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| CP3-ES-0038<br>FRev. 1 | **TITLE**:<br>Sampling Non-Fissile Material | Page 1 of 20 |
|---|---|---|
| **DOCUMENT CATEGORY**: Technical | | |
| **LEVEL OF USE**: ☒ Reference Level ☐ Continuous Use | | |
| **FUNCTIONAL AREA**:<br>Characterization (Sampling/Lab)<br>**SUBJECT MATTER AREA:**<br>Characterization | **SUBJECT MATTER EXPERT**:<br>Chris Skinner, Characterization Field Lead | |
| **NUCLEAR SAFETY REVIEW DOCUMENTATION**:<br>FRNP-23-0265-S | **APPROVED BY/DATE** (Signature on file):<br>Kelly Layne, Laboratory/ Characterization Manager<br>4/17/2023 | |
| **REQUIRED REVIEW DATE** (or expiration date for temporary change):<br>4/17/2026 | **EFFECTIVE DATE**:<br>4/18/2023 | |

**REVISION/CHANGE LOG**

| Revision/Change Letter | Description of Changes | Pages Affected | Date of Revision/Change |
|---|---|---|---|
| FR0 | Revision- Procedure was initially CP4-ES-0038 but is used by multiple functional areas so is being revised to a CP3 procedure. Change reference CP4-ES-2708 to CP3-ES-2708 and added section (6.5) to include Collection of Liquid Samples using Peristaltic Pump Sampling. | All | 3/29/2022 |
| FR0A | Periodic Review has been completed with no changes identified in procedure technical content. Nonintent change to FA, SMA, SME, Approver and dates has been incorporated per CP3-NS-2001. Date for review cycle has been reset. | All | 9/27/2022 |
| FR1 | General Revision to address multiple comments | All | 4/17/2023 |

## TABLE OF CONTENTS

## 1.0 PURPOSE AND SCOPE

### 1.1 Purpose

This procedure describes methods for the sampling of non-fissile material.

### 1.2 Scope

This procedure shall be used by the Deactivation & Remediation (D&R) contractor personnel, and subcontractor personnel for sampling of non-fissile material at the U.S. Department of Energy (DOE) owned Paducah site.

## 2.0 REFERENCES

### 2.1 Use References

- CP2-ES-0006, *Environmental Monitoring Plan Fiscal Year 2023 Paducah Gaseous Diffusion Plant, Paducah Kentycky*
- CP3-EN-0227, *Trenching, Excavation and Penetration Permit*
- CP3-ES-0043*, Temperature Control for Sample Storage*
- CP3-ES-1034, *Nuclear Criticality Safety Requirements for Sample Labeling, Handling, and Assay Smears*
- CP3-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*
- CP3-HS-2055, *Confined Space*
- CP3-WM-1017, *Safe Handling and Opening of Sealed Containers*
- CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*
- CP3-WM-3015, *Waste Packaging*
- CP3-WM-9503, *Off-Site Shipments by Air Transport*
- CP4-ES-0040, *Composite Sampling*
- CP4-ES-0109, *Calibration and Preventative Maintenance of Laboratory Equipment*
- CP4-ES-2700, *Logbooks and Data Forms*
- CP4-ES-2702, *Decontamination of Sampling Equipment and Devices*
- CP4-ES-2704, *Trip, Equipment, and Field Blank Preparation*
- CP5-TS-1000, *Per- and Polyfluoroalkyl Substances Sampling Guidelines*

### 2.2 Source References

- CP2-HS-2000, *Worker Safety and Health Program for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*
- CP3-SM-0003, *Use of High Efficiency Filter Equipped Vacuum Cleaners*
- CP3-SM-0004, *Operation of 1000 and 2000 CFM Negative Air Machines*

- EPA/540/P-87/001, December 1987. *A Compendium of Superfund Field Operations Methods, U.S. Environmental Protection Agency, OSWER Directive 9355.0-14*
- JHA-11236, *Opening, Sampling, and Handling Containerized Waste and Non-Containerized Waste.*
- U.S. EPA, SESDPLAN-001 R5, *Field Branches Quality Management Plan,* May 20, 2013.
- U.S. EPA, SESDPLCY-001 R4, *Field Branches Quality Policy,* August 23, 2011.
- Solid Waste Permit Number SW07300015, SW07300045, SW07300014:
  - Residential Landfill – Special Condition 3 – ACTV0004
  - Contained Landfill – Special Condition 1 – ACTV0006
- Hazardous Waste Management Facility Permit KY8-890-008-982
  - Appendix I2 C-404 Landfill Postclosure Plan

## 3.0 COMMITMENTS

None

## 4.0 PRECAUTIONS AND LIMITATIONS

### 4.1 Precautions

**4.1.1** **When** opening waste containers **and** performing all sampling activities, **then** at least two workers will be present at all times.

**4.1.2** **If** the container contents are **NOT** as expected, **then** the container shall be closed immediately and frontline supervision and Industrial Safety (IS)/Industrial Hygiene (IH) shall be contacted.

**WARNING:**

Containers with contents that have the potential to be pressurized can pose hazards (for example, fire or explosions) that may require immediate action and notification to the Plant Shift Superintendent (PSS). Containers may rupture without any warning and result in personnel injury, equipment or facility damage, or environmental contamination. **If** material containers are observed to be leaking or over pressurized, **then** the PSS shall be notified upon detection.

**4.1.3** **If** material in containers is incompatible, **then** only one container will be opened and sampled at any time or specified by SAEP.

**4.1.4** A two-way radio and/or cell phone shall be kept at the sampling site during any sampling event for communication purposes and **when** working in facilities or areas that may contain a potentially explosive atmosphere, **then** only intrinsically safe radios, cell phones, etc. shall be used.

**4.1.5** Non-sparking tools shall be used to open and close metal waste containers containing flammable/combustible waste.

**4.1.6** IH and Radiological Control (RADCON) will review Radiological Work Permit (RWP) and other documents before opening any containerized waste or sampling-non containerized waste to determine proper Personal Protective Equipment (PPE), respiratory protection, and IH sampling required. IH controls and PPE will be documented on a task-specific Job Hazard Analysis (JHA) or Industrial Hygiene Work Permit (IHWP) if required.

**4.1.7** Containers shall be staged prior to opening for easy access.

**4.1.8** **When** necessary, **then** the ground shall be covered with cloth or other nonskid material to eliminate or reduce a slipping hazard.

**4.1.9** Standing or climbing on containers shall **NOT** be permitted for any sampling activity.

**4.1.10** **If** a waste container (that is, drum or bucket) must be handled in any way, **then** a forklift, drum cart, drum dolly, or other approved means shall be used to handle container movement.

**4.1.11** **If** there is a likelihood for the boots to be splashed with waste material, **then** boot covers shall be worn.

**4.1.12** **When** opening waste containers, **then** company issued clothing shall be worn.

**4.1.13** **When** breaching surfaces, **then** the requirements of CP3-EN-0227, *Trenching, Excavation and Penetration Permit* shall be followed.

**4.1.14** **If** entering a confined space, **then** the requirements of CP3-HS-2055, *Confined Space* shall be followed.

**4.1.15** Wear approved safety glasses shall be worn when sampling activities are being performed.

**4.1.16** Approved eye wash station will be available for employees when chemicals are being used that have the potential to come in contact with the employees eyes.

**4.1.17** Nitrile rubber gloves shall be worn when using sample bottles with prepackaged acid present.

**4.1.18** If any Hydrochloric Acid, Nitric Acid or Sulfuric Acid comes in contact with nitrile gloves then remove and dispose of gloves and obtain an new pair.

**4.1.19** Cut resistant gloves shall be worn when handling materials that may cause cuts or abrasions.

**4.1.20** Personnel shall be aware of the potential for chemical hazards in the area and shall evacuate the area and notify supervision if they suspect chemical exposure, such as: strange smell, vapor cloud, burning or itching sensation, spill of unknown liquid, or broken lines or damage to equipment that may contain hazardous chemicals.

**4.1.21** Personnel shall be familiar with the hazards associated with exposure to Volatile Organic Compounds (VOCs), specifically, trichloroethylene (TCE) and vinyl chloride.

**4.1.22** Personnel shall wear Supreno EC Microflex Nitrile gloves or Showa 730 gloves when handling TCE contaminated equipment, liquid, or soil.

**4.1.23** If an unplanned event, accident, and/or injury occurs during off-shift hours then notify PSS and next line management immediately.

### 4.2 Limitations

**4.2.1** Extreme weather conditions may limit or preclude the conduct of certain types of fieldwork. Outdoor sampling during dusty or wet conditions should be avoided to prevent changing the composition of the material being sampled or contamination of the surrounding area.

**4.2.2** **If** applicable, **then** all posted requirements pertaining to any given sampling location shall be complied with.

## 5.0 PREREQUISITES

**5.1** Notify RADCON and IH personnel before initiating sampling to determine required surveys and monitoring requirements for RWP, task-specific JHA and/or IHWP.

**5.2** Obtain Chain of Custody (COC) forms, sample data forms, and sample labels as necessary from Sample Management Office (SMO).

**5.3** Prepare quality control samples according to CP4-ES-2704, *Trip, Equipment and Field Blank Preparation*, if applicable.

**5.4** Prior to the start of field activities, notify the following parties:

- Facility Manager
- As required, IH/IS Specialist
- As required, RADCON
- As required, Waste Management

**5.5** **If** required, **then** prior to beginning work, read and sign off on the RWP, task specific JHA and/or IHWP.

**5.6** Limit preparation and collection of samples to those individuals who have the necessary training and are knowledgeable of field procedures applicable to the collection of samples.

**5.7** As needed, use a plastic sheet as a ground cover for staging equipment and/or materials, as necessary, to prevent equipment from contacting potentially contaminated surfaces.

**5.8** Ensure the following PPE is available as required:

- Company Issued Clothing
- Ear Plugs
- Face Shield
- Hard Hats (ANSI approved)
- Safety Glasses w/ Side Shields
- Safety-Toed Boots

**5.9** **If** collecting samples for PFAS parameters, **then** consult sampling guidelines discussed in CP5-TS-1000, *Per- and Polyfluoroalkyl Substances Sampling Guidelines.*

**5.10** Prior to use, calibrate and check the Water Quality Meter according to CP4-ES-0109, *Calibration and Preventative Maintenance of Laboratory Equipment.*

## 6.0 INSTRUCTIONS

### 6.1 General Requirements

**Sampling Lead**NOTES:

Project-specific documents include, as applicable, the RWP, JHA, IHWP, Sampling and Analysis Plan (SAP) or Sampling and Analysis Event Plan (SAEP), Health and Safety Plan, Quality Assurance Project Plan, Waste Management Plan, and necessary permits. A copy of any applicable project-specific document shall be available before the onset of field activities. These documents should be consulted, as necessary, and reviewed by the sampling personnel to obtain specific information regarding equipment and supplies, health and safety precautions, sample collection and identification, container size and type, sample packaging, and decontamination.

The choice of specific sample container size and type should be coordinated with the laboratory that will be performing the analysis to ensure that adequate samples are received in the proper condition for the analytical procedures.

**6.1.1** Ensure that field personnel are familiar with project-specific documents.

**6.1.2** Choose appropriate sampling equipment as specified in the SAP or SAEP depending on the characteristics of the material and the type of analysis to be performed.

**6.1.3** Notify the Facility Manager (or other parties responsible for the material to be sampled) of the schedule and scope of the proposed sampling event.

**6.1.4** Notify IH personnel and RADCON personnel to request and schedule any required support for monitoring during the sampling activities.

**6.1.5** Communicate the sampling schedule to a waste engineer and a waste package certifier prior to opening any sealed container.

**Sampler**

**6.1.6** Unless new, verify that all reusable sampling equipment has been decontaminated prior to use and **if** prior decontamination of sampling can **NOT** be verified, **then** decontaminate the equipment according to CP4-ES-2702, *Decontamination of Sampling Equipment and Devices,* prior to use.

**6.1.7** **If** needed, **then** obtain **and** label a sampling debris collection container according to CP3-WM-1037, *Generation and Temporary Storage of Waste Materials.*

NOTE:

The items listed in this section may be used as a guide; however, additional items may also be required.

**6.1.8** Ensure that all needed materials are readily available to take to the field and are in good working condition and gather the following items as needed:

- Analyte-free water
- Appropriate containers for material
- Camera
- Intrinsically Safe Camera
- COC forms and sample labels
- Container closure parts (bungs, lids, lid seals, locking rings, bolts)
- Container grounding straps (if opening ignitable or volatile materials)
- Custody seals, as required
- Decontamination equipment and supplies
- Hammer and chisel
- Ice bags or “blue ice” and cooler (as required)
- Lab wipes
- Lid restraint devices (fork lift truck, restraining devices)
- Logbook, sample data forms, and black indelible ink pens
- Hand tools (ratchets, sockets, adjustable, and end wrenches)
- Measuring tape
- Non-sparking allow tools (bung wrench, hand pick, pickaxe, spike, pry bar, drum de-header)
- Plastic sheeting
- Plastic zip-lock bags
- PPE
- Sample containers with lids (including extra sample containers with lids), pre-preserved if necessary
- Sampling device(s)
- Sampling equipment
- Steel and/or Teflon-lined spatulas, pans, trays, and bowls
- Two-way radio or cellular phone

## 6.2 Collection of Samples

**Sampler**

**6.2.1** Prepare the necessary sample containers according to CP3-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*.

**6.2.2** **If** applicable, **then** prepare quality control samples according to CP4-ES-2704.

**6.2.3** Before sampling, verify that each sample location is the correct container or material scheduled for sampling (that is, check container label information against sampling request or project SAP or SAEP and resolve discrepancy before proceeding).

**6.2.4** If a tamper indicator device (TID) is present on a container, DO NOT proceed with sampling or other activities that require opening the container (TID removal) until the Field Engineer/Waste and Materials Frontline Supervisor and/or Waste Package Certifier are present.

**6.2.5** Don all appropriate PPE according to the applicable IHWP and/or at the direction of Health & Safety personnel, IH, or RADCON and as stated in the RWP.

**WARNING:**

Containers with contents that have the potential to be pressurized can pose hazards (for example, fire or explosions) that may require immediate action and notification to the Plant Shift Superintendent (PSS). Containers may rupture without any warning and result in personnel injury, equipment or facility damage, or environmental contamination. **If** material containers are observed to be leaking or over pressurized, **then** the PSS shall be notified upon detection.

**6.2.6** **If** sampling a container, **then** visually inspect each container for obvious signs of pressurization, such as bulged lids or escaping gases **and if** a container exhibits signs of pressurization, **then** stop work, leave the area immediately, **and** notify PSS, Front Line Manager (FLM), IH, and Safety Manager.

**6.2.7** **If** sampling a container, **then** open each container individually according to CP3-WM-1017, *Safe Handling and Opening of Sealed Containers,* sample one container at a time **and** close the container before opening the next.

**6.2.8** Record field and sampling information in the appropriate logbook or Project Environmental Measurements System (PEMS) generated sample data forms according to CP4-ES-2700, *Logbooks and Data Forms*.

NOTE:

Other sampling methods, tools, or techniques may be used as specified in the project-specific SAP or SAEP or other written instructions.

**6.2.9** Collect samples according to the appropriate method and refer to Sections **6.3** through **6.11** of this procedure for descriptions of sampling devices and methods.

**6.2.10** **If** sampling a container, **then** close **and** secure the material container(s) according to CP3-WM-3015, *Waste Packaging*.

**6.2.11** Ensure sample bottle closure lids are properly secured.

**6.2.12** **If** required, **then** place the samples in a cooler with ice or blue ice to chill the samples.

**6.2.13** Return work area to acceptable housekeeping standards.

**6.2.14** Complete **and** maintain custody of the samples according to CP3-ES-2708.

**6.2.15** Complete all field information and sampling information in the appropriate logbook(s) and/or sample data forms according to CP4-ES-2700.

**6.2.16** **If** all required samples have been collected, **then** notify waste to apply tamper-indicating device or other appropriate seal, as appropriate, **and** proceed to Section **6.12.**

## 6.3 Field Sample Measurements

**6.3.1** Prior to use, calibrate **and** check the Water Quality Meter prior to collecting field measurements according to CP3-ES-0109, *Calibration and Preventative Maintenance of Laboratory Equipment.*

**6.3.2** Collect a representative sample to perform field analyses, according to the sample data forms.

**6.3.3** Record results from field analyses onto appropriate sample data form in the spaces provided.

## 6.4 Submergence Method

NOTES:

The submergence method of sampling will be used for collection of leachate samples.

This is the preferred method of collecting grab samples, unless a vertical profile is required through the water column. This method is commonly used to collect samples from shallow streams, outfall pipes, flumes and weirs. For hard-to-reach locations, an extendable pole can be useful to hold the container. This method has the potential for spreading contamination because of residuals on the outside of the container when the water has high concentrations of hazardous constituents.

Container submergence may **NOT** be suitable for pre-preserved containers. When container submergence is **NOT** appropriate, a dip sampling device may be used with an extension handle.

C-746-U Landfill leachate shall be thoroughly agitated in the tank(s) prior to sampling in order to ensure representative samples.

**6.4.1** Collect leachate samples at the sample location and frequency as specified in CP2-ES-0006, *Environmental Monitoring Plan Fiscal Year 2023 Paducah Gaseous Diffusion Plant, Paducah Kentycky*.

**6.4.2** **If NOT** previously labeled, **then** obtain the appropriate sample container **and** affix the appropriate label as required by the COC.

NOTE:

In flowing bodies of water, the opening of the container should face upstream away from sampling personnel.

**6.4.3** Collect Field Sample Measurements according to section 6.3, and record parameters required on the sample data form and/or COC.

**6.4.4** Submerge the sample container below the water surface preventing surface scum and other floating debris from entering the container unless prescribed in the task-specific task instruction.

**6.4.5** **If** collection of surface scum **CANNOT** be avoided, **then** note as a comment on the appropriate sample data form according to CP3-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*.

**6.4.6** Allow the sample container to fill to the desired volume, allowing some volume for expansion and mixing.

**6.4.7** **If** sampling for VOCs, **then** ensure that a meniscus is raised above the lip of the container before capping, ensuring NO headspace.

**A.** After closing VOC vial, then invert and tap lightly to check for air bubbles.

**B.** **If** air bubbles are present **then** re-open container and add additional sample.

**6.4.8** Remove the container from the water, **and** replace the lid securely.

NOTE:

The best technique is to hold the lid in hand without touching the inside of the lid while filling the container.

**6.4.9** Do **NOT** allow the lid to be in contact with any potentially contaminating surfaces.

**6.4.10** Document sample collection on the COC, sample data form and sample container label according to CP3-ES-2708.

**6.4.11** Place the sample container in a cooler with ice or blue ice to chill the samples until samples are refrigerated.

**6.4.12** Refrigerate samples requiring preservation of less than six degrees Celsius until the samples can be shipped to the laboratory for analysis.

## 6.5 Collection of Liquid/Sludge Samples Using Glass Tubes (Thief)

**Sampler**

NOTES:

This method provides for a quick, relatively inexpensive means of collecting material. The major disadvantage is from potential sample loss, which is especially prevalent when sampling low viscosity fluids. Splashing also can be a problem, and proper protective clothing should always be worn. This method shall **NOT** be attempted with less than two sampling personnel.

Liquid samples from opened containers (for example, 55-gal drums) are collected using lengths of glass tubing (thief). The glass tubes normally are 122 centimeters (48 inches) in length and have an inside diameter of 6 to 16 millimeters (0.24 to 063 inches). Larger diameter tubes may be needed for more viscous fluids. Tubing should be long enough so that at least 30 centimeters (11.8 inches) of tubing extends above the top of the container.

**6.5.1** **If** necessary, **then** remove the lid from the sample container.

NOTE:

Appropriate gloves should be worn when pushing tube into the sludge layer.

Warning:

The presence of hydrofluoric acid may be indicated by glass tube becoming cloudy.

**6.5.2** Insert glass tubing almost to the bottom of the material or until a solid layer is encountered **and if** a sample of liquid and bottom sludge is desired, **then** gently push the tube into the sludge layer, but do **NOT** force the tube.

- **If** an action is observed **when** the glass tube is inserted (violent agitation, smoke, light, etc.), **then** stop, leave the area immediately **and** notify the PSS, FLM, and IH personnel.
- **If** the glass tube becomes cloudy or smoky after insertion into the material being sampled, **then** stop leave the area immediately, **and** notify the PSS, FLM, and IH personnel.

**6.5.3** Allow the material being sampled to reach its natural level in the tube **and** cap the top of the tube with a safety-gloved thumb or stopper, ensuring that liquid does **NOT** come into contact with the stopper or gloved thumb.

**6.5.4** Carefully remove the capped tube from the material **and** insert the uncapped end into the sample container, being careful **NOT** to spill liquid on the outside of the sample container.

NOTE:

**If** necessary, **then** the sludge plug in the bottom of the tube (if collected) can be dislodged with the aid of the stainless steel laboratory spatula.

**6.5.5** Release the thumb or stopper on the top of the tube **and** allow the sample containers to fill to approximately 90% of its capacity, unless otherwise specified.

**6.5.6** Remove the tube from the sample container.

**6.5.7** **If** enough volume has been collected, **then** discard the tube and any material left over into an appropriate disposal container according to CP3-WM-1037 **and if** more volume is needed to fill the sample container(s), **then** repeat Steps **6.5.2** through**6.5.6.**

**6.5.8** Cap the sample container tightly **and** proceed to Step **6.2.11**.

## 6.6 Collection of Liquid Samples Using a Composite Liquid Waste Sampler (COLIWASA)

**Sampler**

NOTE:

The COLIWASA is a sampler designed to permit representative sampling of multi-phase material from drums and other containers. The COLIWASA sampler is commercially available in a variety of materials including Polyvinyl Chloride (PVC), glass, or Teflon. The COLIWASA consists of two sections of tubing. The smaller diameter inner rod has a stopper at one end. Manipulation of the inner rod opens and closes the sampler by raising and lowering the stopper.

**6.6.1** Check to make sure the sampler is functioning properly by ensuring that the stopper provides a tight closure before proceeding

**6.6.2** **If** necessary, **then** remove the lid from the sample container.

NOTE:

Failure to maintain an even liquid level on both the inside and the outside of the COLIWASA sampler tube may result in a non-representative sample.

**6.6.3** Raise the inner rod to open the sampler and slowly lower the sampler into the liquid material while ensuring to lower the sampler at a rate that permits the levels of the liquid on both the inside and the outside of the COLIWASA sampler tube to stay about even.

**6.6.4** **When** the sampler reaches the desired sample depth, **then** push the inner rod downward to close the sampler.

**6.6.5** Carefully discharge the sampler into either the sample container(s) or a larger collection container (that will be subsampled) by slowing raising the inner rod while the lower end of the sampler is positioned inside the material.

**6.6.6** **If** necessary, **then** subsample the liquid from the larger collection of material into the sample containers.

**6.6.7** **If** more volume is needed to fill the sample container(s), **then** repeat Steps **6.5.3** through **6.5.6**.

**6.6.8** Cap the sample container tightly and proceed to Step **6.2.11**.

## 6.7 Collection of Liquid Samples using a Peristaltic Pump Sampling

**Sampler**

NOTE:

This method is **NOT** recommended for collecting volatile organic compound (VOC) samples. VOCs should be collected by the manual grab (dipper) method.

**6.7.1** As needed, use a plastic sheet as a ground cover for staging equipment and/or materials, as necessary, to prevent equipment from contacting potentially contaminated surfaces.

**6.7.2** **If NOT** previously labeled, **then** obtain the appropriate sample container prescribed in the COC **and** affix the appropriate label.

**6.7.3** **If** necessary, **then** remove the lid from the sample container.

**6.7.4** Ensure that an AC power source is available in the field or that there is an adequately charged battery, sized for the peristaltic pump.

**6.7.5** As needed, cut clean, unused tubing and attach to the intake and discharge of the pump. Tubing shall be an inert material [such as, Teflon® or high-density polyethylene (HDPE)].

**6.7.6** Insert the intake end of the tubing to the desired sample depth or as otherwise specified in the project-specific SAP or SAEP.

NOTE:

The peristaltic pump can pull a column of water up to approximately 6 meters (less than 20 feet) through the tube above the water surface.

**6.7.7** Start the pump **and** allow approximately 100 milliliters of water to purge back to the water body, **and** then stop the pump.

**6.7.8** Move the discharge tubing to the sample containers and/or collection container.

**6.7.9** Place the outlet end of the tubing at the mouth of the sample container and/or collection container without touching the sides of the container.

**6.7.10** Start the pump to fill each sample container.

**6.7.11** **If** required, then collect Field Sample Measurements according to section **6.3**, **and** record parameters as required on the sample data form and/or COC.

**6.7.12** Stop the pump after filling each container.

**6.7.13** **If** collection container is used, then fill sample container from the collection container.

**6.7.14** **If** more volume is needed to fill the sample container(s), **then** repeat Steps **6.7.8** through **6.7.12**.

**6.7.15** Cap the sample container tightly and proceed to Step **6.2.11.**

## 6.8 Collection of Sludge Samples Using a Gravity Corer

**Sampler**

NOTES:

A gravity corer is a metal tube with a replaceable tapered nosepiece on the bottom and a ball or other type of check valve on the top. The check valve allows material to pass through the corer on descent, but prevents a washout during recovery. The tapered nosepiece facilitates cutting and reduces core disturbance during penetration. Most corers are constructed of brass or steel and many can accept plastic liners and additional weights.

Corers are capable of collecting samples of most sludge and sediments. They collect essentially undisturbed samples that represent the strata profile that may develop in sediments and sludge during variations in the deposition process. Depending on the density of the substrate and the weight of the corer, penetration to depths of 75 centimeters (30 inches) can be attained.

Solid braided 5 millimeter (3/16 inch) nylon line is sufficient; however, 20 millimeter (3/4 inch) nylon is easier to grasp during hand hoisting. **If** necessary, **then** an additional weight can be attached to the outside of the corer.

CAUTION:

**When** using gravity corers in vessels or lagoons that have liners, **then** care shall be exercised because penetration depths could exceed that of the substrate and result in damage to the liner material.

**6.8.1** Attach a pre-cleaned corer to the required length of retrieval line.

**6.8.2** Secure the free end of the retrieval line to a fixed support to prevent accidental loss of the corer.

**6.8.3** Allow corer to free-fall through the liquid to the bottom, being careful **NOT** to splash.

**6.8.4** Retrieve the corer with a smooth, continuous, hoisting motion, being careful **NOT** to bump the corer, as this may result in some sample loss.

**6.8.5** Remove the nosepiece from the corer **and** slide the sample out of the corer into a stainless steel or Teflon coated pan.

**6.8.6** Transfer the sample into the appropriate sample container(s) with a stainless steel lab spoon or laboratory spatula.

**6.8.7** **If** more volume is needed to fill the sample container(s), **then** repeat Steps **6.8.2** through **6.8.6.**

**6.8.8** Cap the sample container tightly **and** proceed to Step **6.2.11.**

## 6.9 Collection of Viscous Materials Using a Bacon Bomb Sampler

**Sampler**

NOTES:

The Bacon Bomb is designed for the withdrawal of samples from various levels within a special container. It consists of a cylindrical body with an internal tapered plunger that acts as a valve to admit the sample. (Appendix B, *Drawing of a Bacon Bomb Sampler* is provided as a reference). A line attached to the top of the plunger is used to open and close the valve. A removable top cover provides a point of attachment for the retrieval line or pole and has a locking mechanism to keep the plunger closed after sampling. The Bacon Bomb is usually constructed of chrome-plated brass and bronze with a rubber O-ring acting as a plunger sealing surface. Stainless steel versions also are available. The volumetric capacity is 8, 16, or 32 ounces (237, 473, or 946 milliliters).

The Bacon Bomb is a heavy sampler suited best for viscous materials held in large storage tanks or in lagoons. **If** a more non-reactive sampler is needed, **then** the stainless steel version should be used or any of the samplers could be coated with Teflon.

**6.9.1** **If** necessary, **then** remove the lid from the sample container.

**6.9.2** Attach the retrieval line or pole and plunger lines to the sampler.

**6.9.3** Measure **and** mark the retrieval line at the desired depth.

**6.9.4** Gradually lower the sampler by the retrieval line until the desired level is reached.

**6.9.5** **When** the desired level is reached, **then** pull up on the plunger line **and** allow the sampler to fill for a sufficient length of time before releasing the plunger line to seal off the sampler.

**6.9.6** Retrieve the sampler by pulling up on the retrieval line or pole, being careful **NOT** to pull up on the plunger line, thereby accidentally opening the bottom valve.

**6.9.7** Wipe off the exterior of the sampler body.

**6.9.8** Position the sampler over the sample container **and** release its contents by pulling up on the plunger line.

**6.9.9** **If** more volume is needed to fill the sample container(s), **then** repeat Steps **6.9.3~~6.6.9.4~~**through **6.9.8.**

**6.9.10** Cap the sample container tightly **and** proceed to Step **6.2.11.**

## 6.10 Collection of Solid Samples

**Sampler**

NOTE:

Solid material may be sampled with a tier, trowel, scoop, hand auger, or other approved device, hereafter referred to as "the sampler." Unless otherwise specified, material should be collected from the entire volume of the material and composited according to CP4-ES-0040, *Composite Sampling,* before transferring the material into the sample containers. **If** the material is suspected to be heterogeneous, **then** discrete samples may be collected at different depths for characterization.

**6.10.1** Confirm requested analyses and media or material type.

**6.10.2** **If** necessary, **then** remove the lid from the sample container.

**6.10.3** Use the sampler to recover samples from the material.

NOTE:

It may be necessary to shred or cut the material (rags, pigs, pads, gloves, etc.) with scissors or similar tools.

**6.10.4** **When** a sufficient volume has been collected to fill all required sample containers to their proper levels, **then** homogenize the samples in an appropriate container **and** fill each sample container (see CP4-ES-0040 or guidance).

**6.10.5** Place each sample in an approved sample container **and** record unusual conditions of contents (such as color, odor, free liquids, etc.) in the logbook or data form.

**6.10.6** **If** debris is encountered in a container, **then** it is permissible to grab sample portions from the top layers that appear contaminated or "worst case" by using a sample container or a gloved hand to remove a sufficient amount of sample to fill the sample container to its required level **and** document in the logbook or data form.

**6.10.7** **If** a representative sample can **NOT** be taken with a sampler or **when** sampling concrete and other construction debris, **then** take a grab sample by using a sample container or a gloved hand to remove a sufficient amount of sample to fill the sample container to its required level **and** document in the logbook or data form.

**6.10.8** **If** a sufficient amount of concrete or construction debris can **NOT** be collected because of the size of the pieces, **then** size reduce as needed until sufficient volume has been collected..

**6.10.9** Cap the sample container tightly and proceed to Step **6.2.11**.

### 6.11 Collection of Solid Samples Using Grain Thief/Probe

**Sampler**

> CAUTION:
>
> The sampling probe must remain grounded during the entire sampling activity.

**6.11.1** **If** necessary, **then** remove the lid from the sample container.

**6.11.2** **If** sampling carbon from carbon vessels, **then** attach grounding strap to ground sample probe**.**

**6.11.3** Ensure grain thief/probe is in CLOSED position **and** insert sampler into material being sampled.

**6.11.4** Open the grain thief/probe by rotating the inner tube.

**6.11.5** Maneuver the grain thief/probe in the sample container to allow the material to enter the open slots.

**6.11.6** Place the grain thief/probe in the CLOSED position **and** remove sampler from the material being sampled.

**6.11.7** Empty sample in grain thief/probe onto plastic sheeting, into probe sleeves or into stainless steel bowls.

**6.11.8** Transfer sample in appropriate sample container.

**6.11.9** If more volume is needed to fill the sample container(s), then repeat Steps **6.11.3** through **6.11.8**.

**6.11.10** Cap the sample container tightly and proceed to Step **6.2.11**.

### 6.12 Post-Sampling Activities

**Sampling Lead and Sampler**

**6.12.1** Complete the COCs and sample labels according to CP3-ES-2708.

**6.12.2** Ensure sample information is documented according to CP4-ES-2700, *Logbooks and Data Forms,* on sample data forms.

**6.12.3** Inspect reusable sampling equipment to ensure gross quantities of sample material have been removed.

**6.12.4** **If** gross quantities of sample material can **NOT** be removed from the reusable sampling equipment, **then** handle the reusable sampling equipment as non-fissile waste according to CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*.

**6.12.5** Decontaminate sampling equipment according to CP4-ES-2702 **and** record the decontamination event on CP4-ES-2702 F01.

**6.12.6** Dispose of all waste generated from sampling activities in accordance with CP3-WM-1037.

## 7.0 ACCEPTANCE CRITERIA

None

## 8.0 POST PERFORMANCE WORK ACTIVITIES

**8.1** Maintain custody of the samples according to CP3-ES-2708 until samples are transferred to the SMO laboratory for analysis as soon as possible.

**8.2** Ensure that the temperature of the sample(s) is maintained according to CP3-ES-0043, *Temperature Control for Sample Storage*.

**8.3** **If** samples contain radiological material, **then** coordinate with RADCON, **and** release the sample(s) and related COC documentation for further handling according to CP3-WM-9503.

**8.4** Prepare samples for shipment off-site and ship according to CP3-WM-9503.

**8.5** Submit a copy of the COCs and logbook pages/sample data forms to the SMO for entry into PEMS.

**8.6** **If** unused **or** excess sample material is received from the off-site laboratory, **then** dispose of sample material into accumulation containers according to CP3-WM-1037.

**8.7** **When** required, **then** place unused **or** excess sample material into the original waste container according to CP3-WM-1037.

## 9.0 RECORDS

### 9.1 Records Generated

None

### 9.2 Records Disposition

The records are to be maintained according to CP3-RD-0010, *Records Management Process*.

## Appendix A – Acronyms/Definitions

**ACRONYMS**

**AC** – Alternating Current

**COC** – Chain of Custody

**COLIWASA** – Composite Liquid Waste Sampler

**D&R** – Deactivation & Remediation

**DOE** – U.S. Department of Energy

**FLM** – Front Line Manager

**HDPE** – High-density polyethylene

**IH** – Industrial Hygiene

**IHWP**-Industrial Hygiene Work Permit

**IS**–Industrial Safety

**JHA** – Job Hazard Analysis

**PEMS** – Project Environmental Measurements System

**PPE** – Personal Protective Equipment

**PSS** – Plant Shift Superintendent

**PVC** – Polyvinyl Chloride

**RADCON** – Radiological Control

**RWP** – Radiological Work Permit

**SAEP** – Sampling and Analysis Event Plan

**SAP** – Sampling and Analysis Plan

**SMO** – Sample Management Office

**TID** – Tamper Indicating Device

**VOC** – Volatile Organic Compound

**Appendix A – Acronyms/Definitions (continued)**

**DEFINITIONS**

**COLIWASA** – Composite Liquid Waste Sampler, a sampling device used to sample liquids and light sludge.

**Container** – Any portable vessel in which a material (that is, waste) is stored, transported, disposed of, or otherwise handled. Examples of containers include drums, ST-90 boxes, 7A Type A containers, and polyethylene portable tanks.

**Core Sampler** – A metal sampling tube used to sample solid material.

**Debris** – Pieces of any of a variety of solid materials present that are **NOT** intended to be analyzed or are **NOT** part of the sampling objective and interfere with sample collection.

**Known Material** – Material that is identified or has a history that can be traced to a process either past or present at the Paducah Site.

**Material** – Any type of solid, semisolid or liquid material contained by fixed boundaries such as drums, tanks, bins, piping.

**Multiphased Material** – liquid phases occur in material stored in tanks due to the different specific gravities of the material's components and these components' immiscibility or insolubility with one another. Many substances have specific gravities of less than one, may be insoluble in water, and would, therefore, form several distinct, separate layers or phases.

**Unknown Material** – Material about which there is insufficient knowledge of its origin or generation.

**Appendix B – Drawing of a Bacon Bomb Sampler**