WORKING COPY

VERIF. DATE: _____

INTIALS: _____

CP4-ES-2002 FRev. 1C	TITLE: Sampling of Structural Elements and Miscellaneous Surfaces	Page 1 of 13

DOCUMENT CATEGORY: ☐ Administrative ☒ Technical

LEVEL OF USE: ☐ Information Level ☒ Reference Level ☐ Continuous Use

FUNCTIONAL AREA: Characterization (Sampling, Lab) **SUBJECT MATTER AREA:** Characterization	**SUBJECT MATTER EXPERT**: Chris Skinner, Characterization Field Lead
NUCLEAR SAFETY REVIEW DOCUMENTATION: FRNP-23-0329-S	**APPROVED BY/DATE** (Signature on file): Kelly Layne, Characterization Manager 05/11/2023
REQUIRED REVIEW DATE (or expiration date for temporary change): 10/5/2025	**EFFECTIVE DATE**: 05/15/2023

REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
FR0	Initial FRNP release	All	10/20/2017
FR1	General Revision	All	1/2/2018
FR1A	Periodic Review has been completed with no changes identified in procedure technical content. Nonintent change to correct SMA, SME, Approver, and dates has been incorporated per CP3-NS-2001. Date for review cycle has been reset.	All	8/25/2021
FR1B	Periodic Review has been completed with no changes identified in procedure technical content. Nonintent change to correct FA, SMA, SME, Approver, and dates has been incorporated per CP3-NS-2001. Date for review cycle has been reset	All	10/5/2022
FR1C	Intent changes to update references, update P/Ls, and update steps to meet current sampling requirements.	3-13	05/11/2023

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure describes methods for collecting samples from potentially contaminated floors, walls, ceilings, and miscellaneous surfaces to determine representative levels of contamination of the sample media. Typical matrices or surfaces include concrete, masonry, wood, and wallboard. This procedure incorporates the use of drills with drill bits, saws, chisels, and other equipment, as appropriate, to collect the sample media. The samples may be used to obtain chemical or radiological data for the purpose of facility characterization and waste profiling. Chg C

Alternative sampling methods may be used based on location, accessibility, and the type of the material to be sampled. Alternative sampling methods are documented in an approved sampling and analysis plan and/or sampling and analysis event plan (SAP/SAEP).

1.2 Scope

This procedure applies to Deactivation & Remediation (D&R) Contractor personnel and subcontractors that perform sampling of structural elements and miscellaneous surface sampling at the U.S. Department of Energy (DOE)-owned Paducah site. This procedure also may be used for industrial-hygiene related sample collection activities.

2.0 REFERENCES

2.1 Use References

- CP3-EN-0227, *Trenching, Excavation and Penetration Permit*
- CP3-ES-0043, *Temperature Control for Sample Storage* Chg C
- 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* Chg C
- CP3-SM-0003, *Use of High Efficiency Filter Equipped Vacuum Cleaners*
- CP3-SM-0004, *Operation of 1000 and 2000 CFM Negative Air Machines*
- CP3-WM-1036, *Nuclear Criticality Safety Implementation Requirements for Handling and Storage of Fissile and Potentially Fissile Waste*
- CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*
- CP3-WM-9503, *Off-Site Shipments by Air Transport*
- 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*
- Text deleted Chg C

2.2 Source References

- JHA-11236, *Opening, Sampling, and Handling Containerized Waste and Non-Containerized Waste* Chg C
- Nuclear Criticality Safety Approval (NCSA) GEN-015, *On-Site Generation, Handling and Storage of Fissile or Potentially Fissile Material*
- U.S. Environmental Protection Agency, November 2001, *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*. Region 4, Environmental Compliance Branch, Athens, GA. Chg C

3.0 COMMITMENTS

None

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Precautions

4.1.1 An Excavation and/or Penetration Permit is required except for penetrations into building floors, walls, or ceilings less than or equal to 1.25 inches deep (as measured from exposed wall surface) and penetrations into exterior concrete slabs or pavement 6 inches deep or less (as measured from slab/pavement surface).

4.1.2 Safety goggles may be required to prevent dust from entering the eyes when a full-face respirator is not required to be worn.

4.1.3 **If** sampling solid material that may produce airborne contaminants, such as particulates or volatile vapors in sufficient volumes to be a hazard to human health, **then** contact Safety personnel for the project to determine the potential hazards and appropriate controls.

4.1.4 Respiratory protection may be downgraded upon the approval of the Industrial Hygiene Specialist after a negative exposure assessment has been completed.

4.1.5 Negative Air Machines (NAM) shall be handled according to CP3-SM-0004, *Operation of 1000 and 2000 CFM Negative Air Machines*.

4.1.6 High-Efficiency Particulate Air (HEPA) vacuums shall be handled according to CP3-SM-0003, *Use of High Efficiency Filter Equipped Vacuum Cleaners*.

4.1.7 A two-way radio and/or cell phone at the sampling site during any sampling event for communication purposes. Use only intrinsically safe radios, cell phones, etc., when working in facilities or areas that may contain a potentially explosive atmosphere. Chg C

4.1.8 A minimum of two people are always present and within visual range of each other at all times during any sampling activity.

4.1.9 An eyewash station is available and operational near the work location.

4.2 Limitations

4.2.1 Sampling personnel that handle and transport potentially fissile (PF) samples must comply according to CP3-ES-1034, *Nuclear Criticality Safety Requirements for Sample Labeling, Handling, and Assay Smears.*

4.2.2 Sampling personnel shall comply with all posted requirements. Chg C

5.0 PREREQUISITES

Sampler

5.1 Notify Radiation Control (RADCON) and Safety & Health personnel before initiating sampling to determine required surveys and monitoring requirements for radiological work permit (RWP) and industrial hygiene work permit (IHWP). Chg C

5.2 Obtain chain-of-custody forms (COC), field sample logs, sample labels, and custody seals as necessary from Sample Management Office (SMO).

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

5.4 Review the SAP/SAEP for specific sampling methods and equipment to be used, **and** reference any photos, maps, or figures that designate proposed sample locations.

5.5 Notify RADCON and Safety & Health personnel before initiating sampling to determine required surveys and monitoring requirements for RWP and IHWP.

5.6 Label sample containers with known information before collection of the sample according to CP3-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*. Chg C

5.7 Notify the following parties prior to the start of field activities.

- Facility Manager
- Health and Safety Specialist
- RADCON

5.8 Prior to beginning work, read and sign off on the RWP, if required, and review task-specific JHA and IHWP.

5.9 Ensure those individuals who prepare and collect samples have the necessary training and are knowledgeable of the field procedures that are applicable to the type of sample being collected.

5.10 **If** required, **then** obtain an Excavation/Penetration Permit according to CP3-EN-0227, *Trenching, Excavation and Penetration Permit.* Chg C

6.0 INSTRUCTIONS

6.1 General Requirements

Sampler

6.1.1 Ensure assigned project personnel record all sample related observations and operations according to CP4-ES-2700, *Logbooks and Data Forms*.

6.1.2 Manage waste according to CP3-WM-1037, *Generation and Temporary Storage of Waste Materials* or CP3-WM-1036, *Nuclear Criticality Safety Implementation Requirements for Handling and Storage of Fissile and Potentially Fissile Waste*.

NOTE:

Rinsate blanks are **NOT** required when using disposable sampling equipment.

6.1.3 Collect the number and type of Quality Control (QC) samples as specified in the SAP/SAEP.

6.1.4 Prepare QC samples according to CP4-ES-2704.

NOTE:

Project specific records are made at the start of a sampling event and at the time of sample collection but no later than before leaving the sample site. Specific data form entries include for each sample collected: sample media type (for example, concrete, masonry, wood, wallboard), sample method (for instance, drilling, chipping, sawing), depth intervals over which sample was collected, and whether the sample was collected from several areas to form a composite sample.

6.1.5 Prepare logbooks, data forms, and other records according to CP4-ES-2700.

6.1.6 Ensure sampling tools and equipment are decontaminated and ready for use according to CP4-ES-2702, *Decontamination of Sampling Equipment and Devices*.

6.1.7 Ensure sampling tools and equipment are protected from sources of contamination by wrapping in aluminum foil, sealing in plastic or other storage containers, or placing on plastic sheeting in staging area.

6.1.8 Ensure disposable sampling equipment is new and unused.

6.1.9 Ensure only new or certified pre-cleaned sample containers are used for each sampling event. Chg C

6.2 General Requirements for Sampling Structural Elements and Surfaces

NOTE:

The area immediately around the actual sampling point is not marked to prevent contamination of the sample.

Sampler

6.2.1 Locate and mark each area to be sampled as necessary.

6.2.2 Record the sample location and description of the material on the data form.

6.2.3 **If** a single sample point (depth interval) does not provide a sufficient amount of sample material, **then** collect **and** combine sample from multiple areas in the same general location to form one sample for analysis or to prepare separate aliquots for QC purposes (for example, field duplicates, split samples, or matrix spike samples).

6.2.4 **If** sample weights are required, **then** measure **and** record the tare weight of the clean empty sample container in the appropriate units of measure (example, grams). Chg C

6.2.5 Text deleted

6.2.6 Once sample material is collected, measure **and** record the weight of the sample container and the sample material.

6.2.7 Subtract the tare weight from the final weight **and** record the difference on the data form.

6.2.8 Ensure the minimum required amount of sample material has been collected. Chg C

6.2.9 **If** the sample weight is determined to be insufficient, **then** collect more sample material by repeating the sampling process.

6.2.10 **If** the sample material is collected from multiple points, **then** record the number of points **and** identify the areas from which the material was taken.

6.3 Single-Depth Interval Concrete Sampling

Sampler

6.3.1 Don a new pair of chemical-resistant gloves and other personal protective equipment (PPE) appropriate for the expected contaminants and media being sampled.

6.3.2 Drill into the concrete to the depth interval required by the SAP/SAEP. Chg C

NOTE:

For holes greater than two inches in depth, a stainless steel spoon or scoop may be used to collect the sample from the bottom of the hole.

6.3.3 **When** sampling concrete floors or other similar pads, collect the powder directly from the surface of the concrete, or scrape the powder back into the hole and use the less-rounded edge of spatula or other similar tool to retrieve the sample.

6.3.4 Collect the concrete powder into a clean collection pan (e.g. disposable, stainless steel, or aluminum foil lined). Chg C

NOTES:

A scoop or spoon is used to collect any remaining concrete powder from within the hole of a wall or other vertical surface.

It may be necessary to drill the hole at an angle into overhead structures so the concrete powder can fall freely into the collection pan.

6.3.5 **If** sampling concrete from walls or ceilings, **then** place the collection pan below the drill to catch falling powder as drilling progresses. Chg C

6.3.6 **If** needing to prevent dust contaminating the drill, **then** tape a piece of plastic around the drill, just below the chuck. Chg C

6.3.7 Mix the sample material to ensure the sample is representative of the source material.

6.3.8 Transfer the sample from the collection pan into the sample container, being careful to avoid spillage.

6.3.9 Process the sample according to Section **6.7.** Chg C

6.3.10 Upon completion of sample collection and handling, doff sampling gloves and other PPE, as necessary **and** place in a bag or container with other disposable waste items **and** handle according to CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*.

6.4 Multiple-Depth Interval Concrete Sampling

NOTES:

This method may be applied to the collection of concrete samples through multiple-depth intervals from a single area in concrete floors, walls, or ceilings.

Different sample containers are used for each discrete depth interval sample.

Gloves are changed before collecting the sample for each depth interval.

Sampler

6.4.1 Don a new pair of chemical-resistant gloves and other PPE appropriate for the expected contaminants and media being sampled.

6.4.2 Drill to the first-level depth interval. Chg C

6.4.3 Collect the first-level sample with a scoop, spoon, and/or aluminum foil-lined collection pan, as appropriate.

NOTE:

Loose material is removed from the drill holes and concrete surface to minimize any cross-contamination between samples collected through successive depth intervals.

6.4.4 Clean out the sample hole after the required amount of sample material for the first depth interval sample has been collected.

6.4.5 Drill inside the previous hole with a smaller diameter bit to the next depth interval while avoiding contact with the sides of the previous hole.

6.4.6 Collect the sample from the current depth interval.

6.4.7 **If** the sample is collected from a floor or wall, **then** use a small spoon or other suitable tool to retrieve the sample material.

6.4.8 **If** the sample is collected from a ceiling, **then** use a clean collection pan to collect the sample material (e.g. disposable, stainless steel, or aluminum foil lined). Chg C

6.4.9 **After** the required amount of sample material has been collected for the current depth interval, **then** clean out the hole as necessary.

6.4.10 **If** additional samples from subsequent depth intervals are required, **then** repeat Steps **6.4.5** through **6.4.9**.

6.4.11 Record the depth intervals through which the samples were taken on the sample data form.

6.4.12 Process the samples according to Section **6.7**.

6.4.13 After completion of sample collection and handling, doff sampling gloves and other PPE as necessary **and** place in a bag or container with other disposable items and handle according to CP3-WM-1037. Chg C

6.4.14 Text deleted

6.5 Wood, Wallboard, and Masonry Sampling

Sampler

6.5.1 Don a clean pair of chemical-resistant gloves and other PPE appropriate for the expected contaminants and media being sampled.

6.5.2 Select the decontaminated tools and equipment appropriate for the media from which the sample will be collected (for example, hand or keyhole saw, chisel and hammer, etc.).

6.5.3 Use plastic sheeting, as necessary, to prevent tools and equipment from coming in contact with potentially contaminated surfaces.

6.5.4 Cut or chisel into the wood or wallboard, or chisel into the masonry through the depth interval required by the SAP/SAEP.

NOTE:

Samples of wallboard or masonry may consist of pieces of solid material and unconsolidated powder or dust. Both forms of the sample matrix are collected to ensure the sample is representative of the source material.

6.5.5 Collect all sample material into a clean collection pan (e.g. disposable, stainless steel, or aluminum foil lined). Chg C

NOTE:

Samples representing each depth interval are containerized separately.

6.5.6 **If** the SAP/SAEP requires samples at a given point to be collected over more than one depth interval and the matrix is of sufficient depth and/or width such that a single, consolidated piece of material can be retrieved, **then** measure **and** cut the required intervals from the single piece of material.

6.5.7 Transfer the sample material from the collection pan into a clean bowl. Chg C

NOTE:

Sample portions are mixed thoroughly to ensure the sample is representative of the source material.

6.5.8 Reduce the sample material to a uniform size as specified in the SAP/SAEP or the COC. Chg C

6.5.9 Transfer the sample material into the sample container being careful to avoid spillage.

6.5.10 **If** a minimum sample weight is required, **then** repeat steps **6.5.5** through **6.5.9** the sample process until the minimum amount is collected. Chg C

6.5.11 Process the samples according to Section **6.7**.

6.5.12 Upon completion of sample collection and handling, doff sampling gloves and other PPE, as necessary **and** place in a bag or container with other disposable items **and** handle according to CP3-WM-1037. Chg C

6.6 Sampling Miscellaneous Surfaces by Scraping

NOTE:

This method may be applied to the collection of known or potentially contaminated surface layer samples consisting of paint and other surface coatings including oil and residue stained surfaces.

Sampler

6.6.1 Locate **and** record a description of the area to be sampled.

6.6.2 Don a new pair of chemical-resistant gloves and other PPE appropriate for the expected contaminants and media being sampled.

NOTE:

The area immediately around the actual sampling point is **NOT** marked to prevent contamination of the sample.

6.6.3 **If** a specific surface area was requested to be sampled (example, 100 square centimeters), **then** measure **and** mark the desired surface area or use an appropriate size template.

6.6.4 Score an outline of the area to be sampled using a razor knife or equivalent cutting tool along the inside edge of the template or marked area. Chg C

6.6.5 Select the appropriate, decontaminated tools for the sample media to be collected (for example, razor knife, locking pocket knife, paint scraper, brush).

NOTE:

Where possible, the sample is peeled from the substrate by sliding the tool along the score or marked area and underneath the sample material.

6.6.6 Scrape the surface down to the substrate of the desired area **and** collect the sample material into a clean collection pan (e.g. disposable, stainless steel, or aluminum foil lined). Chg C

6.6.7 Mix the sample to ensure it is representative of the source material.

6.6.8 Transfer the sample material from the collection tray into the sample container being careful to avoid spillage.

6.6.9 **If** a minimum sample weight is required, **then** repeat steps **6.6.6** through **6.6.8** until the minimum amount is collected. Chg C

6.6.10 Process the samples according to Section **6.7**.

6.6.11 Upon completion of sample collection and handling, doff sampling gloves and other PPE, as necessary **and** place in a bag or container with other disposable items **and** handle according to CP3-WM-1037. Chg C

6.7 Sample Processing

Sampler

6.7.1 Ensure sample bottle closure lids are properly secured.

6.7.2 **If** required, **then** place the samples in a cooler with blue ice or bagged ice prior to transport to storage location. Chg C

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

6.7.4 Record all field observations and sampling methods according to CP4-ES-2700.

6.8 Post-Sampling Activities

Sampling Lead and Sampler

6.8.1 Complete the COC forms and sample labels according to CP3-ES-2708.

6.8.2 Ensure sample information is documented according to CP4-ES-2700 on sample data forms.

6.8.3 Inspect reusable sampling equipment to ensure gross quantities of sample material have been removed. Chg C

6.8.4 **If** gross quantities of the sample material **CANNOT** be removed from the reusable sampling equipment, **then** handle the reusable sampling equipment as non-fissile waste according to CP3-WM-1037.

6.8.5 Decontaminate sampling equipment according to CP4-ES-2702 **and** record the decontamination event in the logbook or data form.

6.8.6 Dispose of all waste generated from sampling activities according to CP3-WM-1037.

6.8.7 Ensure sample information is documented according to CP4-ES-2700 or project specific data form generated from PEMS.

7.0 ACCEPTANCE CRITERIA

None

8.0 POST PERFORMANCE WORK ACTIVITIES

Sampling Lead and Sampler

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

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

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 COC forms and logbook pages/data forms to the SMO for entry into the 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

The following records may be generated by this procedure:

None

9.2 Records Disposition

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

Appendix A – Acronyms/Definitions

ACRONYMS

COC – Chain of Custody

D&R – Deactivation and Remediation

DOE – U.S. Department of Energy

HEPA – High-Efficiency Particulate Air

IHWP – Industrial Hygiene Work Permit

Chg C

JHA – Job Hazard Analysis

NAM – Negative Air Machines

PF – Potentially Fissile

PPE – Personal Protective Equipment

QC – Quality Control

RADCON – Radiation Control

Chg C

RWP – Radiological Work Permit

SAP/SAEP – Sampling and Analysis Plan/Sampling and Analysis Event Plan

SMO – Sample management Office

DEFINITIONS

COMPOSITE SAMPLE – A sample that consists of a number of discrete samples collected from a source and mixed before analysis. The objective of sample compositing is to represent the average condition of the sampled media.

DISCRETE SAMPLE – A sample collected from one specific horizontal and vertical interval that is not mixed with aliquots from other locations.