Sediment Sampling at Standing Water Sample Locations

SSFL SOP 19
Revision: 0
Date: July 2012

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1.0 Objective

The objective of this technical standard operating procedure (SOP) is to define the techniques and requirements for collecting sediment samples for environmental characterization purposes at standing water sample locations requiring sampling from a boat. The procedure is applicable to sampling of Silvernale Pond where water depths can exceed 5 feet.

2.0 Background

2.1 Definitions

Grab Sample - A discrete portion of sediment or an aliquot taken from a specific sample location at a given point in time.

Petite Ponar® Sampler- A stainless steel self-tripping sampler used to collected gravels, sands, silts, and clay sediment on the bottom of water bodies. Equipped with lowering cable and center-hinged jaws, the sampler has the potential to collect approximately 2.4 liters of sample volume per collection event.

Trowel - A small Teflon®, Teflon® -lined, stainless steel, or plastic disposable utensil measuring approximately 6 inches long with a stem-like handle (for manual operation) for sub-sampling from Ponar sampler. Samples are collected and combined using a scooping action.

Sediment - A naturally occurring material that is broken down by processes of weathering and erosion, and is subsequently transported by the action of wind, water, or ice, and/or by the force of gravity acting on the particle itself. For this sampling event, sediment will consist of the depth of material present on the pond bottom that can be retrieved using a sampling device. Organic material retrieved in the Petite Ponar® dredge sampler including seeds, leaves, grass, twigs, debris, wood, etc. will be removed from the sediment sample when possible.

2.2 Associated Procedures

- SSFL SOP 1*, Procedures for Locating and Clearing Phase 3 Samples*
- SSFL SOP 6, *Field Measurement of Total Organic Vapors*
- SSFL SOP 7, *Field Measurement of Residual Radiation*
- SSFL SOP 8, *Field Data Collection Documents, Content, and Control*
- SFSL SOP 9, *Lithologic Logging*
- SSFL SOP 10, *Sample Custody*
- SSFL SOP 11, *Packaging and Shipping Environmental Samples*
- SSFL SOP 12, *Field Equipment Decontamination*
- SSFL SOP 13, *Guide to Handling Investigation Derived Waste*
- SSFL SOP 15, *Photographic Documentation of Field Activities*
- SSFL SOP 16, *Control of Measurement and Test Equipment*

2.3 Discussion

Sediment samples will be collected to confirm and provide temporal data on the types(s) and level(s) of contamination in Silvernale Pond. Sediment at SSFL generally occurs in drainages that receive surface water runoff from operational areas or in natural or made-made depressions/ponds that make up the site's surface water control system. The Silvernale Pond is used for the collection of surface water from operational areas prior to its treatment. Depth of water in the pond during sampling is expected to be between 3 and 10 feet. The pond exists in a natural bedrock depression with the side slopes

potentially steep. Sampling will be conducted from a boat launched from a known shallow shore line. A review of boring logs from prior sampling of the pond indicate that sediment above bedrock can range 1 to 5 feet in thickness. The sampling event will involve sampling of the surface of the water sediment interface to a depth that the Petite Ponar® sampling tool can penetrate (expected to be about 3 inches).

This SOP addresses collection of pond sediment samples for chemical and radionuclide analyses. The US Environmental Protection Agency (EPA) and their consultant Hydrogeologic Inc. (HGL) will participate in the sampling and will be responsible for providing sample containers and sample requirements relative to radionuclide analyses.

3.0 General Responsibilities

Field Team Leader - The field team leader is responsible for ensuring that field personnel collect sediment samples in accordance with this SOP.

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

Site Health and Safety Technician– The person who will use field screening instruments to monitor all field activities for volatile 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).

4.0 Required Equipment

4.1 General-+

- Site-specific plans (e.g., Field Sampling Plan [FSP] Addendum, health and safety)
- Field logbook
- Appropriate sample containers for chemicals
- Appropriate sample containers for radionuclides
- Insulated cooler(s)
- Bags of ice
- Nitrile or appropriate gloves
- Clear, waterproof tape
- Indelible black ink pens and markers
- Stainless mixing bowls
- Global positioning system (GPS) unit
- Two-way radios
- Pond depth sounding line, marked at 6 inch intervals
- Monitoring/screening equipment per health and safety plan
- Personal protective clothing and equipment
- Plastic sheeting
- Plastic zip-top bags
- Chain-of-custody forms
- Custody seals
- Sample labels
- Decontamination supplies
- Kimwipes or paper towels
- Teflon squares and sleeve end caps
- Trash bags
- Disposable plastic spoons or knives
- Nylon lines to secure items in boat

4.2 Petite Ponar® Sampling

- Petite Ponar® sampler
- Sample messenger
- Cable
- Stainless steel or Teflon-lined pan (tray)

4.3 Trowel Subsampling

- Stainless steel, plastic or Teflon-lined trowel
- Measuring tape/ruler

4.4 Work Platform and Water Safety

- Rowboat with oars
- Anchor
- Approved personal flotation device
- Throw ropes, anchor line(s), floats

- Work table or cooler (appropriate sized)
- Launch area/ramp
- Whistle or air horn
- Rubber waders/boots

5.0 Procedures

5.1 Preparation – General

1. Review site-specific health and safety plan and FSP Addendum before initiating sampling activity.

2. Don the appropriate personal protective clothing as indicated in the site-specific health and safety plan.

3. Locate sampling location(s) in accordance with FSP Addendum and document pertinent information in the appropriate field logbook (SSFL SOP 8). Confirm GPS coordinates of each location (SSFL SOP 1).

4. Use clean, (decontaminated) sampling tools to obtain sample material from each specified sample location.

5. Pre-notify site personnel of date and time of sampling.

6. Assemble required support/buddy system and review communication system.

7 Review weather report and site conditions before launching or sampling near water bodies. Perform assessment and determine if sampling can safely be performed within expected sampling duration period.

8. The Site Health and Safety Technician will perform contaminant screening using hand-held instruments for each sample collected (SSFL SOPs 6 and 7*).* Contamination screening before sampling will not be performed if sediments are submerged. The sediment spoils and organic materials will be segregated to minimize cross-contamination. The breathing zone and excavated materials will be monitored continuously, if odors or measurable photoionization detector (PID) readings are observed. If levels are detected above health and safety plan action levels (HASP page 8), work will be temporarily discontinued. If radiation levels exceed two-times background levels (HASP page 8), the Department of Energy (DOE), The Boeing Company, and the California Department of Toxic Substances Control will be contacted. Site work will not resume at that location until further guidance is provided by DOE or The Boeing Company. Contact information is in the health and safety plan.

5.1.1 Rowboat

The following steps must be followed when sediment sampling from a rowboat:

1. Inspect and improve, as necessary, rowboat launch area/access ramp.

2. Set up decontamination equipment and area on shore.

3. Set up sampling preparation and packaging area.

4. Identify and set up throw-line anchor locations from accessible areas on the shore.

5. Install sample work table/cooler and health and safety equipment on rowboat.

6. Inspect oars and overall condition of the exterior, interior, and floor of the boat. Return boat to vendor if not pond-worthy.

7. Inspect equipment and personal protective equipment (PPE) and ensure operational condition.

8. Load equipment and distribute weight evenly to ensure accessibility and stable configuration, and prevent overturning rowboat during sampling.

5.1.2 Sampling Preparation

The following steps will be followed prior to sampling:

1. Inspect and improve, as necessary, boat ram access area.
2. Set up decontamination equipment and area on shore.
3. Set up health and safety equipment and area on shore.
4. Set up sampling preparation and packaging area on shore.
5. Inspect equipment and PPE to ensure operational condition.
6. For work along pond shoreline, probe pond bottom surface for stability using a "walking stick" with ¼-foot calibration demarcation, slowly probe sediment bottom for footing stability as needed for boat launching.

5.2 Sample Collection - General

The following general steps must be followed when collecting all sediment samples. Sediment samples will be preserved by placing the samples on ice.

1. Wear clean gloves during handling of sample containers and sampling devices. Change out gloves at each sampling location, or each time a new sample is to be collected, to avoid cross-contamination.
2. TPH, tritium, and carbon-14 samples that may be degraded by aeration will be collected first and with the least disturbance possible to minimize sample disturbance and consequently minimize analyte loss.
3. Using a weighted and marked sounding line, measure and record depth of water column near sample location.
4. After sample collection, the sediment lithology shall be described in accordance with SSFL SOP 9.
5. Specific sampling devices are identified in the FSP Addendum and will be recorded in the field logbook. Document any and all deviations from the SOPs and the sampling plan in the field logbook and include rationale for changes. See SSFL SOP 8 for guidance on entering information into field log books.
6. Care must be taken to prevent cross-contamination and misidentification of samples as described in subsequent subsections of this SOP.

5.2.1 Sediment Collection Using a Petite Ponar® Sampler

The following steps must be followed when collecting environmental sediment samples using a Petite Ponar® Sampler

1. Attach a clean piece of ½- to ¾-inch (12- to 19-mm) braided nylon line or Teflon-coated wire rope to the top of the Petite Ponar® sampler. The line must be long enough to reach the pond bottom to access sediment, and have enough slack to release the mechanism as well as secure the line to a fixed support. Mark the distance to the bottom (target depth) on the line.
2. Attach the free end of the sampling line to a fixed support to prevent loss of the sampler.
3. At the specified sampling location, open the sampler jaws and slowly lower the sampler until contact with the bottom (sediment) is felt.
4. Release tension on the line; allow sufficient slack for the mechanism (latch) to release. Slowly raise the sampler (to reduce disturbance of the collected sediment to the extent possible).

5. Once the sampler is above the water surface, place the sampler above a stainless steel or Teflon-lined tray or pan (sample pan) and open the sampler transferring the sediment to the sample pan.

6. Quickly screen the sample for volatiles and radiation (SSFL SOPs 6 and 7).

7. Immediately subsample for TPH using a sub-sampling tool and placement in an 8 ounce jar.

8. Proceed with additional sediment collection to obtain required sampling volumes as specified by the laboratory.

9. Record observations of the sediments per SSFL SOP 9.

10. After collecting all samples return remaining sediment from the sample pan back into the water column. Place plastic sheeting and gloves in garbage bag and transfer decontamination water to storage container as specified SSFL SOP 13.

11. Decontaminate all equipment between each sample in accordance with SSFL SOP 12.

12. Complete the field logbook entry and other forms, being sure to record all relevant information before leaving the sample location.

13. Properly package all samples for shipment and complete all necessary sample shipment documentation. Remand custody of samples to the appropriate personnel. See SSFL SOPs 10 and 11.

5.3 Collecting Sediment Samples for TPH Analysis

1. TPH samples will be collected using a sub-sampling tool directly from the contents of the Ponar dredge and placed in 8 ounce glass jars. TPH samples will be the first samples collected.

5.4 Method for Collecting Sediment Samples for Nonvolatile Organic or Inorganic Compound Analyses

The requirements for collecting samples of sediment for nonvolatile organic or inorganic analyses are as follows:

1. Use a clean Petite Ponar® sampler to collect targeted sediment. Several Petite Ponar® samples will be required to collect the necessary amount of sediment to satisfy the analytical protocol (refer to sampling rationale Table 1 in the FSP Addendum). Sediment from the Petite Ponar® sampler will be placed on a sample pan immediately after removal from the water column. Quickly screen the sample pan for presence of volatiles and radioactivity (SSFL SOPs 6 and 7).

2. Collect sub samples for chromium (Cr^{3+}) and/or hexavalent chrome (Cr^{6+}) and or pH from the center of the sample pan or stainless steel sleeve into a glass jar using a disposable plastic spoon or knife. Ensure that the soil that was in contact with the sample pan or sleeve is not collected in the jar.

3. Sediment from the sample pan will be placed in sample jars/baggies (radionuclide analyses) for the remaining nonvolatile parameters.

4. Wipe the sample containers with a clean paper towel or Kimwipe to remove any residual sediment from the sample container surface.

5. Fill out the sample label with the appropriate sample information (e.g., sample identification, date/time of sample collection, requested analyses) per FSP Addendum Table 1 and attach to sample sleeve.

6. Place sample containers in individual zip-top plastic bags and seal the bags. Place the bags onto ice in an insulated cooler

to maintain at 4 degrees Celsius (±2 degrees Celsius).

7. Decontaminate all non-disposable sampling equipment in accordance with SSFL SOP 12.

5.5 Method for Collecting Sediment Samples for Radionuclide Analyses

The requirements for collecting samples of sediment for radionuclide analyses by EPA/HGL are as follows:

1. Sediment samples from the Ponar sampler will be drained of free liquid prior to placement in baggies.
2. Wear new, clean gloves during handling of sample containers and sampling devices. Change out gloves at each sampling location, or each time a new sample is to be collected, to avoid cross-contamination.
3. After collecting chemical sediment samples, baggies provided by EPA/HGL will be filled with sediment from the Ponar sampler using a sub-sampling tool. Given the wet weight of the sediment, approximately 5 pounds of wet sediment will be collected. HGL will provide a scale to ensure required sample volume. Collection of several Petite Ponar® samples may be required to obtain the required sample volume for radionuclide analyses
4. Wipe the sample container with a clean paper towel or Kimwipe to remove any residual sediment from the sample container surface.
5. Fill out the sample label with the appropriate sample information (e.g., sample identification, date/time of sample collection, requested analyses) per EPA/HGL request and attach to sample baggie.
6. Place sample containers in individual zip-top plastic bags and seal the bags. Place the bags in an insulated cooler.
7. Decontaminate all non-disposable sampling equipment in accordance with SSFL SOP 12.
8. Complete Chain-of-Custody form provided by EPA/HGL and transfer the samples and CoC to EPA/HGL.

5.6 Method for Collecting Sediment Samples for Tritium or Carbon-14 Analyses

The requirements for collecting samples of sediment for tritium or Carbon-14 analyses are as follows:

1. When collecting grab samples for tritium or carbon-14 analysis, it is necessary to minimize sample disturbance and consequently minimize analyte loss.
2. Wear new, clean gloves during handling of sample containers and sampling devices. Change out gloves at each sampling location, or each time a new sample is to be collected, to avoid cross-contamination.
3. Use a sub-sampling tool to collect the sediment sample from a freshly retrieved Ponar sampler and place sample in container provided by EPA/HGL.
4. Wipe the sample container with a clean paper towel or Kimwipe to remove any residual sediment from the sample container surface.
6. Fill out the sample label with the appropriate sample information (e.g., sample identification, date/time of sample collection, requested analyses) per EPA/HGL request and attach to sample container.
7. Place sample containers in individual zip-top plastic bags and seal the bags. Place the bags in an insulated cooler.
8. Decontaminate all non-disposable sampling equipment in accordance with SSFL SOP 12.
9. Complete Chain-of-Custody form provided by EPA/HGL and transfer the samples and CoC to EPA/HGL

5.7 Sample Packing and Shipment

1. Store samples at 4 degrees Celsius (±2 degrees Celsius) until samples are delivered to the designated analytical laboratory.

2. Pack all samples per SSFL SOP 11 and/or laboratory requirements. Include properly completed documentation and affix signed and dated custody seals to the cooler lid. See SSFL SOP 10 for guidance on sample custody procedures.

5.8 Decontamination

1. Decontaminate all non-disposable sampling equipment in accordance with SSFL SOP 12.

2. Decontaminate all heavy equipment (rowboat) in accordance with SSFL SOP 12. A decontamination pad will be established at the pond shoreline for purposes of cleaning the boat prior to transfer back to vendor.

6.0 Restrictions/Limitations

Confirm with Boeing no utilities are present. Archeological and cultural resources as well as Native American cultural concerns will be cleared during the process of identifying sample locations.

Also, when grab sampling for TPH analysis or for analysis of any other compound(s) that may be degraded by aeration, it is necessary to minimize sample disturbance and analyte loss. The representativeness of a TPH grab sample is difficult to determine because the collected sample represents a single point, is not homogenized, and has been disturbed.

7.0 References

American Society for Testing and Materials. 1999. *Standard Test Method for Penetration Test and Split Barrel Sampling of Soils*. Standard Method D1586-99.

Murdoch, A. and S.D. MacKnight. 1991. Handbook of Techniques for Aquatic Sediment Sampling. CRC Press, Inc. 201 p.

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