WASTE PILE SAMPLING

CONTENTS

* These sections affected by Revision 0.1

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WASTE PILE SAMPLING

1.0 SCOPE AND APPLICATION

The objective of this standard operating procedure (SOP) is to outline the equipment and methods used in collecting representative samples from waste piles, sludges, or other solid or liquid waste mixed with soil.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent on site conditions, equipment limitations or other procedure limitations. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute United States Environmental Protection Agency (U.S. EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Shovels, trowels, or scoops constructed of appropriate materials should be used to clear away surface material and debris before samples are collected. For depth samples, a decontaminated auger may be used to advance the hole, and then another decontaminated auger is used for sample collection. For sample cores, thin-wall tube samplers are used. Near-surfaces samples can be collected with clean spoons or trowels.

All samples collected, except those for volatile organic compounds (VOCs), must be placed into inert containers that will not react with the contaminants, or interfere with the analyses (e.g., Teflon®-lined or stainless steel) and mixed thoroughly before sample aliquots are transferred to appropriate sample container(s).

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of solids is generally not recommended. Refrigeration to 4 degrees Celsius (^{O}C) is usually the best approach, supplemented by a minimal holding time, depending on contaminants of concern.

Wide-mouth glass containers with Teflon-lined caps are typically used for waste pile samples. The volume of sample required is a function of the analytical requirements and should be specified in the site-specific Work Plan (WP).

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

There are several variables involved in waste sampling, including shape and size of piles, compactness, and structure of the waste material. Waste material or waste piles vary greatly in areal extent and height. Since Federal and State regulations or protocols often require a specified

number of samples per volume of waste, the size and shape must be used to calculate volume and to plan for the correct number of samples. Shape must also be accounted for when planning physical access to the sampling point and the equipment necessary to successfully collect the sample at that location.

Material to be sampled may be homogeneous or heterogeneous. Homogeneous material resulting from known situations may not require an extensive sampling protocol. Heterogeneous and unknown wastes require more extensive sampling and analysis to ensure the different components (i.e. layers, strata) are being represented.

The term "representative sample" is commonly used to denote a sample that has the properties and composition of the waste pile area from which it was collected. The usual options for obtaining the most "representative sample" from waste piles are simple random sampling or stratified random sampling. Simple random sampling is the method of choice unless: (1) there are known distinct strata; (2) one wants to prove or disprove that there are distinct strata; or (3) one is limited in the number of samples and wants to statistically minimize the size of a "hot spot" that could go unsampled. If any of these conditions exist, stratified random sampling would be chosen.

Stratified random sampling can be employed only if all points within the pile can be accessed. In such cases, the pile should be divided into a three-dimensional grid system. The grid cubes should be numbered, and the grid cubes to be sampled should be chosen by random number tables or generators. The only exceptions to this are situations in which representative samples cannot be collected safely or where the investigative team is trying to determine worst case conditions.

If sampling is limited to certain portions of the waste pile, a statistically-based sample will be representative only of that portion, unless the waste is homogenous.

5.0 EQUIPMENT/APPARATUS

Waste pile solids may include powdered, granular, or block materials of various sizes, shapes, structure, and compactness. The type of sampler chosen and the construction of the sampler should be compatible with the waste. Samplers commonly used for waste piles include: scoops, shovels, trowels, spoons, and hand augers, typically constructed of stainless steel, plastic or Teflon.

Waste pile sampling equipment check list:

- Sampling plan
- Maps/plot plan
- Safety equipment, as specified in the Health and Safety Plan (HASP)
- Compass

- Tape measure
- Survey stakes or flags
- Camera and film, or suitable recording media
- Homogenization bucket or bowl, constructed of appropriate material
- Appropriate size sample jars
- Canvas or plastic sheet
- Spade or shovel
- Spatula
- Scoop
- Plastic or stainless steel spoons
- Trowel
- Continuous flight (screw) augers
- Bucket auger
- Post hole auger
- Extension rods
- T-Handle
- Thin-wall tube sampler with cutting tips
- Sampling trier
- Grain sampler
- Re-sealable plastic bags (e.g., Ziploc)
- Logbook
- Labels
- Chain of Custody records and seals
- Field data sheets
- Cooler(s)
- Ice
- Paper towels
- Decontamination supplies/equipment

6.0 REAGENTS

No chemical reagents are used for the preservation of waste pile samples; however, decontamination solutions may be required. If decontamination of equipment is required, refer to Environmental Response Team/Scientific, Engineering, Response and Analytical Services (ERTSERAS) SOP #2006, *Sampling Equipment Decontamination*, and the site-specific WP.

7.0 PROCEDURES

7.1 Preparation

1. Review all information available on expected or unknown contaminants.

2. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies required.

3. Obtain necessary sampling and monitoring equipment.

4. Decontaminate or pre-clean equipment, and ensure that it is in working order.

5. Prepare schedules, and coordinate with staff, client, and regulatory agencies, if appropriate.

6. Perform a general site survey prior to site entry in accordance with the site-specific HASP.

7. To collect a representative sample, measure the waste pile dimensions, and divide it into a number of equal sections, from which a sample will be collected, or use a random sampling scheme to determine the sample locations.

8. Use stakes or flagging to identify and mark all sampling locations. Specific site factors, including extent and nature of contaminant(s) should be considered when selecting sample locations. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions.

7.2 Sample Collection

7.2.1 Sampling with Shovels and Scoops

Collection of samples from surface portions of the pile can be accomplished with tools such as spades, shovels, and scoops. Surface material can be removed to the required depth with this equipment, and then a scoop, or equivalent can be used to collect the sample.

Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by sample team members. Use of a flat, pointed mason trowel to cut a block of the desired material can be helpful when undisturbed profiles are required. A stainless steel scoop, lab spoon, plastic spoon, or equivalent will suffice in most other applications. Care should be exercised to avoid the use of devices plated with chrome or other materials. Plating is particularly common with implements such as garden trowels.

The following procedure is used to collect the surface samples:

1. Carefully remove the top layer of material to the desired sample depth with a pre-cleaned spade.

2. Using a pre-cleaned scoop, spoon, trowel, or equivalent, remove and discard a thin layer of material from the area which came in contact with the spade.

3. If VOCs are to be determined, transfer the sample into an appropriately labeled sample container with a clean lab spoon, or equivalent, and secure the cap tightly. Place the remainder of the sample into an appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Transfer the sample into appropriately labeled containers and secure the caps tightly.

4. If composite samples are to be collected, place sample aliquots into a homogenization container and mix thoroughly. When compositing is complete, transfer the sample into appropriately labeled containers and secure the caps tightly.

7.2.2 Sampling with Bucket Augers and Thin-Wall Tube Samplers

These samplers consist of a series of extensions, a "T" handle, and a bucket auger or thin-wall tube sampler (Figure 1, Appendix A). The auger is used to bore a hole to a desired sampling depth, and is then withdrawn. The sample may be collected directly from the bucket auger. If a core sample is to be collected, the auger tip is then replaced with a thin-wall tube sampler. The sampler is then lowered down the borehole, and driven into the pile to the completion depth. The sampler is withdrawn and the core collected from the thin-wall tube sampler.

Several augers are available. These include: bucket, continuous flight (screw), and post hole augers. Bucket augers are better for direct sample recovery since they provide a large volume of sample in a short time. When continuous flight augers are used, the sample can be collected directly from the flights, which are usually available in five (5) foot intervals. The continuous flight augers are satisfactory for use when a composite of the complete waste pile column is desired. Post hole augers have limited utility for waste pile sampling as they are designed to cut through fibrous, rooted, swampy areas.

The following procedure will be used for collecting waste pile samples with the bucket augers and thin-wall tube samplers:

1. Attach the auger bit and the extension(s) to the "T" handle.

2. Clear the area to be sampled of any surface debris. It may be advisable

to remove the first three to six inches of surface material for an area approximately six inches in radius around the sample location.

3. Begin augering, periodically removing and depositing accumulated materials onto a plastic sheet spread near the hole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding extensions. It also facilitates refilling the hole, and avoids possible contamination of the surrounding area.

4. After reaching the desired depth, slowly and carefully remove the auger from the borehole. When sampling directly from the auger, collect the sample after the auger is removed from the borehole and proceed to Step 10.

5. Remove auger tip from extension rods and replace with a pre-cleaned thin-wall tube sampler. Install proper cutting tip.

6. Carefully lower the tube sampler down the borehole. Gradually force the tube sampler into the pile. Care should be taken to avoid scraping the borehole sides. Avoid hammering to facilitate coring, as the vibrations may cause the borehole walls to collapse.

7. Remove the tube sampler, and unscrew the drill rod extensions.

8. Remove the cutting tip and the thin-wall tube sampler.

9. Discard the top of the core (approximately one-inch), as this represents material collected before penetration into the layer of concern. Place the remaining core into the appropriately labeled sample container. Sample homogenization is not required.

10. If VOCs are to be determined, transfer the sample into an appropriate labeled sample container with a lab spoon, or equivalent, and secure the cap tightly. Place the remainder of the sample into an appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Transfer the sample into appropriately labeled container(s) and secure the caps tightly.

11. If composite samples are to be collected, place sample aliquots into the homogenization container and mix thoroughly. When compositing is complete, transfer the sample into appropriately labeled container(s) and secure the caps tightly.

12. If another sample is to be collected from the same hole, but at a greater depth, re-attach the bucket auger to the extension and "T" handle assembly, and follow Steps 3 through 11, making sure to decontaminate the bucket auger and thin-wall tube sampler between samples.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All equipment and instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the site-specific WP. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, Occupational Safety and Health Administration (OSHA) and corporate health and safety procedures.

12.0 REFERENCES

United States Environmental Protection Agency. Office of Solid Waste and Emergency Response. 1986. *Test Methods for Evaluating Solids Waste (SW-846)*, 3rd ed., Vol. II. Field Manual.

United States Environmental Protection Agency, Engineering Support Branch, Region IV. 1986. *Standard Operating Procedures and Quality Assurance Manual.*

New Jersey Department of Environmental Protection. 1992. *Field Sampling Procedures Manual.*

13.0 APPENDICES

APPENDIX A
Figures
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FIGURE 1. Sampling Augers