient for characterization.
				5																				
				10																				
				15													X							
5B_DG-597	SCTI	Trench east of Building 4656	Trench	0.5	X	X	X	X	X	X				X	X			X			X	X	One of eight representative locations for B4356 fill area (see description for 5B_DG-523).	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a trench. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X	X	X				X	X			X			X	X		
				10	X	X	X	X	X	X				X	X			X			X	X		
5B_DG-598	SCTI	Trench east of Building 4656	Trench	0.5	X	X	X	X	X	X				X	X			X			X	X	Targets a secondary containment trench, provides characterization of operational area and adjacent tank containment pit (water with hydrazine). Excavate exploratory trench in perpendicular direction to former trench alignment (southwest - northeast transect) and analyze for cooling tower suite since trench associated with SCTI water treatment. Target native soil or soil just above bedrock for vertical definition and potential impacts to groundwater (former samples collected at a maximum of 10 feet). Sample intervals at each location based on anticipated depth to bedrock per previous sampling.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a trench. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X	X	X				X	X			X			X	X		
				10	X	X	X	X	X	X				X	X			X			X	X		
5B_DG-599	SCTI	Southwest of B4356	Test Pit	0.5	X	X		X	X					X	X			X			X	X	Targets intersection of two linear terrain conductivity anomalies south of the SCTI Water Treatment Area. Analyze for general suite plus cooling towers/anti-corrosion suite. Adjust samples depths based on field observations (i.e., if fill observed target top of native and collected deepest sample just above bedrock if staining or impacts are observed).	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a test pit. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X		X	X					X	X			X			X	X		
				10	X	X		X	X					X	X			X			X	X		
5B_DG-616	Kalina Complex	South of B4226	Trench	0.5	X	X		X	X					X	X			X			X	X	Excavate exploratory trench in northwest-southeast alignment targeting intersection of two linear terrain conductivity anomalies. Adjust samples depths based on field observations (i.e., if fill observed target top of native and collected deepest sample just above bedrock if staining or impacts are observed).	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a trench. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X		X	X					X	X			X			X	X		
				10	H	H		H	H					H	H			H			H	H		
5B_DG-617[3]	Kalina Complex	Building 4392 (Electrical Equipment Building)	Soil Boring	0.5																			Targets Building 4392 (Electrical Equipment Building). Hold 10 foot sample pending shallow results.	Cr(VI) was inadvertently not analyzed at 5 feet bgs during the first round of Phase 3 data gap sampling. The analysis was proposed to characterize the soil based on cooling tower operations in adjacent areas. The sample at 0.5 feet bgs was analyzed for Cr(VI) with results below RLs, and the sample location is within a PRA with sufficent Cr(VI) data for characterization. Therefore, Cr(VI) at 5 feet bgs is not necessary.
				5					X															
				10																				
5B_DG-619[3]	Kalina Complex	Southwest of Building 4392	Soil Boring	0.5																			Representative sampling in operational area (RFI chemical use area); include chemicals associated with cooling tower operations. Also serves as stepout for PAHs and dioxins detects at SL-105-SA5B. Hold 10 foot samples pending shallow results.	Cr(VI) was inadvertently not analyzed at 5 feet bgs during the first round of Phase 3 data gap sampling. The sample at 0.5 feet bgs was analyzed for Cr(VI) with results below RLs, and the location is within a PRA with sufficent Cr(VI) data for characterization. Therefore, Cr(VI) at 5 feet bgs is no longer necessary.
				5					X															
				10																				
5B_DG-628	Kalina Complex	Building 4334	Test Pit	0.5	X	X	X	X	X		X			X	X			X			X	X	Representative characterization of operational area (RFI chemical use area) and area of geophysical anomalies. Excavate test pit to investigate geophysical anomalies (signs of fill, piping, etc.). Analyze for general and cooling tower suites. Hold 10 foot sample pending shallow results since addressing potential surface releases.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a test pit. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X	X		X			X	X			X			X	X		
				10	H	H	H	H	H		H			H	H			H			H	H		

Table 3A
Status of Uncollected Subarea 5B Soil Sample Locations
Final Phase 3 Data Gap Analysis
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Location ID	Area	Location Description	Sample Type	Depth (ft bgs)	Analytical Method																		Rationale / Comments[1]	Rationale for Not Implementing[2]
					PAHs (EPA Method 8270C (SIM))	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Cr(VI) (EPA Method 7196A)	Glycols (EPA Method 8015B)	Alcohols (EPA Method 8015B)	Energetics (EPA Method 8330A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	VOCs (SV) (EPA Method 8260B)	VOCs (SM) (EPA Method 8260B)	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)		
5B_DG-632	SCTL	South of B4226	Trench	0.5	X	X		X						X							X	X	Soil boring targets intersection of two linear terrain conductivity anomalies. Hold 10 foot sample pending shallow results. Excavate trench approximately 20 feet to the northeast to investigate potential sump location. Collect sample if fill, staining, or other impacts observed.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a trench. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X		X						X							X	X		
				10	H	H		H						H							H	H		
5B_DG-643[3]	SCTL	Building 4026	Soil Boring	0.5																			Targets Building 4026 adjacent to motor generator room; include corrosion inhibitors since cooling tower operations. Hold 10 foot sample pending shallow results.	Cr(VI) was inadvertently not analyzed at 5 feet bgs during the first round of Phase 3 data gap sampling. The sample at 0.5 feet bgs was analyzed for Cr(VI) with results below RLs, and the sample location is within a PRA with sufficent Cr(VI) data for characterization. Therefore, Cr(VI) at 5 feet bgs is not necessary.
				5					X															
				10																				
5B_DG-680	SCTL	Building 4714	Test Pit	0.5	X	X	X	X	X					X	X			X			X	X	Targets B714 identified as the PowerPak Interconnecting Facility. Also stepout for PUBS1029. Analyze for corrosion inhibitors since associated with cooling tower operations. Hold deep pending shallow results to evaluate potential for surface release. [Note: Feature was identified during sitewide aerial photograph review as a transformer chemical use area; however aerial photos are not conclusive. PCBs included in analyses to address uncertainty.]	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a test pit. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	H	H	H	H	H					H	H			H			H	H		
				10	H	H	H	H	H					H	H			H			H	H		
5B_DG-690	HMSA	South of B4357	Test Pit	0.5	X	X	X	X	X					X	X			X			X	X	Exploratory test pit targets linear terrain conductivity anomaly; adjust sample depths based on field observations.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a test pit. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X	X					X	X			X			X	X		
				10	X	X	X	X	X					X	X			X			X	X		
5B_DG-695	B4011 Area	East of B4005/B4006 Leach Field	Soil Boring/ Test Pit	0.5	X	X	X	X						X					X		X	X	Stepout for dioxins and metals and characterization in open area. Shallow bedrock observed in surrounding samples. Collect and analyze sample just above bedrock. Conduct adjacent test pit for linear geophysical anomaly and adjust 5 foot boring sample to target (or sample pit as appropriate).	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a test pit. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X						X					X		X	X		
				10	H	H	H	H						H					H		H	H		
5B_DG-704	B4011 Area	Parking Area northwest of Building 4011	Soil Boring	0.5		X	X	X						X							X	X	Same as 5B_DG-705. Location at previously collected U5BS1014 analyzed for PAHs; complete analytical suite.	Location not implemented as part of the first round of Phase 3 data gap sampling due to being within an environmentally sensitive area. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5		X	X	X						X							X	X		
5B_DG-717A	B4011 Area	Transformer northwest of B4011	Soil Boring	0.5		X																X	Transformers in Area IV are being resampled with analysis of all discrete samples. Recollect samples at four former discrete locations and analyze each sample for PCBs; hold deep samples pending shallow results.	Location not implemented as part of the first round of Phase 3 data gap sampling due to the targeted transformer being active. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				3		H																H		
5B_DG-717B	B4011 Area	Transformer northwest of B4011	Soil Boring	0.5		X																X		
				3		H																H		
5B_DG-717C	B4011 Area	Transformer northwest of B4011	Soil Boring	0.5		X																X		
				3		H																H		
5B_DG-717D	B4011 Area	Transformer northwest of B4011	Soil Boring	0.5		X																X		
				3		H																H		
5B_DG-739	B4011 Area	Fill Area FA-11 West of B4011 Leach Field	Trench	0.5	X	X	X	X	X					X	X						X	X	Targets fill area identified in EPA HSA and defines extent of identified contamination area at B4011 Leach Field. Excavate trench to investigate presence and depth of fill. Analyze all depths for full chemical suite based on PAHs, dioxins, PCBs and metals detected in fill and unknown source of material. Depth to refusal variable between 6 and 10 feet bgs; collect sample in underlying native soil if discernible and deepest sample just above bedrock.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a trench. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X	X					X	X						X	X		
				10	X	X	X	X	X					X	X						X	X		
5B_DG-741	B4011 Area	Fill Area FA-11 East of B4011 Leach Field	Trench	0.5	X	X	X	X	X					X	X						X	X	Same as 5B_DG-739.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a trench. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X	X					X	X						X	X		
				10	X	X	X	X	X					X	X						X	X		
5B_DG-746	B4007 Area	B4704 Transformer Substation	Soil Boring	0.5	X	X	X	X						X							X	X	Collected discrete samples around substation. Analyze full suite since location adjacent to substation support structures, and bounds Identified Contamination Area. Analyze sample just above bedrock at depth. Shallow soils anticipated.	Location not implemented as part of the first round of Phase 3 data gap sampling due to the targeted transformer being active. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				3	X	X	X	X						X							X	X		
5B_DG-747	B4007 Area	B4704 Transformer Substation	Soil Boring	0.5	X	X	X	X						X							X	X	Same as 5B_DG-746.	Location not implemented as part of the first round of Phase 3 data gap sampling due to the targeted transformer being active. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				3	X	X	X	X						X							X	X		
5B_DG-748	B4007 Area	B4704 Transformer Substation	Soil Boring	0.5		X	X															X	Collect discrete samples around substation. Hold deep samples pending shallow results. Analyze dioxins due to detections in adjacent areas.	Location not implemented as part of the first round of Phase 3 data gap sampling due to the targeted transformer being active. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				3		H	H															H		
5B_DG-749	B4007 Area	B4704 Transformer Substation	Soil Boring	0.5	X	X	X	X						X							X	X	Same as 5B_DG-746.	Location not implemented as part of the first round of Phase 3 data gap sampling due to the targeted transformer being active. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				3	X	X	X	X						X							X	X		

Table 3A
Status of Uncollected Subarea 5B Soil Sample Locations
Final Phase 3 Data Gap Analysis
(3 of 4)

Location ID	Area	Location Description	Sample Type	Depth (ft bgs)	Analytical Method																		Rationale / Comments[1]	Rationale for Not Implementing[2]
					PAHs (EPA Method 8270C (SIM))	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Cr(VI) (EPA Method 7196A)	Glycols (EPA Method 8015B)	Alcohols (EPA Method 8015B)	Energetics (EPA Method 8330A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	VOCs (SV) (EPA Method 8260B)	VOCs (SM) (EPA Method 8260B)	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)		
5B_DG-750	B4007 Area	B4704 Transformer Substation	Soil Boring	0.5		X	X																X	Same as 5B_DG-748.	Location not implemented as part of the first round of Phase 3 data gap sampling due to the targeted transformer being active. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				3		H	H																H		
5B_DG-751	B4007 Area	B4704 Transformer Substation	Soil Boring	0.5		X	X																X	Same as 5B_DG-748.	Location not implemented as part of the first round of Phase 3 data gap sampling due to the targeted transformer being active. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				3		H	H																H		
5B_DG-755[3]	B4007 Area	Storage Yard North B4007	Soil Boring	0.5														X						Location characterizes area for storage of flammable hazardous materials (solvents, morpholine, hydrazine, petroleum fuels, metals, PCBs, and propellants) described in RFI and EPA HSA. Analyze VOCs in soil matrix since soils too shallow for soil vapor. Shallow bedrock observed in adjacent samples; collect 5 foot sample if soil present. 5B_DG-768 also serves as a stepout for L2BS1009 to the south.	VOCs sampling was not implemented as part of the first round of Phase 3 data gap sampling due to shallow soil thickness (< 3 ft). 9 of 12 locations in the area were analyzed for VOCs during Phase 3 sampling with all results below RLs. Since location is within PRA and there is sufficient VOC data in the area, no additional sampling is warranted.
				5														X							
5B_DG-756[3]	B4007 Area	Storage Yard between B4007/B4008	Soil Boring	0.5														X						Location characterizes area for storage of flammable hazardous materials (solvents, morpholine, hydrazine, petroleum fuels, metals, PCBs, and propellants) described in RFI and EPA HSA. Analyze VOCs in soil matrix since soils too shallow for soil vapor. Shallow bedrock observed in adjacent samples; collect 5 foot sample if soil present. 5B_DG-768 also serves as a stepout for L2BS1009 to the south.	VOCs sampling was not implemented as part of the first round of Phase 3 data gap sampling due to shallow soil thickness (< 3 ft). 9 of 12 locations in the area were analyzed for VOCs during Phase 3 sampling with all results below RLs. Since location is within PRA and there is sufficient VOC data in the area, no additional sampling is warranted.
				5														X							
5B_DG-761[3]	B4007 Area	Building 4007	Soil Boring	0.5														X						Location characterizes area for storage of flammable hazardous materials (solvents, morpholine, hydrazine, petroleum fuels, metals, PCBs, and propellants) described in RFI and EPA HSA. Analyze VOCs in soil matrix since soils too shallow for soil vapor. Shallow bedrock observed in adjacent samples; collect 5 foot sample if soil present. 5B_DG-768 also serves as a stepout for L2BS1009 to the south.	VOCs sampling was not implemented as part of the first round of Phase 3 data gap sampling due to shallow soil thickness (< 3 ft). 9 of 12 locations in the area were analyzed for VOCs during Phase 3 sampling with all results below RLs. Since location is within PRA and there is sufficient VOC data in the area, no additional sampling is warranted.
				5														X							
5B_DG-789	17th St. Pond	Area southeast of 17th St. Pond Identified Contamination Area	Soil Boring	0.5	X	X	X	X						X								X	X	Stepout/representative sample location to characterize open area southeast of Identified Contamination Area (define extent) and stepout for dioxins/metals both to east and west. Analyze all depths. Shallow soil anticipated based on previous sampling.	Location not implemented as part of the first round of Phase 3 data gap sampling due to being within an environmentally sensitive area. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X						X								X	X		
5B_DG-790	17th St. Pond	Area southeast of 17th St. Pond Identified Contamination Area	Soil Boring	0.5	X	X	X	X						X								X	X	Stepout/representative sample location to characterize open area southeast of Identified Contamination Area (define extent) and stepout for dioxins/metals both to east and west. Analyze all depths. Shallow soil anticipated based on previous sampling.	Location not implemented as part of the first round of Phase 3 data gap sampling due to being within an environmentally sensitive area. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X						X								X	X		
5B_DG-791	17th St. Pond	East of 17th Street Identified Contamination Area	Soil Boring	0.5	X	X	X	X						X								X	X	Stepout for identified contamination area to the west, providing characterization of open area to the east. Location is also stepout between contamination area and silver (615 ppm) at location P2TS57. PCBs detected in identified contamination area and as TIC at P2TS57. Located in a suspect dredge area identified in RFI report. Analyze all depths; however, refusal on bedrock likely at approximately 5 feet bgs.	Location not implemented as part of the first round of Phase 3 data gap sampling due to being within an environmentally sensitive area. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X						X								X	X		
				10	X	X	X	X						X								X	X		
5B_DG-792	17th St. Pond	Area southeast of 17th St. Pond Identified Contamination Area	Soil Boring	0.5	X	X	X	X						X								X	X	Stepout/representative sample location to characterize open area southeast of Identified Contamination Area (define extent) and stepout for dioxins/metals both to east and west. Analyze all depths. Shallow soil anticipated based on previous sampling.	Location not implemented as part of the first round of Phase 3 data gap sampling due to being within an environmentally sensitive area. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X						X								X	X		
5B_DG-794	17th St. Pond	East of 17th Street Identified Contamination Area	Soil Boring	0.5	X	X	X	X						X								X	X	Same as 5B_DG-791.	Location not implemented as part of the first round of Phase 3 data gap sampling due to being within an environmentally sensitive area. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X						X								X	X		
				10	X	X	X	X						X								X	X		
5B_DG-796	17th St. Pond	Sewer Line South of 17th Street Pond	Test Pit	0.5	X	X	X	X						X								X	X	Excvate test pit to investigate linear geophysical anomaly south of the 17th Street Pond. Inspect test pit for signs of fill and target sample at top of native if fill observed. Collect deepest samples just above bedrock to evaluate potential migration to groundwater.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a test pit and within an environmentally sensitive area. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X						X								X	X		
				10	X	X	X	X						X								X	X		
5B_DG-802	17th St. Pond	Area west of 17th St. Pond Clearly Contaminated Area	Soil Boring/ Test Pit	0.5	X	X	X	X						X								X	X	Stepout for western extent of 17th Street Pond Identified Contamination Area and dioxins in SL-173-SA5B. Analyze all depths. Refusal in bedrock between 3' and 4' in nearby borings. Conduct adjacent test pit for linear geophysical anomaly and adjust 5 foot boring sample to target (or sample pit as appropriate).	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a test pit and within an environmentally sensitive area. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X						X								X	X		
5B_DG-803	17th St. Pond	Reclaimed Water Sprayfield East of EEL	Soil Boring/ Test Pit	0.5	X	X	X	X	X				X	X	X							X	X	Location characterizes area downslope of fill north of road, west of Identified Contamination Area, and assesses potential impacts from reclaimed water sprayfields. Hexavalent chromium, formaldehyde and perchlorate added for potential presence in reclaimed water. Shallow soils anticipated; collect deepest sample just above bedrock.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a test pit and within an environmentally sensitive area. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X	X				X	X	X							X	X		
				10	H	H	H	H	H				H	H	H							H	H		
5B_DG-793	17th St. Pond	Southeast of 17th Street Identified Contamination Area Area III	Soil Boring	0.5	X	X	X	X						X								X	X	**Future Location.** Stepout for silver (and potentially PCBs) impacts in sample P2TS57 as described for 5B_DG-791.	Location is not planned for sampling at this time since it was proposed to delineate lateral extent not associated within a migration pathway and does not evaluate contamination that is contiguous and emanating from Area IV.
				5	X	X	X	X						X								X	X		
				10	H	H	H	H						H								H	H		

Table 3A
Status of Uncollected Subarea 5B Soil Sample Locations
Final Phase 3 Data Gap Analysis
(4 of 4)

Location ID	Area	Location Description	Sample Type	Depth (ft bgs)	Analytical Method																		Rationale / Comments[1]	Rationale for Not Implementing[2]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Cr(VI) (EPA Method 7196A)	Glycols (EPA Method 8015B)	Alcohols (EPA Method 8015B)	Energetics (EPA Method 8330A)	Perchlorate (EPA Method 6850/6860)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	VOCs (SV) (EPA Method 8260B)	VOCs (SM) (EPA Method 8260B)	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)		
5B_DG-795	17th St. Pond	South of 17th St. Pond Clearly Contaminated Area	Soil Boring	0.5	X	X	X	X						X							X	X	**Future Location.** Stepout to delineate elevated silver in sample P2TS56. Analyze for dioxins since it is found throughout the 17th Street Pond Clearly Contaminated Area. Deep samples on hold pending shallow results since no detections above ISLs at depth. Depth to refusal unknown.	Location is not planned for sampling at this time since it was proposed to delineate lateral extent not associated within a migration pathway and does not evaluate contamination that is contiguous and emanating from Area IV.
				5	X	X	X	X						X							X	X		
				10	H	H	H	H						H							H	H		
5B_DG-814	B4011 Area	Hazardous Matrials Storage Area East of Building 3271	Soil Boring	0.5	X	X	X	X	X				X	X	X						X	X	**Future Location.** Characterize soil immediately adjacent to concrete pad for Hazardous Materials Storage Area, undefined feature observed in 1960-1963 aerial photograph, and potential impacts from reclaimed water spray field. Bedrock in area approximately 7 feet bgs; target deepest sample just above bedrock due to assess potential fluid release and migration along bedrock from HMSA.	Location is not planned for sampling at this time since it was proposed to delineate lateral extent not associated within a migration pathway and does not evaluate contamination that is contiguous and emanating from Area IV.
				5.0	X	X	X	X	X				X	X	X						X	X		
				10	X	X	X	X	X				X	X	X						X	X		

Footnotes

1. Rationale originally included in the Subarea 5C Data Gap Analysis Technical Memorandum (Attachment 1 in Addendum No. 1 to the Master Field Sampling Plan) that was submitted and approved by DTSC in April 2012. The rationale has not been modified and is included for reference.

2. Rationale is provided explaining why locations were not collected as part of the first round of Phase 3 data gap sampling (e.g., near active transformers or utilities, trenching/test pit locations that had not been implemented yet, pending geophysical survey results) and why implementation of these sample locations is no longer necessary to support remedial planning decisions.

3. Additional analyses were proposed and analyzed in samples collected at this location during the first round of Phase 3 data gaps. Analyses listed in this table were not implemented as originally planned.

Acronyms

AST = above-ground storage tank
bgs = below ground surface
Cr(VI) = hexavalent chromium
EEL = Environmental Effects Laboratory
EPA = Environmental Protection Agency
ft = foot or feet
HSA = Historical Site Assessment
PAH = polyaromatic hydrocarbons
PCB = polychlorinated biphenyls
PCT = polychlorinated terphenyls
ppm = parts per million
RL = Reporting Limit
SCTI = Sodium Component Test Installation
SCTL = Sodium Component Test Loop
SM = soil matrix
TPH = total petroleum hydrocarbons
VOC = volatile organic compound

Table 3B
Status of Uncollected Subarea 5C Soil Sample Locations
Final Phase 3 Data Gap Analysis
(1 of 4)

Location ID	Area	Location Description	Sample Type	Depth (ft bgs)	Analytical Method																			Rationale / Comments[1]	Rationale for Not Implementing[2]
					PAHs including NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Cr(VI) (EPA Method 7196A)	Silver (EPA Method 6020)	Mercury (EPA Method 7174A)	Biphenyls (EPA Method 8270C)	Terphenyls (EPA Method 8015B)	Glycols (EPA Method 8015B)	Alcohols (EPA Method 8015B)	Perchlorate (EPA Method 314.0/6850/6860)	Energetics (EPA Method 8330A)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
5C_DG-517[3]	B4015 Field	Storage yard area south of B4015	Soil Boring	0.5																				Representative sample to characterize potential storage in cleared area around B4015 observed in aerial photographs. Location is also downslope of/adjacent to B4373 leach field to address potential subsurface lateral migration. Analyze formaldehyde to address potential hydrazine use in B4373 area.	Formaldehyde analysis was inadvertently omitted at this location. Location is within a PRA where chemical drivers and vertical extent are sufficiently defined, therefore analysis is no longer necessary.
				5														X							
				10														X							
5C_DG-519	B4383 LF Area	Historical drainage feature from B4383 to drainage along road	Trench	0.5	X	X	X	X	X							X						X	X	Targets historical drainage feature observed in aerial photo. Analyze hexavalent chromium since detected above ISL in adjacent operational area. Collect/analyze samples at depth due to potential recharge and depth uncertainty associated with feature. Trench to inspect for historical drainage/fill.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a trench. Location is within a PRA where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X	X							X						X	X		
				10	X	X	X	X	X							X						X	X		
5C_DG-534	B4383 LF Area	Historical drainage east of B4383 operational area	Soil Boring	0.5	X	X	X	X								X						X	X	Targets historical drainage feature observed in aerial photo. Collect/analyze samples at depth due to potential recharge and depth uncertainty associated with feature.	Location not implemented as part of the first round of Phase 3 data gap sampling due to nearby active utilities. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X								X						X	X		
				10	X	X	X	X								X						X	X		
5C_DG-535	B4383 LF Area	Historical drainage east of B4383 operational area	Soil Boring	0.5	X	X	X	X								X						X	X	Targets historical drainage feature observed in aerial photo; located at confluence with historical drainage leading from B4011 operational area observed in 1959/1960 aerial photo. Collect/analyze samples at depth due to potential recharge and depth uncertainty associated with feature.	Location not implemented as part of the first round of Phase 3 data gap sampling due to nearby active utilities. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X								X						X	X		
				10	X	X	X	X								X						X	X		
5C_DG-536[3]	SPTF	Unknown tank south of B4461	Soil Boring	0.5			X																	Unknown tank identified during sitewide aerial photo review; analyze for SPTF suite. PCBs & dioxins added as stepout for detection at SL-096. PAHs added to delineate detections at SL-096 and U5BS1053. Deeper samples on hold pending shallow results since location for potential AST surface release .	Dioxins analysis was indavertently ommitted during first round of Phase 3 data gap sampling. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined, therefore analysis is no longer necessary.
				5																					
				10																					
5C_DG-538	B4383 LF Area	Historical drainage east of B4383 operational area	Trench	0.5	X	X	X	X								X				X		X	X	Sample near former location L2BS1400 to target historical drainage collection feature observed in aerial photo near road (at apparent culvert). Excavate exploratory trench to inspect soil for fill, sediments, staining, and other indications of historical drainages and/or impacts. Serves to characterize potential runoff from upstream drainages/operational areas and is upstream/upslope of elevated results (e.g., SL-116-SA5C, SL-117-SA5C, SL-179-SA5B). Collect/analyze (no hold) samples at depth due to potential recharge and depth/location uncertainty associated with feature.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a trench. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X								X				X		X	X		
				10	X	X	X	X								X				X		X	X		
5C_DG-540	B4383 LF Area	Historical drainage east of B4383 operational area	Soil Boring	0.5	X	X	X	X								X						X	X	Targets historical drainage feature observed in aerial photo. Collect/analyze samples at depth due to potential recharge and depth uncertainty associated with feature.	Location not implemented as part of the first round of Phase 3 data gap sampling due to nearby active utilities. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X								X						X	X		
				10	X	X	X	X								X						X	X		
5C_DG-576	B4015 Field	Potential fill area east of B4015	Trench	0.5	X	X	X	X								X		X	X			X	X	Sample characterizes northern extent of potential fill area. Representative location analyzed for formaldehyde (as breakdown product of hydrazine) due to low level (less than ISL) concentrations of NDMA.**See Footnote 1 regarding sampling depths.**	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a trench. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X								X		X	X			X	X		
				10	X	X	X	X								X		X	X			X	X		
5C_DG-590A	B4100	South of B4100	Soil Boring	0.5		X																	X	Previous sample was a composite of four discrete samples (ND with elevated RLs). 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.	Location not implemented as part of the first round of Phase 3 data gap sampling due to the targeted transformer being active. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				3		H																	H		
5C_DG-590B	B4100	South of B4100	Soil Boring	0.5		X																	X		
				3		H																	H		
5C_DG-590C	B4100	South of B4100	Soil Boring	0.5		X																	X	Previous sample was a composite of four discrete samples (ND with elevated RLs). 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.	Location not implemented as part of the first round of Phase 3 data gap sampling due to the targeted transformer being active. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				3		H																	H		
5C_DG-590D	B4100	South of B4100	Soil Boring	0.5		X																	X		
				3		H																	H		
5C_DG-598	B4100	Field east of B4100	Trench	0.5	X	X	X	X								X		X				X	X	Representative sample in debris / fill area. Analytical suites selected since detected in other portions of the fill area. Excavate exploratory trench and collect samples at depth/location based on field observations.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a trench. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X								X		X				X	X		
				10	X	X	X	X								X		X				X	X		
5C_DG-601	B4100	Field east of B4100	Trench	0.5	X	X	X									X		X					X	Co-located sample to complete the analytical suite at elevated silver detect (5.6 ppm at BHTS18). Representative sample in debris/fill area. Excavate exploratory trench and collect samples at depth/location based on field observations. Actual sample locations will be based on field observation and soil conditions.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a trench. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X									X		X					X		
				10	X	X	X									X		X					X		

Table 3B
Status of Uncollected Subarea 5C Soil Sample Locations
Final Phase 3 Data Gap Analysis
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Location ID	Area	Location Description	Sample Type	Depth (ft bgs)	Analytical Method																		Rationale / Comments[1]	Rationale for Not Implementing[2]
					PAHs including NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Cr(VI) (EPA Method 7196A)	Silver (EPA Method 6020)	Mercury (EPA Method 7174A)	Biphenyls (EPA Method 8270C)	Terphenyls (EPA Method 8015B)	Glycols (EPA Method 8015B)	Alcohols (EPA Method 8015B)	Perchlorate (EPA Method 314.0/6850/6860)	Energetics (EPA Method 8330A)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
5C_DG-622	B4015 Field	Fill Area	Trench	approx 10' and 15' (see rationale for further description)	X	X	X	X								X		X	H			X	X	Co-locate sample location at SL-130-SA5C. Sampling to (a) verify depth and sample native soil, (b) confirm total depth of impacts below former 10' samples, and (c) assess vertical migration of large molecular weight contaminants (PCBs, dioxins) from overlying fill into native soil. Excavate exploratory trench and collect samples at previous location below 10 f (targeting top of native soil) to bedrock (actual depths/locations will be determined based o soil conditions observed in trench). Analyze for all chemical groups detected in fill area (PAHs, PCBs, perchlorate, dioxins, metals, NDMA, TPH). Representative location on hold for formaldehyde (breakdown product of hydrazine) due to low level (less than ISL) concentrations of NDMA - pending offsite NDMA data. Note: previous sampling logs do n identify top of native soil; this sampling is intended to target native soil below fill to bedroc	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a trench. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
					X	X	X	X								X		X	H			X	X		
5C_DG-624	B4015 Field	Fill Area	Trench	approx 10' and 15' (see rationale for further description)	X	X	X	X								X		X	H			X	X	Co-locate sample at SL-120-SA5C. Same rationale as 5C_DG-622.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a trench. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
					X	X	X	X								X		X	H			X	X		
5C_DG-625	B4015 Field	Fill Area	Trench	approx 10' and 15' (see rationale for further description)	X	X	X	X								X		X	H			X	X	Co-locate sample at SL-129-SA5C. Same rationale as 5C_DG-622.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a trench. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
					X	X	X	X								X		X	H			X	X		
5C_DG-645	B4015 Field	Fill Area	Trench	approx 10' and 15' (see rationale for further description)	X	X	X	X								X		X	H			X	X	Co-locate sample at SL-141-SA5C. Same rationale as 5C_DG-122, however samples will likely be shallower.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a trench. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
					X	X	X	X								X		X	H			X	X		
5C_DG-647	B4065 Metals Clarifier	Southern Screening Area	Trench	(see rationale)	X	X	H	X	H			H	H	H		H	H	X				X	X	New potential fill area identified ("Loose Earth Fill") in historical drawing that associated th area with the Building 4056 Landfill. Conduct a geophysical survey and locate trenches and test pits to address any anomalies, and provide coverage over entire area. Excavate 10 exploratory trenches and 13 test pits to characterize the area, with test pits located along outer boundaries to identify extent of fill. Excavate 10 exploratory trenches, to be located based on a geophysical survey and field observations. Collect one sample from each of 10 trenches in new potential fill area. Add samples if targeting specific anomalies observed during trenching, based on PID readings, and/or based on field observations. Analyze all samples for the standard investigation suite (PAHs, PCBs/PCTs, metals, and TPH). Analyze one representative sample for dioxins, Cr(VI), biphenyls, terphenyls, glycols, perchlorate, and energetics due to historical use in Area IV operations to assess potential disposal. Hold all subsequent samples for these analyses pending results of the first sample. (Note: Location 5C_DG-646 selected for representative analysis in the table, but actual representative sample location to be based on field observations). Excavate 13 test pits at regular intervals around the area perimeter to delineate the lateral extent of the potential fill area. Test pit locations may be adjusted based on the geophysical survey results and field observations. One or more test pits may be trenched at historical topographic low points to determine the vertical extent of the potential debris area. Samples will be collected from test pit locations/depths based on field observations and/or PID readings. Collect a minimum of one sample from each test pit (additional samples may be collected if field observations warrant). For this FSP Addendum, assume 7 samples (approx half of test pits) will be analyzed for the standard investigation suite (PAHs, PCBs/PCTs, metals, and TPH) and the remaining samples placed on hold pending field observations. Analyze one representative sample collected from test pit locations for dioxins, Cr(VI), biphenyls, terphenyls, glycols, perchlorate, and energetics due to historical use in Area IV operations to assess potential disposal; these analyses on hold in all subsequent samples pending results in representative sample. (Note: Location 5C_DG-656 selected for representative analysis in the table, but actual representative sample location to be based on field observations). Collect surface samples at ten locations (5C_DG-646, -648, -649, -652, -654, -655, -659, -663, -666, -668) to characterize area for potential aerial deposition from burning activities a the B100 Trench; analyze for PAHs, metals, and dioxins. NOTE: Overall sampling will be located to be representative of the fill area both laterally and with depth, as well as targeted locations depending on field observations.	Portions of new potential fill area are within PRAs identified following first rou of Phase 3 sampling. The geophysical survey of the potential fill area performed as part of the Phase 3 activities identified two magnetometer anomalies and potential fill at thicknesses up to 12 feet. Four exploratory trenches (5C_DG-646, -651, -653, and -655) are proposed in final data gap analysis to characterize extent of PRAs and investigate magnetometer anomalies and potential fill.
5C_DG-648	B4065 Metals Clarifier	Southern Screening Area	Trench	0.5	X		X	X														X	X		
				(see rationale)	X	X	H	X	H			H	H	H		H	H	X				X	X		
5C_DG-649	B4065 Metals Clarifier	Southern Screening Area	Trench	0.5	X		X	X														X	X		
				(see rationale)	X	X	H	X	H			H	H	H		H	H	X				X	X		
5C_DG-650	B4065 Metals Clarifier	Southern Screening Area	Trench	(see rationale)	X	X	H	X	H			H	H	H		H	H	X				X	X		
5C_DG-652	B4065 Metals Clarifier	Southern Screening Area	Trench	0.5	X		X	X														X	X		
				(see rationale)	X	X	H	X	H			H	H	H		H	H	X				X	X		
5C_DG-654	B4065 Metals Clarifier	Southern Screening Area	Trench	0.5	X		X	X														X	X		
				(see rationale)	X	X	H	X	H			H	H	H		H	H	X				X	X		
5C_DG-656	B4065 Metals Clarifier	Southern Screening Area	Test Pit	(see rationale)	X	X	X	X	X			X	X	X		X	X	X				X	X		
5C_DG-657	B4065 Metals Clarifier	Southern Screening Area	Test Pit	(see rationale)	H	H	H	H	H			H	H	H		H	H	H				H	H		
5C_DG-658	B4065 Metals Clarifier	Southern Screening Area	Test Pit	(see rationale)	X	X	H	X	H			H	H	H		H	H	X				X	X		
5C_DG-659	B4065 Metals Clarifier	Southern Screening Area	Test Pit	0.5	X		X	X														X	X		
				(see rationale)	H	H	H	H	H			H	H	H		H	H	H				H	H		
5C_DG-660	B4065 Metals Clarifier	Southern Screening Area	Test Pit	(see rationale)	X	X	H	X	H			H	H	H		H	H	X				X	X		
5C_DG-661	B4065 Metals Clarifier	Southern Screening Area	Test Pit	(see rationale)	H	H	H	H	H			H	H	H		H	H	H				H	H		
5C_DG-662	B4065 Metals Clarifier	Southern Screening Area	Test Pit	(see rationale)	X	X	H	X	H			H	H	H		H	H	X				X	X		
5C_DG-663	B4065 Metals Clarifier	Southern Screening Area	Test Pit	0.5	X		X	X														X	X		
				(see rationale)	H	H	H	H	H			H	H	H		H	H	H				H	H		
5C_DG-664	B4065 Metals Clarifier	Southern Screening Area	Test Pit	(see rationale)	X	X	H	X	H			H	H	H		H	H	X				X	X		
5C_DG-665	B4065 Metals Clarifier	Southern Screening Area	Test Pit	(see rationale)	H	H	H	H	H			H	H	H		H	H	H				H	H		
5C_DG-666	B4065 Metals Clarifier	Southern Screening Area	Test Pit	0.5	X		X	X														X	X		
				(see rationale)	H	H	H	H	H			H	H	H		H	H	H				H	H		
5C_DG-667	B4065 Metals Clarifier	Southern Screening Area	Test Pit	(see rationale)	H	H	H	H	H			H	H	H		H	H	H				H	H		
5C_DG-668	B4065 Metals Clarifier	Southern Screening Area	Test Pit	0.5	X		X	X														X	X		
				(see rationale)	H	H	H	H	H			H	H	H		H	H	H				H	H		

Table 3B
Status of Uncollected Subarea 5C Soil Sample Locations
Final Phase 3 Data Gap Analysis
(3 of 4)

Location ID	Area	Location Description	Sample Type	Depth (ft bgs)	Analytical Method																			Rationale / Comments[1]	Rationale for Not Implementing[2]
					PAHs including NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Cr(VI) (EPA Method 7196A)	Silver (EPA Method 6020)	Mercury (EPA Method 7174A)	Biphenyls (EPA Method 8270C)	Terphenyls (EPA Method 8015B)	Glycols (EPA Method 8015B)	Alcohols (EPA Method 8015B)	Perchlorate (EPA Method 314.0/6850/6860)	Energetics (EPA Method 8330A)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
5C_DG-669A	B4065 Metals Clarifier	Former Transformer West of B4065	Soil Boring	0.5		X																	X	PCB results ND with elevated RLs in previous samples (XFBS03 and XFBS04). 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.	Location not implemented as part of the first round of Phase 3 data gap sampling due to the targeted transformer being active. PRA drawn to include transformer because the majority of transformers sampled within Area IV have PCBs above LUT values.
				3		H																	H		
5C_DG-669B	B4065 Metals Clarifier	Former Transformer West of B4065	Soil Boring	0.5		X																	X		
				3		H																	H		
5C_DG-669C	B4065 Metals Clarifier	Former Transformer West of B4065	Soil Boring	0.5		X																	X		
				3		H																	H		
5C_DG-669D	B4065 Metals Clarifier	Former Transformer West of B4065	Soil Boring	0.5		X																	X		
				3		H																	H		
5C_DG-674[3]	B4065 Metals Clarifier	Storage Area West of B4065	Soil Boring	0.5																X				Location targets undefined feature/structure (1980 aerial) in open storage area. Also serves as stepout sample to delineate dioxins and metals at SL-043 and TPH and pesticides at SL-039. Refusal observed at 3 feet approx. 30 feet south; collect deeper sample just above bedrock and analyze since detections at SL-039 and SL-043 at depth.	Pesticides analysis was indavertently ommitted during first round of Phase 3 data gap sampling. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined, therefore analysis is no longer necessary.
				5																X					
5C_DG-714	B4065 Metals Clarifier	Drainage Southeast of B4066	Soil Boring	0.5	X	X	X	X										X				X	X	Targets historical drainage feature observed in aerial photo. Collect/analyze samples at depth due to potential recharge and depth uncertainty associated with feature (collect last sample just above bedrock).	Location not implemented as part of the first round of Phase 3 data gap sampling due to nearby active utilities. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X										X				X	X		
				10	X	X	X	X										X				X	X		
5C_DG-721	B4065 Metals Clarifier	Drainage Southeast of B4062	Soil Boring	0.5	X	X	X	X										X				X	X	Targets historical drainage feature observed in aerial photo. Collect/analyze samples at depth due to potential recharge and depth uncertainty associated with feature (collect last sample just above bedrock).	Location not implemented as part of the first round of Phase 3 data gap sampling due to nearby active utilities. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X										X				X	X		
				10	X	X	X	X										X				X	X		
5C_DG-725	B4065 Metals Clarifier	North side of B4062	Soil Boring	0.5	X	X	X	X										X				X	X	Sample targets unidentified feature observed in 1980 aerial photograph. Hold deeper sample pending shallow results. Conduct geophysical survey along north side of building to assess potential pipeline from UST to building.	Location not implemented as part of the first round of Phase 3 data gap sampling because an evaluation of the geophysical survey results had not been completed. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	H	H	H	H										H				H	H		
				10	H	H	H	H										H				H	H		
5C_DG-726	B4065 Metals Clarifier	B4062	Soil Boring	0.5	X	X	X	X										X				X	X	Sample targets the sanitary sewer exit from building. Analyze general suite (PAHs, PCBs, dioxins, metals, TPH) due to testing activities in the building. Hold deep sample pending shallow results. Conduct geophysical survey to assess actual location of sanitary sewer line.	Location not implemented as part of the first round of Phase 3 data gap sampling because an evaluation of the geophysical survey results had not been completed. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X										X				X	X		
				10	H	H	H	H										H				H	H		
5C_DG-733[3]	S of B4057	Sewer discharge from B4057	Soil Boring	0.5															X					Targets sewer discharge from B4057; includes Cr(VI) and formaldehyde to address operations involving cooling water use. Collect deep sample just above bedrock and hold pending shallow results. Analyze larger chemical suite in deep sample depending on 5C_DG-732 results near bedock to assess migration along bedrock from drywell.	Formaldehyde analysis was indavertently ommitted during first round of Phase 3 data gap sampling. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined, therefore analysis is no longer necessary.
				5															X						
				10															H						
5C_DG-745	B4065 Metals Clarifier	Drainage east of B4038	Soil Boring	0.5	X	X	X	X										X				X	X	Targets historical drainage feature observed in aerial photo (note EPA drainage sediment samples not collected due to lack of sediment in lined drainage). Collect/analyze (no hold) samples at depth due to potential recharge and depth uncertainty associated with feature (collect last sample just above bedrock).	Location not implemented as part of the first round of Phase 3 data gap sampling due to nearby active utilities. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X										X				X	X		
				10	X	X	X	X										X				X	X		
5C_DG-746A	B4059 SNAP	Former Transformer North of B4057	Soil Boring	0.5		X																	X	PCB results ND with elevated RLs in previous samples (SABS01, SABS02). 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.	Location not implemented as part of the first round of Phase 3 data gap sampling due to the targeted transformer being active. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				3		H																	H		
5C_DG-746B	B4059 SNAP	Former Transformer North of B4057	Soil Boring	0.5		X																	X		
				3		H																	H		
5C_DG-746C	B4059 SNAP	Former Transformer North of B4057	Soil Boring	0.5		X																	X		
				3		H																	H		
5C_DG-746D	B4059 SNAP	Former Transformer North of B4057	Soil Boring	0.5		X																	X		
				3		H																	H		
5C_DG-751	B4065 Metals Clarifier	B4062	Soil Boring	0.5	X	X	X	X										X				X	X	Sample characterizes area for potential fuel line leading from UST to B4062. Analyze general suite (PAHs, PCBs, dioxins, metals, TPH) due to testing activities in the building. Conduct geophysical survey to assess actual location of fuel conveyance line. Hold 10 foot sample pending results in 0.5 and 5 foot samples.	Location not implemented as part of the first round of Phase 3 data gap sampling because an evaluation of the geophysical survey results had not been completed. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X										X				X	X		
				10	H	H	H	H										H				H	H		

Table 3B
Status of Uncollected Subarea 5C Soil Sample Locations
Final Phase 3 Data Gap Analysis
(4 of 4)

Location ID	Area	Location Description	Sample Type	Depth (ft bgs)	Analytical Method																			Rationale / Comments[1]	Rationale for Not Implementing[2]
					PAHs including NDMA (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals (EPA Methods 6010B/6010C /6020/6020A/7471A/7471B)	Cr(VI) (EPA Method 7196A)	Silver (EPA Method 6020)	Mercury (EPA Method 7174A)	Biphenyls (EPA Method 8270C)	Terphenyls (EPA Method 8015B)	Glycols (EPA Method 8015B)	Alcohols (EPA Method 8015B)	Perchlorate (EPA Method 314.0/6850/6860)	Energetics (EPA Method 8330A)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
5C_DG-504	B4015 Field (Area III)	Fill area east of B4015	Trench	0.5	X	X	X	X								X						X	X	**Future Location.** Complete characterization in downslope, eastern portion of fill area based on results observed in clearly contaminated fill area to the west.	Location is in Area III and is not within a migration pathway (i.e., drainage); therefore, does not evaluate if contamination is contiguous and emanating from Area IV.
				5	X	X	X	X								X						X	X		
				10	X	X	X	X								X						X	X		
5C_DG-505	B4015 Field (Area III)	Fill area east of B4015	Trench	0.5	X	X	X	X								X						X	X	**Future Location.** Complete characterization in downslope, eastern portion of fill area based on results observed in clearly contaminated fill area to the west.	Location is in Area III and is not within a migration pathway (i.e., drainage); therefore, does not evaluate if contamination is contiguous and emanating from Area IV.
				5	X	X	X	X								X						X	X		
				10	X	X	X	X								X						X	X		
5C_DG-506	B4015 Field (Area III)	Fill area east of B4015	Trench	0.5	X	X	X	X								X						X	X	**Future Location.** Complete characterization in downslope, eastern portion of fill area based on results observed in clearly contaminated fill area to the west.	Location is in Area III and is not within a migration pathway (i.e., drainage); therefore, does not evaluate if contamination is contiguous and emanating from Area IV.
				5	X	X	X	X								X						X	X		
				10	X	X	X	X								X						X	X		
5C_DG-582	B4015 Field	Area III Southeast of B4015 field.	Soil Boring	0.5	X	X	X	X	X							X		X	X			X	X	**Future Location.** Stepout in Area III from PAH, PCBs, metals, TPH, and dioxins detection in adjacent samples to the northwest. Also assesses potential impacts from adjacent reclaimed water sprayfields.	Location is in Area III and is not within a migration pathway (i.e., drainage); therefore, does not evaluate if contamination is contiguous and emanating from Area IV.
				5	X	X	X	X	X							X		X	X			X	X		
5C_DG-753	B4015 Field (Area III)	Drainage south of B4015 Field	Soil Boring	0.5	X	X	X	X								X						X	X	**Future Location.** Location targets drainage southeast of B4015 field in Area III; deeper samples on hold pending shallow results.	Location is within drainage with LUT exceedances in downstream samples. Location 5C_DG-511 will evaluate potential for elevated exceedances emanating from Area IV.
				5	H	H	H	H								H						H	H		
				10	H	H	H	H								H						H	H		

Footnotes
1. Rationale originally included in the Subarea 5C Data Gap Analysis Technical Memorandum (Attachment 1 in Addendum No. 1 to the Master Field Sampling Plan) that was submitted and approved by DTSC in April 2012. The rationale has not been modified and is included for reference.

2. Rationale is provided explaining why locations were not collected as part of the first round of Phase 3 data gap sampling (e.g., near active transformers or utilities, trenching/test pit locations that had not been implemented yet, pending geophysical survey results) and why implementation of these sample locations is no longer necessary to support remedial planning decisions.

3. Additional analyses were proposed and analyzed in samples collected at this location during the first round of Phase 3 data gaps. Analyses listed in this table were not implemented as originally planned.

Acronyms
bgs = below ground surface
Cr(VI) = hexavalent chromium
EPA = Environmental Protection Agency
ft = foot/feet
H = sample on hold
PAH = polyaromatic hydrocarbons
PCB = polychlorinated biphenyls
ppm = parts per million
TPH = total petroleum hydrocarbons
X = sample to be analyzed by corresponding analytical method

Table 3C
Status of Uncollected Subareas 3 and 6 Soil Sample Locations
Final Phase 3 Data Gap Analysis
(1 of 1)

Location ID	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method												Rationale / Comments[1]	Rationale for Not Implementing[2]
					PAHs (EPA Method 8270C [SIM])	PCBs / PCTs (EPA Method 8082)	Dioxins/Furans (EPA Method 1613)	Metals (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)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)		
6_DG-568	B4064 Area	Parking Lot 4513 Area	Test Pit/Soil Boring	0.5	X	X	X	X				X				X	X	Stepout for TPH at L4BS1018. Conduct exploratory test pit to investigate linear magnetic anomaly; if pipe or buried metal observed, collect sample in soil beneath feature.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a test pit. 6_DG-570 is planned for collection during final data gap sampling and will sufficiently characterize storage area and define northern extent of PRA.
				5	X	X	X	X				X				X	X		
				10	H	H	H	H				H				H	H		
6_DG-656	Old Con Area	SRE Pipeline/Container Storage Area Southeast of B4320	Test Pit/Soil Boring	0.5	X	X	X	X				X		X	X	X	X	Location targets uncharacterized area within former tank berm fill soils extent and the former SRE Pond discharge pipeline; also a stepout to delineate northern extent of Old Con/New Con Drainage Clearly Contaminated Area (dioxins, metals, PCBs, pesticides, TPH), TPH at OCBS05 and SL-217-SA6, and PAHs, PCBs, metals (Cd, Ag), and TPH at OCBS1036. Location is within mapped extent of historical storage area. Conduct exploratory test pit to investigate and characterize layer of greenish fuel staining noted in soil borings between approximately 3.5 and 6 feet bgs in the central portion of the Container Storage Area; if observed, collect sample of greenish stained soil. Bedrock anticipated <10'; collect and analyze deepest sample targeting soil just above bedrock to characterize potential for lateral migration along bedrock.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a test pit. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X				X		X	X	X	X		
				10	X	X	X	X				X				X	X		
6_DG-657	Old Con Area	Container Storage Area Southeast of B4320	Test Pit/Soil Boring	0.5	X	X	X	X				X				X	X	Location targets uncharacterized area within former tank berm fill soils extent; also a stepout for TPH at OCBS05 and OCBS43 and PAHs, PCBs, metals (Cd, Ag), and TPH at OCBS1036. Location is within mapped extent of historical storage area. Conduct exploratory test pit to investigate and characterize layer of greenish fuel staining noted in soil borings between approximately 3.5 and 6 feet bgs in the central portion of the Container Storage Area; if observed, collect sample of greenish stained soil. Bedrock anticipated <10'; collect and analyze deepest sample targeting soil just above bedrock to characterize potential for lateral migration along bedrock.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a test pit. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X				X				X	X		
				10	X	X	X	X				X				X	X		
6_DG-687	Old Con Area	Southwest of OCY West of Substation 4783	Test Pit/Soil Boring	0.5	X	X	X	X				X				X	X	Stepout for dioxins at SL-154-SA6; also characterizes debris area identified during 2008 debris survey. Conduct exploratory test pit to investigate geophysical anomaly (terrain conductivity and ground penetrating radar) area; if fill with debris is present, collect and analyze sample within fill, at top of native (if encountered), and just above bedrock. Bedrock anticipated ~5'.	Location not implemented as part of the first round of Phase 3 data gap sampling because the sampling type was a test pit. Location is within a PRA footprint where chemical drivers and vertical extent are sufficiently defined.
				5	X	X	X	X				X				X	X		

Footnotes

1. Rationale originally included in the Subarea 3 and 6 Data Gap Analysis Technical Memorandum (Attachment 1 in Addendum No. 5 to the Master Field Sampling Plan) that was submitted and approved by DTSC in October 2012. The rationale has not been modified and is included for reference.

2. Rationale is provided explaining why locations were not collected as part of the first round of Phase 3 data gap sampling (e.g., near active transformers or utilities, trenching/test pit locations that had not been implemented yet, pending geophysical survey results) and why implementation of these sample locations is no longer necessary to support remedial planning decisions.

Acronyms

Ag = silver
bgs = below ground surface
Cd = cadmium
Cr(VI) = hexavalent chromium
EPA = Environmental Protection Agency
ft = foot or feet
Hg = mercury
PAH = polyaromatic hydrocarbons
PCB = polychlorinated biphenyls
PCT = polychlorinated terphenyls
SRE = Sodium Reactor Experiment
TPH = total petroleum hydrocarbons
VOC = volatile organic compound

Table 4A
Subarea 5B Proposed Soil Sample Locations
Final Phase 3 Data Gap Analysis
(1 of 2)

Location ID[1]	Area	Location Description	Sample Type	Depth (ft. bgs)	Analytical Method															Rationale / Comments
					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)	VOCs (SM) (EPA Method 8260B)	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)	
5B_DG-529	B4010 Area	South of B4012	Trench	0.5	X	X	X	X				X			X			X	X	Targets AST with unknown contents; also targets southern portion of fill and potential leach field location. Excavate exploratory trench perpendicular to leach field orientation to investigate leach field location (inspect for signs of fill, gravel, leach lines, etc.). Analyze for corrosion inhibitors due to cooling tower operations in area. Analyze at depth due to potential fill, potential leach field impacts, and soil movement/fill. 15 foot sample targets native soil just above bedrock; analyze for full suite plus VOCs (SM) to evaluate potential migration pathway to groundwater.
				5	X	X	X	X				X			X			X	X	
				10	X	X	X	X				X			X			X	X	
				15	X	X	X	X				X		X	X			X	X	
5B_DG-693	B4011 Area	East of B4005/B4006 Leach Field	Soil Boring / Test Pit	0.5	X	X	X	X				X				X		X	X	Excavate trench in east/west orientation to target leach line, linear geophysical anomaly, and northern terminus of above ground fuel line. Extend trench approximately 20 feet eastward to investigate the northern terminus of the fuel line (i.e., determine if the pipeline goes underground at this location and has been removed). Collect sample targeting geophysical anomaly; adjust 5 foot sample to target soil beneath anomaly if observed. Collect an additional sample at the terminus of the pipeline if subsurface piping is identified or soil staining observed. **Collect additional samples at 5-foot intervals to bedrock with the deepest sample targeting soil just above bedrock.**
				5	X	X	X	X				X				X		X	X	
				10	X	X	X	X				X				X		X	X	
5B_DG-699	B4011 Area	Open Area South of SCTL PowerPak Interconnecting Facility	Soil Boring/ Test Pit	0.5	X	X	X	X				X				X		X	X	Excavate test pit to investigate linear geophysical anomaly. If observed, adjust 5 foot boring sample to target soil immediately beneath the anomaly. **Collect additional samples at 5-foot intervals to bedrock with the deepest sample targeting soil just above bedrock.**
				5	X	X	X	X				X				X		X	X	
				10	X	X	X	X				X				X		X	X	
				15	X	X	X	X				X				X		X	X	
5B_DG-707	B4007 Area	Former aboveground tank T-735	Soil Boring/ Test Pit	0.5	X	X	X	X				X				X		X	X	Stepout for TPH detections to the south and dioxins/pesticides to the north; also targets fuel pipeline from T-735. **Collect samples at 5' intervals to bedrock with deepest sample just above bedrock; analyze all depths.**
				5	X	X	X	X				X				X		X	X	
				10	X	X	X	X				X				X		X	X	
5B_DG-798	Area III South of 17th St. Pond	Drainage South of Area III/ IV Boundary	Soil Boring	0.5	X	X	X	X				X						X	X	Stepout to delineate down drainage extent of PAH, PCB, dioxins, and metals impacts from sample SL-284-SA5B. **Collect samples at 5' intervals to bedrock; analyze all depths due to potential for deposition over time.**
				5	X	X	X	X				X						X	X	
				10	X	X	X	X				X						X	X	
5B_DG-836	B4010 Area	B4013 Footprint	Soil Boring	15	X	X		X				X						X	X	**Final Data Gap Location.** One of two locations to evaluate depth to bedrock in area around B4013. Stepdown at 5B_DG-511 since previous sample did not contact bedrock and had exceedances in deepest sample at 10 feet bgs. **Collect and analyze samples at 5-foot intervals to bedrock beginning at 15 feet bgs with deepest sample collected just above bedrock.**
				20	X	X		X				X						X	X	
				25	X	X		X				X						X	X	
5B_DG-837	B4010 Area	B4013 Footprint	Soil Boring	15	X	X		X				X						X	X	**Final Data Gap Location.** One of two locations to evaluate depth to bedrock in area around B4013. Stepdown at SL-295-SA5B since previous sample did not contact bedrock and had exceedances in deepest sample at 10 feet bgs. **Collect and analyze samples at 5-foot intervals to bedrock beginning at 15 feet bgs with deepest sample collected just above bedrock.**
				20	X	X		X				X						X	X	
				25	X	X		X				X						X	X	
5B_DG-838	B4006 Area	B4006 Footprint	Soil Boring	0.5	X	X	X	X				X						X	X	**Final Data Gap Location.** Targets former features (18-inch diameter tubes) removed during demolition of B4006 and stained soil encountered. Bedrock anticipated >20 feet bgs (excavation extended to 20 feet bgs during feature removal). **Collect samples at 5' intervals to bedrock with deepest sample just above bedrock; analyze all depths.**
				5	X	X	X	X				X						X	X	
				10	X	X	X	X				X						X	X	
				15	X	X	X	X				X						X	X	
				20	X	X	X	X				X						X	X	
				25	X	X	X	X				X						X	X	
5B_DG-839	B4006 Area	B4006 Footprint	Soil Boring	0.5	X	X	X	X				X						X	X	**Final Data Gap Location.** Targets former features (18-inch and 48-inch diameter tubes) removed during demolition of B4006 and stained soil encountered. Bedrock anticipated >20 feet bgs (excavation extended to 20 feet bgs during feature removal). **Collect samples at 5' intervals to bedrock with deepest sample just above bedrock; analyze all depths.**
				5	X	X	X	X				X						X	X	
				10	X	X	X	X				X						X	X	
				15	X	X	X	X				X						X	X	
				20	X	X	X	X				X						X	X	
				25	X	X	X	X				X						X	X	
5B_DG-840	B4006 Area	West of B4006	Soil Boring	0.5	X	X	X	X				X						X	X	**Final Data Gap Location.** Targets former dry well removed during demolition of B4006. Bedrock anticipated <10 feet bgs. **Collect samples at 5' intervals to bedrock with deepest sample just above bedrock; analyze all depths.**
				5	X	X	X	X				X						X	X	
				10	X	X	X	X				X						X	X	

Table 4A
Subarea 5B Proposed Soil Sample Locations
Final Phase 3 Data Gap Analysis
(2 of 2)

Location ID[1]	Area	Location Description	Sample Type	Depth (ft. bgs)	Analytical Method															Rationale / Comments
					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)	VOCs (SM) (EPA Method 8260B)	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)	
5B_DG-841	B4011 Area	B4011 Footprint	Soil Boring	0.5	X	X	X	X				X						X	X	Final Data Gap Location. Targets stained soil encountered during demolition of B4011. Bedrock anticipated <10 feet bgs. **Collect samples at 5' intervals to bedrock with deepest sample just above bedrock; analyze all depths.**
				5	X	X	X	X				X						X	X	
				10	X	X	X	X				X						X	X	
5B_DG-842	17th Street Pond	South of 17th St. Pond Clearly Contaminated Area	Soil Boring	0.5	X	X	X	X				X						X	X	Final Data Gap Location. Characterizes area downslope of samples with results above LUT values. Locate drainage feature (e.g. rill, topographic low, etc.) and map with GPS prior to collection of sample. Bedrock anticipcated <10 feet bgs. **Collect samples at 5' intervals to bedrock with deepest sample just above bedrock; analyze all depths.**
				5	X	X	X	X				X						X	X	
				10	X	X	X	X				X						X	X	
5B_DG-843	B4011 Area	B4816 Footprint	Soil Boring	0.5	X	X	X	X				X						X	X	Final Data Gap Location. Targets stained soil encountered during demolition of B4816. Bedrock anticipated <10 feet bgs. **Collect samples at 5' intervals to bedrock with deepest sample just above bedrock; analyze all depths.**
				5	X	X	X	X				X						X	X	
				10	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' and 5' 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.

Acronyms

bgs = below ground surface
Cr(VI) = hexavalent chromium
EPA = Environmental Protection Agency
ft. = foot or feet
LUT = Look-Up Table
PAH = polyaromatic hydrocarbons
PCB = polychlorinated biphenyls
PCT = polychlorinated terphenyls
SCTL = Sodium Component Test Loop
SM = soil matrix
TPH = total petroleum hydrocarbons
VOC = volatile organic compound

Table 4B
Subarea 5C Proposed Soil Sample Locations
Final Phase 3 Data Gap Analysis
(1 of 1)

Location ID[1]	Area	Location Description	Sample Type	Depth (ft bgs)	Analytical Method																	Rationale / Comments
					PAHs including 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)	Biphenyls (EPA Method 8270C)	Terphenyls (EPA Method 8015B)	Glycols (EPA Method 8015B)	Alcohols (EPA Method 8015B)	Perchlorate (EPA Method 314.0/6850/6860)	Energetics (EPA Method 8330A)	TPH (EPA Method 8015B)	Formaldehyde (EPA Method 8315A)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)	
5C_DG-503	B4015 Field (Area III)	Fill area east of B4015	Trench	0.5	X	X	X	X						X						X	X	Complete characterization in downslope, eastern portion of fill area based on results observed in clearly contaminated fill area to the west. If fill observed, collect sample within fill and in top of native soil beneath fill to evaluate vertical migration. **Collect deepest sample targeting soil just above bedrock.**
				5	X	X	X	X						X						X	X	
				10	X	X	X	X						X						X	X	
5C_DG-511	B4015 Field (Area III)	Drainage southeast of potential fill area east of B4015	Soil Boring	0.5	X	X	X	X						X						X	X	Location targets drainage southeast of B4015 field in Area III just before confluence with STL-IV drainage. **Collect deepest sample targeting soil just above bedrock.**
				5	X	X	X	X						X						X	X	
				10	X	X	X	X						X						X	X	
5C_DG-605	B4100	Field east of B4100	Trench	0.5	X	X	X	X						X		X				X	X	Representative sample targetting mounded material observed in EPA aerial photo review. Analytical suites selected since detected in other portions of the area. Excavate exploratory trench and collect samples based on field observation. Conditions should be observed in the trench and sample depths should target fill and native soil immediately beneath it.
				5	X	X	X	X						X		X				X	X	
				10	X	X	X	X						X		X				X	X	
5C_DG-646	B4065 Metals Clarifier	Southern Screening Area	Trench	0.5	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	The geophysical survey performed as part of the Phase 3 activities to investigate the new potential fill area identified ("Loose Earth Fill") in historical drawings found two magnetometer anomalies and potential fill at thicknesses up to 12 feet. Excavate four trenches to evaluate vertical and lateral extent of potential fill and and one of the magnetometer anomalies (5C_DG-563). Collect surface samples at each location to characterize area for potential aerial deposition from burning activities at the B100 Trench; analyze for PAHs, metals, and dioxins. **Collect one sample from each trench at 5' bgs. Collect additional samples targeting fill, native below fill, debris, staining, and/or elevated PID readings based on field observations. If no impacts are observed, collect the deepest sample in soil just above bedrock (~10' bgs).** Analyze all samples for the standard investigation suite (PAHs, PCBs/PCTs, metals, and TPH) and for documented chemicals used in historical Area IV operations (dioxins, Cr(VI), biphenyls, terphenyls, glycols, perchlorate, and energetics).
				5	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	
				10 (see rationale)	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	
5C_DG-651	B4065 Metals Clarifier	Southern Screening Area	Trench	0.5	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	
				5	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	
				10 (see rationale)	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	
5C_DG-653	B4065 Metals Clarifier	Southern Screening Area	Trench	0.5	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	
				5	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	
				10 (see rationale)	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	
5C_DG-655	B4065 Metals Clarifier	Southern Screening Area	Trench	0.5	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	
				5	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	
				10 (see rationale)	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	
5C_DG-748	B4015 Field (Area III)	Drainage Southeast of B4015 Field	Soil Boring	0.5	X	X	X	X						X						X	X	Location targets southeast portion of the drainage that runs through the B4015 field; specifically characterizes area down drainage from detects and prior to confluence with the drainage east of B4015 field. **Collect deepest sample targeting soil just above bedrock.**
				5	X	X	X	X						X						X	X	
				10	X	X	X	X						X						X	X	
5C_DG-749	B4015 Field (Area III)	Drainage Southeast of B4015 Field	Soil Boring	0.5	X	X	X	X						X						X	X	Location targets southern portion of the drainage east of B4015 field; specifically characterizes area down drainage from detects and prior to confluence with the drainage that runs through B4015 field. **Collect deepest sample targeting soil just above bedrock.**
				5	X	X	X	X						X						X	X	
				10	X	X	X	X						X						X	X	
5C_DG-754	B4059 SNAP	NE of B4059	Soil Boring	15	X	X		X						X						X	X	**Final Data Gap Location.** Stepdown at SL-001-SA5C to evaluate depth of impacts and bedrock. Previous sample did not contact bedrock and had exceedances in deepest sample collected at 10 feet bgs. **Collect and analyze samples at 5-foot intervals to bedrock beginning at 15 feet bgs with deepest sample collected just above bedrock.**
				20	X	X		X						X						X	X	
				25	X	X		X						X						X	X	
5C_DG-755	B4065 Metals Clarifier	South of B4066	Soil Boring	0.5	X	X	X	X						X						X	X	**Final Data Gap Location.** Location targets sanitary sewer pipeline that runs along the north side of F Street. Bedrock anticipated <10 feet bgs. **Collect deepest sample targeting soil just above bedrock.**
				5	X	X	X	X						X						X	X	
				10	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' and 5' 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.

Acronyms

bgs = below ground surface
Cr(VI) = hexavalent chromium
EPA = Environmental Protection Agency
ft = foot/feet
H = sample on hold
NDMA = n-nitrosodimethylamine
PAH = polyaromatic hydrocarbons
PCB = polychlorinated biphenyls
TPH = total petroleum hydrocarbons
VOC = volatile organice compound
X = sample to be analyzed by corresponding analytical method

Table 4C
Subareas 3 and 6 Proposed Soil Sample Locations
Final Phase 3 Data Gap Analysis
(1 of 1)

Location ID[1]	Area	Location Description	Sample Type	Depth (feet bgs)	Analytical Method													Rationale / Comments
					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)	Pesticides (EPA Method 8081)	Herbicides (EPA Method 8151A)	pH (EPA Method 9045C)	Soil Moisture (ASTM D2216/ EPA Method 160.3)	
6_DG-569	B4064 Area	West of Parking Lot 4513 Area	Test Pit/Soil Boring	0.5	X	X	X	X				X				X	X	Stepout for TPH at L4BS1018 and SL-171-SA6. Conduct exploratory test pit to investigate linear terrain conductivity anomaly; if fill observed, collect sample at top of native immediately beneath fill. **Collect deepest sample just above bedrock; analyze all depths.**
				5	X	X	X	X				X				X	X	
				10	X	X	X	X				X				X	X	
6_DG-570	B4064 Area	Parking Lot 4513 Area	Test Pit/Soil Boring	0.5	X	X	X	X				X				X	X	Stepout for TPH at L4BS1018; analyze standard suite since characterizing area for potential storage. Conduct exploratory test pit to investigate linear magnetic anomaly; if pipe or buried metal observed, collect sample in soil beneath feature. **Collect deepest sample just above bedrock; analyze all depths.**
				5	X	X	X	X				X				X	X	
				10	X	X	X	X				X				X	X	
6_DG-686	Old Con Area	West of ESG Storage Yard	Test Pit/Soil Boring	0.5	X	X	X	X				X				X	X	Location characterizes area west of ESG storage yard identified in 1988 Radiological Survey Report and targets surface water flow pathway at end of historical dirt road; also addresses potential aerial dispersion/deposition to the northwest of incinerator at B4040. Conduct exploratory test pit to investigate ground penetrating radar anomaly area; if fill with debris is present, **collect and analyze sample within fill and just above bedrock.** Bedrock anticipated <2'.
				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' and 5' 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.

Acronyms

bgs = below ground surface
Cr(VI) = hexavalent chromium
EPA = Environmental Protection Agency
ESG = Energy Systems Group
ft = foot or feet
PAH = polyaromatic hydrocarbons
PCB = polychlorinated biphenyls
PCT = polychlorinated terphenyls
TPH = total petroleum hydrocarbons

FIGURES

Northern Buffer Zone

Northern Buffer Zone

Subarea 3

Subarea 6

Subarea 5A

Subarea 5B

Subarea 5C

Subarea 5D North

Subarea 5D South

Subarea 8 North

Subarea 8 South

Area III

Area II

Area IV

Area III

Area III

Area II

ISI Storage

weather station

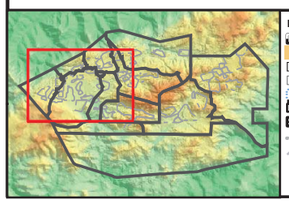
Test Stand #4

LH2 Pump House

GWTS

ECS #3

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
- Area IV HSA Subarea
- Existing Building or Structure
- Removed Building or Structure
- Ponds
- Excavated Area
- Backfilled Excavation Area
- Pipe
- Leach Field
- Drainage
- Lined Drainage
- Rock Outcrop
- Dirt Road
- A/C Paving
- Fence

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.

Legend

- EPA Area IV Sewer

SSFL Sewer System Features

- Sewer Cleanout
- Sewer Stations
- Sewer Repair Locations
- Sewer Manhole
- Sanitary Sewer

"All Chemicals" Detect

- <= 1x LUTV or ML MRL
- 1x - 2x LUTV or ML MRL
- 2x - 10x LUTV or ML MRL
- 10x - 100x LUTV or ML MRL
- > 100x

All Chemicals Non-Detect

- <= 1x LUTV or ML MRL
- 1x - 2x LUTV or ML MRL
- 2x - 10x LUTV or ML MRL
- 10x - 100x LUTV or ML MRL
- > 100x

Area IV Soil Sample Locations within 15 feet of Sewer System Features

SANTA SUSANA FIELD LABORATORY

Path: T:\projects\rock3\Figures\HSA\HSA_Area1V_Soils within 15 Feet of Sewer.mxd

Date: 11/7/2013

1 inch = 342 feet

0 110 220 Feet

FIGURE 1

Northern Buffer Zone

Northern Buffer Zone

Subarea 3

Subarea 6

Subarea 5A

Subarea 5B

Subarea 5C

Subarea 8 North

Subarea 8 South

Subarea 5D North

Subarea 5D South

Area III

Area II

Area IV

Area III

Outfall-003

Outfall-004

Outfall-005

Outfall-006

Outfall-007

Outfall-008

ISI-Storage

Test Stand #4

LH2 Pump House

GWTS

ECS #3

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
- Area IV HSA Subarea
- Existing Building or Structure
- Removed Building or Structure
- Ponds
- Excavated Area
- Backfilled Excavation Area
- Pipe
- Leach Field
- Drainage
- Lined Drainage
- Surface Water Divide
- Rock Outcrop
- Dirt Road
- A/C Paving
- Fence
- NPDES Outfall

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.

Legend

- EPA Water Infrastructure Line

SSFL Water Conveyance System

- Spray Fields

SSFL Water Infrastructure Conveyance System-Lines

- Fresh Process Water/Domestic Water Pipeline
- Reclaimed Water Inflow and Outflow
- Reclaimed Water Pipeline

All Chemicals Detect

- <= 1x LUTV or ML MRL
- 1x - 2x LUTV or ML MRL
- 2x - 10x LUTV or ML MRL
- 10x - 100x LUTV or ML MRL
- > 100x

All Chemicals ND

- <= 1x LUTV or ML MRL
- 1x - 2x LUTV or ML MRL
- 2x - 10x LUTV or ML MRL
- 10x - 100x LUTV or ML MRL
- > 100x

Area IV Soil Sample Locations within 15 feet of Water Conveyance Features

SANTA SUSANA FIELD LABORATORY

Path: T:\projects\rock3\Figures\HSA\HSA_Area1V_Soils within 15 Feet of Water.mxd

Date: 11/7/2013

1 inch = 342 feet

0 110 220 Feet

FIGURE 2

Northern Buffer Zone

Northern Buffer Zone

Subarea 3

Subarea 6

Subarea 5A

Subarea 5B

Subarea 5C

Subarea 5D North

Subarea 5D South

Subarea 8 North

Subarea 8 South

Area III

Area II

Area IV

Area III

Area II

Area III

ISI Storage

weather station

Test Stand #4

LH2 Pump House

GWTS

ECS #3

PDU

Passage

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
- Area IV HSA Subarea
- Existing Building or Structure
- Removed Building or Structure
- Ponds
- Excavated Area
- Backfilled Excavation Area
- Pipe
- Leach Field
- Drainage
- Lined Drainage
- Rock Outcrop
- Dirt Road
- A/C Paving
- Fence

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.

Legend

- EPA Gas Lines
- SSFL Natural Gas Lines

All Chemicals Detect

- <= 1x LUTV or ML MRL
- 1x - 2x LUTV or ML MRL
- 2x - 10x LUTV or ML MRL
- 10x - 100x LUTV or ML MRL
- > 100x

All Chemicals ND

- <= 1x LUTV or ML MRL
- 1x - 2x LUTV or ML MRL
- 2x - 10x LUTV or ML MRL
- 10x - 100x LUTV or ML MRL
- > 100x

Area IV Soil Sample Locations within 5 Feet of Natural Gas Pipelines

SANTA SUSANA FIELD LABORATORY

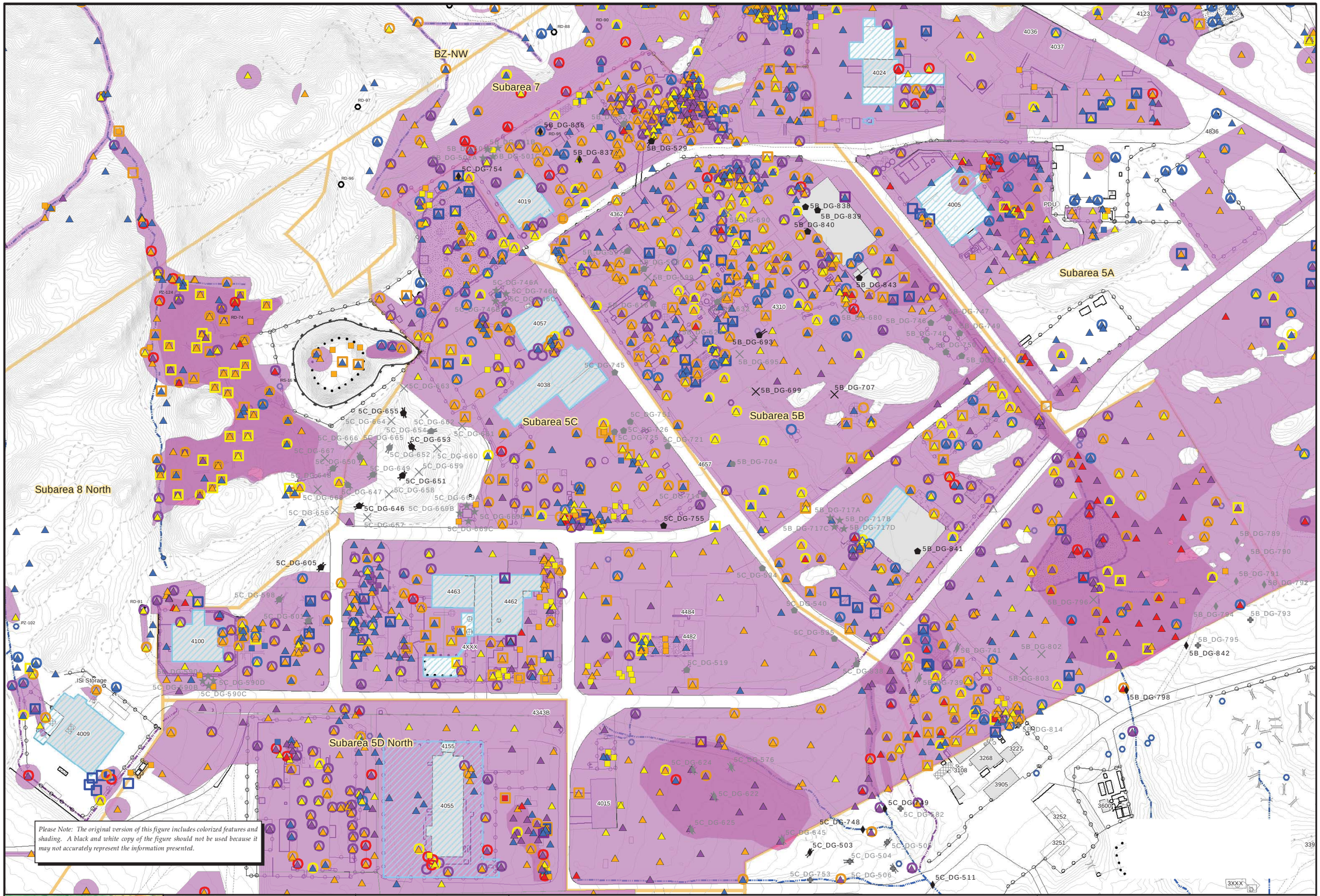
Path: T:\projects\rock3\Figures\HSA\HSA_Area1V_Soils within 5 Feet of Gas.mxd

Date: 11/7/2013

1 inch = 342 feet

0 110 220 Feet

FIGURE 3



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
- Area IV HSA Subarea
- Clearly Contaminated Areas
- DOE AOC Preliminary Remediation 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
- Elevation Contour

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.

TPH is represented by a color coded halo surrounding the combined analyte data symbol where analyzed. For locations where TPH was detected, the higher of the ratio of gasoline range TPH / LUT value or the sum of kerosene, diesel, and lubricant oil range TPH / LUT value was used; otherwise the higher of the ratio of gasoline range TPH MRL / LUT or sum of kerosene, diesel, and lubricant oil range TPH MRLs / LUT value was used and the location was symbolized as ND.

Proposed Area IV Data Gap Locations

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

Locations Not Planned for Implementation

- Add to Analytical Suite at Sample Location
- Future
- Reanalysis Sample Location (RLs)
- Other Targeted Sample Location
- Stepout/Stepdown Location
- Test Pit
- Tank Sample Location

TPH Detect / LUT Values: <= 1x LUT Values; 1x - 2x LUT Values; 2x - 10x LUT Values; 10x - 100x LUT Values; > 100x LUT Values

TPH ND/ LUT Values: <= 1x LUT Values; 1x - 2x LUT Values; 2x - 10x LUT Values; 10x - 100x LUT Values

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

Final Data Analysis Proposed Locations – Subareas 5B and 5C

SANTA SUSANA FIELD LABORATORY

Path: T:\projects\rock3\HSA\Working\HSA_5BandC_SoilMatrix_Proposed.mxd

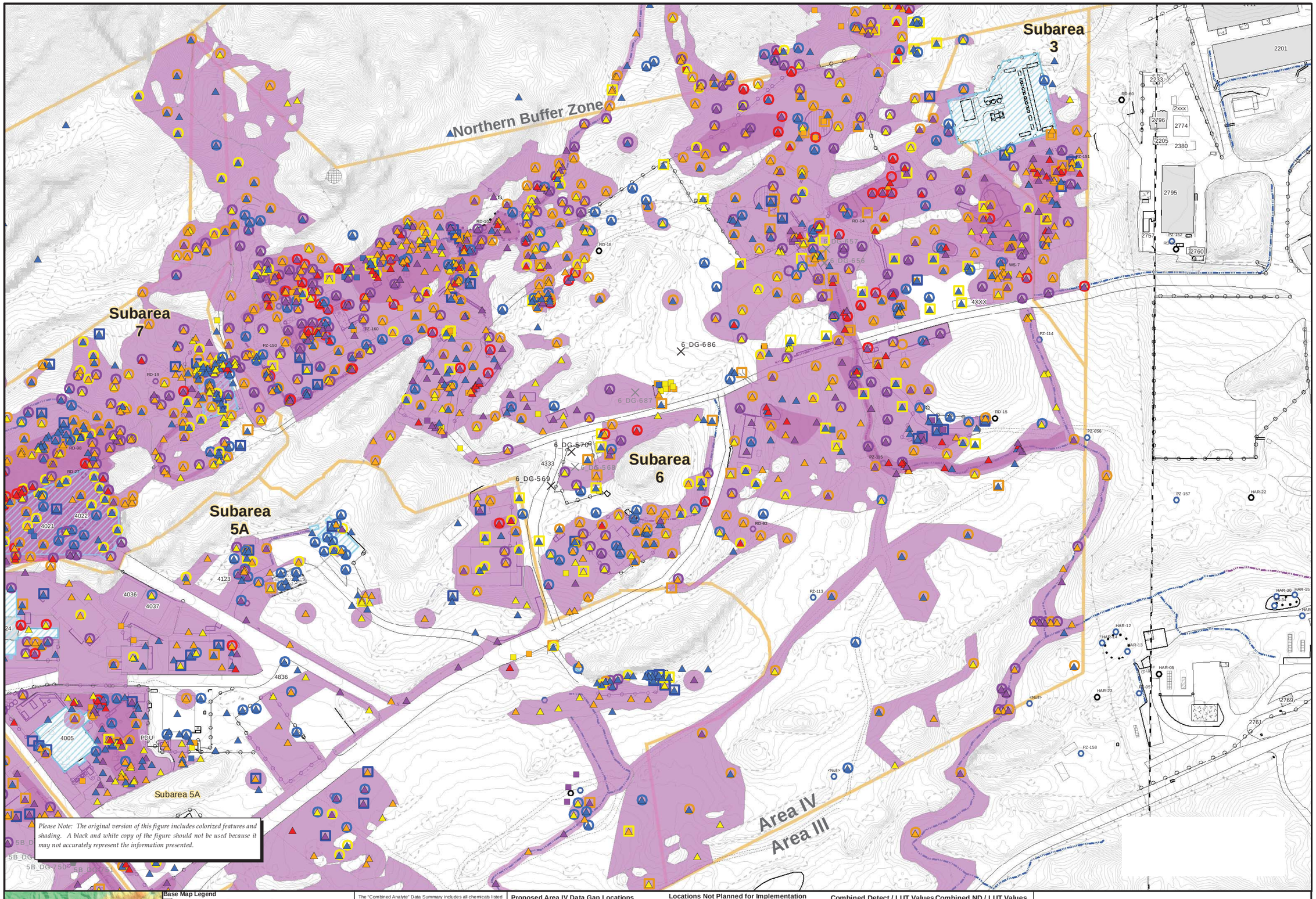
Date: 11/7/2013

1 inch = 125 feet

0 125 250 Feet

N

FIGURE 4



Base Map Legend

- Administrative Area Boundary
- Area IV HSA Subarea
- Clearly Contaminated Areas
- DOE AOC Preliminary Remediation 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
- Elevation Contour

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.

TPH is represented by a color coded halo surrounding the combined analyte data symbol where analyzed. For locations where TPH was detected, the higher of the ratio of gasoline range TPH / LUT value or the sum of kerosene, diesel, and lubricant oil range TPH / LUT value was used; otherwise the higher of the ratio of gasoline range TPH MRL / LUT or sum of kerosene, diesel, and lubricant oil range TPH MRLs / LUT value was used and the location was symbolized as ND.

Proposed Area IV Data Gap Locations

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

Locations Not Planned for Implementation

- Add to Analytical Suite at Sample Location
- Future
- Reanalysis Sample Location (RLs)
- Other Targeted Sample Location
- Stepout/Stepdown Location
- Test Pit
- Tank Sample Location

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

TPH Detect / LUT Values

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

TPH ND/ LUT Values

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

Final Data Analysis Proposed Locations – Subareas 3 and 6

SANTA SUSANA FIELD LABORATORY

Path: T:\projects\rock3\HSA\Working\Subarea 6 & 3\HSA_6_3_SoilMatrix_Proposed for Public Meeting.mxd

Date: 11/7/2013

1 inch = 150 feet

0 110 220 Feet

FIGURE 5

ATTACHMENTS

Attachment 2
AOC Look-up Table Values

Att 2 Chemical Look-Up Table for DOE and 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.