

Procedures for Locating and Clearing Phase 3 Samples

SSFL SOP 1
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Prepared: J. Sobol

Technical Review: C. Werden

QA Review: J. Oxford

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1.0 Objective

The objective of this technical standard operating procedure (SOP) is to describe the sample location and utility clearance protocols for the Phase 3 - Chemical Data Gap Investigation at the Santa Susana Field Laboratory (SSFL) site. Because this phase of investigation is targeted at minimizing data gaps in the understanding of the nature and extent of chemical contaminants in surface (0 to 0.5 foot) and subsurface (0.5 to 20 feet) soil, the precise location of each soil sample location is very important.

2.0 Background

2.1 Definitions

Data Gap Analysis—An analysis that identifies specific soil sample locations and depths for which insufficient data exists. The analysis is to minimize the data gap and ensure that collected data are representative of the study area. MWH, Inc. (MWH; under a separate agreement with Department of Energy [DOE]) is performing this effort.

Staked Location—Proposed sample location marked on the ground surface either with fluorescent paint (on concrete or asphalt), metal pins with fluorescent nylon whiskers, or wooden stakes marked with the sample location identifier installed at the exact sample locations identified through the MWH data gap analysis.

GPS— Global Positioning System that measures east-west and north-south coordinates of sample locations.

GeoExplorer 6000 Series Handheld Unit—GPS field unit used to survey proposed and actual sample locations.

Utility Locate—A survey of all proposed sample locations for underground utilities, including, but not limited to, water lines, sewer lines, storm sewer lines, gas lines, electric lines, and telecommunication lines. Performed by subcontractor.

Fisher TW-6-M-Scope Pipe and Cable Locator (or equivalent)—A field unit used to identify detectable electrically conductive conduits or piping which may have no surface expression.

Radiodetection RD4000 Utility Locator (or equivalent)—A field unit used to locate the surface trace of a variety of buried utilities.

Metrotech 50/60 Power Line Locator (or equivalent)—A field unit used to detect conduits that carry 60-cycle current.

3M Dynatel 2250 Cable Locator (or equivalent)—A field unit used to detect the surface trace of telephone and other narrow gauge wiring.

2.2 Associated Procedures

- SSFL SOP 2, *Surface Soil Sampling*
- SSFL SOP 3, *Subsurface Soil Sampling with Hand Auger*
- SSFL SOP 4, *Direct Push Technology (DPT) Sampling*
- SSFL SOP 5, *Backhoe Trenching/Test Pits for Sample Collection*
- SSFL SOP 6, *Field Measurement of Total Organic Vapor*
- SSFL SOP 7, *Field Measurement of Residual Radiation*
- SSFL SOP 8, *Field Data Collection Documents, Content, and Control*
- SSFL SOP 14, *Geophysical Survey*

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- SSFL SOP 16, *Control of Measurement and Test Equipment*

2.3 Discussion

Geographic Information System (GIS) sample location files will be received from MWH for field verification and those locations staked using global GPS location identification procedures. Office and field verification of GPS coordinates is necessary for determining the precise location of each sample point and to ensure the adequacy of signal strength of the GPS equipment. Inaccessible locations due to underground utilities, site geology, or that do not target the identified site will be assigned alternate locations by CDM Smith. Using GPS, site coordinate data will be collected at the alternative location and the updated surveyed location data will be electronically provided to MWH for updating the Area IV GIS. All proposed sample locations will be marked in the field using fluorescent paint, metal pins, or wooden stakes. Following MWH review of the relocated marked sample locations, CDM Smith will complete any additional required utility/geophysics clearances of the sample location and initiate sampling. In addition, protection of cultural and natural resources is an integral portion of locating sample points. Cultural, biological, and Native American monitors will be engaged throughout the process. Quality control measures will be implemented during GPS field collection and during post processing of confirmed or relocated sample locations.

3.0 General Responsibilities

Field Team Leader - The field team leader (FTL) is responsible for ensuring that field personnel collect soil and sediment samples in accordance with this SOP and other relevant procedures.

Site Health and Safety Technician— The person who will use field screening instruments to monitor all field activities for VOCs and radiological contaminants and pre-shipment sample coolers. This person is a trained radiological technician who works under the guidance of Science Application International Corporation's (SAIC's) Certified Health Physicist (CHP).

Site Geologist – The person responsible for attending sample location efforts and collecting and logging the soil sample.

Utility Locator Subcontractor – The subcontractor is responsible for identifying all buried utilities in the vicinity of soil borings, trenches, and test pits.

4.0 Required Equipment

4.1 General

- Site-specific plans (e.g., Field Sampling Plan [FSP] Addendum, health and safety)
- Mapping of proposed sample locations
- Mapping of known utilities
- Fluorescent paint and metal pins or wooden stakes
- Field logbook
- 2-way radios
- Monitoring and screening instruments per the health and safety plan
- 3M Dynatel 2250 Cable Locator (or equivalent) to detect the surface trace of telephone and other narrow gauge wiring
- Fisher TW-6-M-Scope Pipe and Cable Locator (or equivalent)
- Radiodetection RD4000 Utility Locator (or equivalent)
- Metrotech 50/60 Power Line Locator (or equivalent) to detect conduits that carry 60-cycle current
- GeoExplorer 6000 Series Handheld GPS Unit
- Sample rationale table (Table 1 of FSP Addendum)

5.0 Procedures

5.1 Field Staking

1. MWH provides specific data gap sample location information (i.e., GIS coordinates, map, and table) to CDM Smith for field use. The sample information includes:
 - Sample rationale (sampling objective)
 - Sample location
 - Depth interval
 - Analytical suite

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2. The figures showing proposed sample locations are provided to the cultural, biological, and Native American monitors in advance of field verification so they can review their records for any cultural or biological resources in the vicinity of the sampling areas.
3. A minimum of four working days advanced notice of field work is required for the cultural and biological resource reviews. CDM Smith will meet with the monitors to discuss concerns. Sample locations in areas of resource concern are reported back to CDM Smith and revised sample locations are discussed with DOE, the California Department of Toxic Substances Control (DTSC) and MWH.
4. Once all locations have been reviewed, the GIS sample location coordinates are loaded into the GPS (See Section 5.2) for field staking.
5. CDM Smith's Sample Location Team mobilizes to each proposed sampling location. This Team consists of:
 - CDM Smith's FTL/Geologist
 - CDM Smith Site Health and Safety Technician
 - Utility Location Technician
 - Science Applications International Corporation's (SAIC's) Archaeological/Cultural Resource Compliance representative
 - SAIC's Natural Resource Compliance representative
 - Native American monitor
6. The FTL locates each sample station using the GPS. The FTL verifies that the location addresses the sampling rationale stated for the location in the FSP Addendum (Table 1). If it does, the location is marked with fluorescent paint and metal pins with fluorescent nylon whiskers or wooden stakes at the precise GIS/GPS coordinates.
7. If the location is identified by the cultural, natural resource, or Native American monitor as a location of concern, they will demarcate restricted areas as necessary and determine the degree of support necessary for each sample location during the intrusive investigation (soil boring or excavation). Each proposed sample location is also preliminarily screened for radiation.
8. Once staked, the FTL will escort the subcontract utility locator (See Section 5.3) to clear all proposed sample locations for underground utilities. Samples locations affected by underground utilities will be noted, and an alternative location staked to avoid the utility. All adjusted sample locations will be reviewed with DOE, DTSC, and MWH; and the cultural and natural resource, and Native American monitors.
9. Proposed locations may be adjusted based on the following considerations:
 - sample locations that are impacted by overhead/underground utilities
 - sample locations that are impacted by steep or non-accessible terrain or exposed bedrock
 - sample locations that are impacted by archaeological/cultural resources
 - sample locations that are impacted by biological resources
 - sample locations that did not meet the intent of the MWH sample rationale
10. Using the final GPS coordinates, CDM Smith will provide the updated the sample location data to MWH for updating the Area IV GIS. A revised sample location map will be incorporated into the FSP Addendum and provided to DOE and DTSC.
11. DOE, DTSC, and MWH will have the opportunity to review all sample locations in the field and approve/accept the locations. Locations noted to be impacted or not meeting the intent of the sample collection rationale will be reviewed and direction will be provided to the FTL. Coordinates for adjusted samples locations will be immediately collected using the GPS unit and marked in the field as described above. Markers/paint of samples locations that will not be used will be destroyed at that time.
12. At each location, additional field-check of the sample location (coordinates) will be performed using the GPS unit at the time of sample collection.

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5.2 GPS Survey

5.2.1 General

The following equipment is required to load and use GPS waypoint data for field surveys.

- ESRI ArcGIS Software
- Trimble Pathfinder Office Software
- TerraSync Software
- GeoExplorer 6000 Series Handheld Unit

The procedure to load and use GPS data consists of:

1. Load 2009 U.S. Department of Agriculture (USDA) National Agricultural Imagery Program (NAIP) color imagery onto GPS with the Pathfinder Office data transfer utility
2. Prepare GPS unit for data logging based on Chapter 9 (Setup Section) in "TerraSync Software Getting Started Guide", which are as follows:
 - a. 2.0 meter antenna height
 - b. 30 positions logged and averaged for each collected sample location
 - c. Required accuracy < 1.0 meter
 - d. Quality of Global Navigation Satellite Systems (GNSS) positions logged will be controlled by the Trimble default "Smart Settings" referenced on page 181 of Chapter 9 of the Software Guide.

5.2.1 Method for Importing Sample Point Location Data

The following steps are used to load the data to the TerraSync software and should be done prior to navigating to a point (Chapters 5 and 6 of "TerraSync Software Getting Started Guide" can be referenced for further help):

1. Open TerraSync software on GPS unit and select 'Data' in the section list button
2. Tap 'Manager – Existing File'
3. Select 'MWH_SampleLoc.ssf'
4. Select 'Map' in the section list button
5. Tap 'Layers – Background Files'
6. Check the box next to 'SSFL_Aerial.sid' and return to map view
7. Current location is denoted by a red x and the points on the map represent the MWH chosen sample locations.

The following steps must be taken to navigate to a given point (Chapter 7 of "TerraSync Software Getting Started Guide" can be referenced for further help):

1. Walk toward the nearest sample location with the FSP Addendum mapping and aerial photo as a reference
2. Select the point with the 'select' tool from the map tool dropdown list
3. Tap 'Options – Set Nav Target'
4. Determine distance and bearing to target through the direction dial screen
5. A close-up screen will appear once target is within close proximity
6. Move toward the target and stop when the red x is within the center of the circle
7. Place the sample location pin or wooden stake at the base of the antenna

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5.2.2 Coordinate Collection for Revised Sample Locations

The following steps will be taken to survey revised sample locations where the proposed location was deemed inaccessible due to underground utilities or the presence of archaeological/cultural, natural resource, or Native American considerations. CDM Smith will determine an alternate location for the sample and the coordinate data set will be updated using the GPS unit (Chapter 6 of "TerraSync Software Getting Started Guide" can be reference for further help):

1. Select 'Data' in the section list button
2. Select 'Update' from the sub-section list button
3. Tap 'Options – Logging Options' and confirm it is set to 'Update Feature (Replace)'
4. Return to the update features screen and select the sample location you intend to modify from the 'Choose Feature' list

5.2.3 Quality Assurance/Quality Control

Proper operation of the GPS unit will be demonstrated prior to and at the conclusion of each day's field activity. The following two permanent survey control points located within the SSFL Area IV will used to confirm the accuracy of the GPS unit:

<u>Permanent Survey Control Point</u>	<u>Northing</u>	<u>Easting</u>	<u>Elevation</u>
Set 2x2 w/ MG Tag #1	1907959.668000	6346660.571000	1825.270
Set 2x2 w/ MG Tag #2	1909915.202000	6350452.377000	1854.230
Set 1-in Pipe w/ MG Plastic Cap #3	1906485.748000	6344437.803000	1870.060
Set 1-in Pipe w/ MG Plastic Cap #4	1905107.447000	6344791.648000	2134.570
Set 1-in Pipe w/ MG Plastic Cap #5	1908215.335000	6348977.693000	1816.780

At the beginning and end of day, the GPS unit will be positioned directly over the Control Point and the coordinates recorded in the GPS unit. The GPS coordinates will be compared to the above stated survey control point coordinates. If comparison of the coordinates is within the acceptable required accuracy (< 1.0 meter) of the instrument, the GPS unit is locating properly and this information will be recorded in the logbook. If the coordinates are outside of the acceptable required accuracy (< 1.0 meter), then the SSFL SOP 16 should be consulted. Generally, if any field equipment fails to operate properly or provides inaccurate results, the field work will be temporarily suspended and the concern will be entered on the calibration log form and field logbook (SSFL SOP 8). Work will not resume until proper calibration is achieved or replacement equipment is received.

5.3 Utility Location and Clearance

Prior to survey activities, all subcontractor equipment will be inspected by the FTL to ensure that the equipment meets Occupational Safety and Health Act (OSHA) or other contract or SSFL health and safety requirements. Following inspection, the utility locate survey will be conducted by the utility locator subcontractor:

1. Review GIS mapping of known utilities for utility types in vicinity of each proposed sampling location.
2. Using the geophysical instrumentation, search and mark on the ground the identified underground utilities, including, but not limited to, water lines, sewer lines, storm sewer lines, gas lines, electric lines, and telecommunication lines within a 10-foot radius of the sample location. Verify the proximity of any buried natural gas lines within 25-feet of the sampling point.
3. Search and mark, if identified, any anomalies representing potential subsurface structures or obstructions (such as, but not limited to, boulders, rebar, underground storage tanks, sinkholes, voids, buried artifacts, concrete pipes, etc.). Where possible, the concrete slab thickness shall also be estimated.

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4. Additional soil boring/test pit utility clearing of all locations within a 10-foot radius of an identified utility or anomaly. Any identified utilities and anomalies shall be marked on the ground surface, on a hand-drawn sketch, and on a scaled site map. **Note:** All test pit excavations require coordination and onsite oversight of the cultural, natural resource, and Native American monitors.
5. Provide field notes, hand-drawn sketches and scaled maps of each survey location to the FTL at the conclusion of each day. CDM Smith will make available to the subcontractor scaled base maps for the site.

All known surface and subsurface utilities located within the Area IV GIS will be used, in part, to determine the level of effort for clearing individual boring/test pit locations in (a) non-developed areas and (b) developed or previously developed areas or areas with known utilities. These areas and effort are discussed below.

5.3.1 Non-Developed Areas

The utility subcontractor will perform a reconnaissance survey of all areas that have no historic record of development and are absent of known utilities (as illustrated by the Area IV GIS). The subcontractor will physically inspect all or a portion of the area as necessary to provide assurance that the area does not contain utilities. The subcontractor will determine the identification method and effort necessary and communicate this information to the FTL prior to commencing of sampling activities in those areas. Following approval from the FTL or geologist, the utility subcontractor will clear soil boring/test pit locations. The utility subcontractor will mark utilities/features on the ground within the designated areas using a color code established by the American Public Works Association (and provided by the subcontractor).

5.3.2 Developed Areas and Areas with Know Utilities

In developed areas, the exteriors of the buildings, curbsides, streets, and/or land where building demolishing and dismantling activities have taken place, the utility subcontractor will visually inspect proposed sample/test pit locations for evidence of utilities. Exposed tracer wire or portions of metallic conduits and pipe will be used to conduct a signal with the instrument appropriate for a given type of utility. All utilities/features identified using conductive signals will be marked on the ground within the designated areas using a color code established by the American Public Works Association (and provided by the subcontractor).

The utility subcontractor will physically inspect all or a portion of the proposed sampling/test pit area as necessary to provide assurance that the area does not contain utilities and to identify any surface features (depressions, pits, trenches, etc.) or anomaly representing potential subsurface structures or obstructions (such as, but not limited to, boulders, rebar, underground storage tanks, voids, buried artifacts, concrete pipes, etc.).

For areas where soil borings are located within 10 feet, and test pits are within 50 feet, of an identified utility or identified subsurface features or anomaly, additional clearing of the soil boring/test pit location will be required. The utility subcontractor will provide additional clearing activities at these locations as described below.

Equipment/instruments that do not use an induced current via pipe/conduit/wire will be swept over the ground surface within the designated clearance area. The signals will be traced at the surface and the underground utility or features will be delineated.

At a minimum, two 20-foot transects that are perpendicular to each other will be run within the diameter of each survey area. The transects will be centered on the boring/test pit location. Any surface features and anomaly representing potential subsurface structures or obstructions shall be identified and marked as appropriate. Where possible, the concrete slab thickness shall also be estimated.

5.4 Onsite Equipment and Vehicle Requirements

All equipment will be cleaned prior to entering and leaving SSFL. Vehicles are restricted to asphalt roads and parking lots and will be free of leaks. If vehicles or any equipment is leaking it will be taken out of service immediately and the fluids will be contained. Under CDM Smith's direction, the subcontractor will immediately clean up any petroleum or hydrocarbon fluid spills. Boeing, DOE, and DTSC will be immediately notified of any spills at the site.

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6.0 Restrictions/Limitations

6.1 GPS Survey Instruments

External factors with the potential to degrade the quality of GPS data and the locating capabilities of the GPS are inherent within the GPS environment. A low signal to noise ratio (SNR), a high Position Dilution of Precision (PDOP), a multipath (GPS signal hits a physical barrier, thus reducing reflectivity), and a changing satellite constellation can all impact the quality of the GPS data. Because the equipment and logging settings are pre-determined for this project, inaccurate data due to the aforementioned external factors and potential human input errors should be minimized. The quality control procedures outlined in Section 5.2.3 will be followed to reduce GPS data quality issues/concerns.

7.0 References

National Geodetic Survey. 2012. "What We Do". <http://www.ngs.noaa.gov/INFO/WhatWeDo.shtml>

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