SOP # SRC-OGDEN-04

Sediment Sampling

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1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide a standardized method for collecting sediment samples at hazardous waste sites. This SOP may be used by employees of USEPA Region 8, or contractors and subcontractors supporting USEPA Region 8 projects and tasks. Deviations from the procedures outlined in this document must be approved by the USEPA Region 8 Remedial Project Manager, Regional Toxicologist or On-Scene Coordinator prior to initiation of the sampling activity.

This standard operating procedure (SOP) is applicable to the collection of representative sediment samples. Analysis of sediment may be biological, chemical, or physical in nature and may be used to determine the following:

- toxicity
- biological availability and effects of contaminants
- benthic biota
- extent and magnitude of contamination
- contaminant migration pathway and potential source
- fate of contaminants
- grain size distribution

The methodologies discussed in this SOP are applicable to the sampling of sediment in both flowing and standing water. For the purposes of this procedure, sediments are those mineral and organic materials situated beneath an aqueous layer. The water may be static, as in lakes, ponds, and impoundments; or flowing, as in rivers and streams.

2.0 RESPONSIBILITIES

The Field Project Leader (FPL) may be an USEPA employee or contractor who is responsible for overseeing the sediment sampling activities. The FPL is also responsible for checking all work performed and verifying that the work satisfies the specific tasks outlined by this SOP and the Project Plan. It is the responsibility of the FPL to communicate with the Field Personnel regarding specific collection objectives and anticipated situations that require any deviation from the Project Plan. It is also the responsibility of the FPL to communicate the need for any deviations from the Project Plan with the appropriate USEPA Region 8 personnel (Remedial Project Manager, Regional Toxicologist or On-Scene Coordinator).

Field personnel performing sediment sampling are responsible for adhering to the applicable tasks outlined in this procedure while collecting samples.

3. 0 EQUIPMENT

- Ponar dredge - used for collecting sediment samples

- Sample coring device - used for collecting sediment samples designated for volatile organic compounds (VOCs) analysis or toxicity testing. Must have removable Teflon sleeve

- Nylon rope or steel cable - for raising and lowering the dredge
- Collection containers - 4-oz., 8-oz., and one-quart wide mouth amber glass jars with Teflon lined lids. Samples designated for VOC analysis or toxicity testing must be submitted in the teflon sleeve used for collection
- Gloves - for personal protection and to prevent cross-contamination of samples. May be plastic or latex. Disposable, powderless.
- Field clothing and Personal Protective Equipment - as specified in the Health and Safety Plan.
- Sampling flags - Used for identifying sediment sampling locations.
- Field notebook -a bound book used to record progress of sampling effort and record any problems and field observations during sampling.
- Three-ring binder book- to store necessary forms used to record and track samples collected at the site. Binders will contain the Sediment Data Sheet, Site Diagram, and sample labels for each day. Example forms are provided in Attachment 1.
- Permanent marking pen - used to mark soil boring tubes and for documentation of field logbooks and data sheets.
- Stainless Steel lab spoon - or equivalent. Used for homogenizing sediment samples that will not be used for VOCs analysis or toxicity testing
- Stainless Steel Buckets - used for compositing samples that will not be used for VOCs analysis or toxicity testing. Must have 10 - 12 liter capacity
- Trash Bag - used to dispose of gloves and any other non-hazardous waste generated during sampling

4.0 METHOD SUMMARY

Sediment is collected from beneath an aqueous layer using a Ponar dredge or sample coring device. A Ponar dredge is a heavyweight sediment sampling device with weighted jaws that are lever or spring activated. It is used to collect consolidated fine to coarse textured sediment. Section 5.1 describes the procedure for collecting sediment with a Ponar dredge. Following collection, the sample is mixed and homogenized according to the procedure described in Section 5.1. The sediment is then transferred from the mixing bucket to a 8 oz. amber glass jar.

Samples designated for VOC analysis or toxicity testing must be collected with a sample coring device equipped with a removable Teflon sleeve that can be capped immediately following collection, and

submitted directly to the analytical or toxicity testing laboratory. The procedure for collecting sediment samples with a coring device is described in Section 5.2.

5.0 SAMPLE COLLECTION PROCEDURE

A new pair of plastic gloves are to be worn at each sampling location. Each sampling location must be recorded on the site diagram prior to collecting the sample. All sampling equipment must be decontaminated prior to use.

5.1 Collection with a Ponar Dredge

Attach a sturdy nylon rope or steel cable to the ring provided on top of the dredge. Arrange the Ponar dredge with jaws in the open position, setting the trip bar so that the sampler remains open when lifted from the top. If the dredge is so equipped, place the spring loaded pin into the aligned holes in the trip bar. Slowly lower the sampler to a point approximately two inches above the sediment. Drop the sampler to the sediment. Slack on the line will release the trip bar or spring loaded pin; pull up sharply on the line, closing the dredge. Raise the dredge to the surface and slowly decant any free liquid through the screens on top of the dredge. Care should be taken to retain the fine sediment fraction during this operation.

Open the dredge and transfer the sediment to a stainless steel or teflon compositing container (bowl). If necessary, repeat the collection procedure until sufficient material has been collected. Homogenize the sample by mixing with a stainless steel lab spoon or equivalent, then transfer the sample to an amber glass jar. When splitting sediment samples, continuous mixing may be required to maintain homogeneity, and to avoid the settling of larger sediment fractions in the bottom of the compositing bowl. Affix one sample ID label to each container and one label to the Field Data Sheet.

5.2 Collection with a Coring Device

Sediment designated for VOC analysis or toxicity testing must be collected with a sampling system consisting of a tube sampler, removable Teflon tube, ‘eggshell’ check valve, nosecone, extensions, and a “T” handle or drivehead. The use of additional extensions can increase the depth of water from which sediment can be collected from 24 inches to 10 feet or more, but sample handling and manipulation become more difficult as the depth of water increases. This sampler can be used with either a “T” handle for soft sediment, or a drivehammer for firm sediment.

Assemble the coring device by inserting the Teflon core into the sampling tube. Insert the “eggshell” check valve into the lower end of the sampling tube with the convex surface positioned inside the bottom of the Teflon tube. Screw the nosecone onto the lower end of the sampling tube, securing the Teflon tube and the check valve. Crew the “t” handle onto the upper end of the sampling tube, and add extension rods, as needed. Position the sampler perpendicular to the sediment being sampled.

If the “T” handle is used, collect the sample by pressing down on the sampling device until the desired depth is achieved. After reaching the desired depth, rotate the sampler to shear off the bottom of the sediment core. Slowly withdraw the sampler from the sediment, and decant the surface water, using care to retain the fine sediment fraction. Unscrew the nosecone and remove the eggshell check valve. Slide the Teflon core out of the sampler tube. If there is headspace in the upper end of the sediment core, use a hacksaw to shear off the Teflon tubing at the sediment surface. To minimize the potential for

volatilization of certain compounds of interest, samples designated for VOC analysis or toxicity testing must not have any space present between the sediment core and the end of the teflon sleeve.

If the drive hammer is used, insert the tapered handle (drive head) through the top of the sampler. Drive the sampler into the sediment to the desired depth, and rotate the sampler to shear off the bottom of the sediment core. Slowly withdraw the sampler from the sediment, and decant the surface water, using care to retain the fine sediment fraction. Unscrew the nosecone and remove the eggshell check valve. Slide the Teflon core out of the sampler tube. If there is headspace in the upper end of the sediment core, use a hacksaw to shear off the Teflon tubing at the sediment surface.

Cap both ends of the core, and use a water proof pen to indicate the orientation of the sediment core. Affix one sample identification label to the core and one label to the Field Data Sheet. Immediately place the sample on ice for transport to the analytical laboratory.

6.0 HEALTH AND SAFETY

All field personnel must wear protective clothing and equipment as specified in the Health and Safety Plan. When sampling from waterbodies, physical hazards must be identified, and adequate precautions must be taken to ensure the safety of the sampling team. The team member collecting the samples should stay away from the edge of the waterbody, where bank failure may cause loss of balance. When collecting samples near the edge of waterbodies, personnel must wear a lifeline. All sampling personnel must wear personal flotation devices (life vests). If sampling from a boat, appropriate protective measures must be implemented.

7.0 SAMPLE CONTAINERS AND LABELING

Following the procedures outlined in Section 5.0, sediment is collected and then homogenized using a spoon and mixing bowl or bucket. Prior to homogenization, a portion is removed and transferred immediately to a volatile organic analysis sample container (VOA vial). The remainder of the sample is poured into appropriate sample containers. For each sample, two sample identification labels are required. One label is placed on the Field Data Sheet, and the other label is affixed to the sample container.

Sample labeling will occur as prescribed below:

1) Place a pre-printed label onto the sample collection container (See Project Plan for appropriate containers).
2) Place a pre-printed label onto the Field Data Sheet.
3) This procedure will be repeated for each sample collected using clean sample containers and unique sample ID numbers.

All samples should be stored on wet ice (4°C) in a secured cooler. Samples designated for VOC analysis or toxicity testing must be kept away from direct sunlight and immediately chilled to 4°C. Ship samples under chain- of-custody, protected with suitable resilient packing material to reduce shock, vibration, and disturbance.

8.0 SITE CLEAN-UP

Excess sediment not included in the sample should be washed into the stream, pond, lake, or surface impoundment where it came from. All marker flags (if reused) should be decontaminated by wiping off with towels and/or baby wipes before re-use.

Throw all used wipes and gloves into the trash bags and take with you to dispose of at the field office.

9.0 RECORD KEEPING AND QUALITY CONTROL

Field personnel should collect the number and type of quality control sample as described in the Quality Assurance Project Plan. Each field crew will carry a three-ring binder book that contains field data sheets, site diagrams, and sample labels. In addition, a field notebook should be maintained by each individual or team that is collecting samples, as described in the Project Plan. Each sampling location must be recorded on the site diagram. Each sample should have an ID number affixed to the outside of the collection container, and the duplicate label must be affixed to the Field Data Sheet. Deviations from this sampling plan should be noted in the field notebook, as necessary.

For each location, the notebook information must include:

a. date
b. time
c. personnel
d. weather conditions
e. sample identification numbers that were used
f. descriptions of any deviations to the Project Plan and the reason for the deviation

Samples taken from waters with visible color abnormalities, foaming, unusual odor, iridescent film, or other indications of non-homogeneous conditions should also be noted. Field personnel will collect the proper type and quantity of quality control samples as prescribed in the Project Plan.

10.0 DECONTAMINATION

Because decontamination procedures are time consuming, having a quantity of sampling tools available is recommended. All sampling equipment must be decontaminated prior to reuse as prescribed in the Project Plan.

Equipment decontamination will consist of the following 5 steps:

1) Detergent Wash
2) Tap water rinse
3) Acetone rinse
4) Deionized water rinse
5) Air Dry

11.0 GLOSSARY

Project Plan - A written document that spells out the detailed site-specific procedures to be followed by the FPL and the field personnel. In this case, the Project Plan consists of the Phase 3 Sampling and Analysis Plan.

12.0 REFERENCES

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