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CP4-ES-2702 **FRev. 1**	**TITLE**: Decontamination of Sampling Equipment and Devices	Page 1 of 12

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure establishes methodologies for cleaning and decontaminating sampling equipment and devices that come into contact with fissile and non-fissile sample media and/or contaminants.

The objectives of decontamination are to remove contaminants from surfaces, mitigate the spread of contaminants to other uncontaminated surfaces, prevent cross-contamination of sample matrices, and to minimize personnel exposure and waste volume.

1.2 Scope

This procedure shall be used for decontamination of sampling equipment and devices used for characterization and cleanup verification activities performed by the Deactivation & Remediation (D&R) Contractor personnel, and subcontractor personnel at the U.S. Department of Energy (DOE)-owned Paducah site. This procedure is **NOT** intended to provide direction on the decontamination of large field equipment and equipment components.

2.0 REFERENCES

2.1 Use References

- CP2-HS-2000, *Worker Safety and Health Program*
- 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*
- CP4-ES-2700, *Logbooks and Data Forms*
- CP4-ES-2704, *Trip, Equipment and Field Blank Preparation*
- Equipment or instrument-specific instructions provided by manufacturer
- Job Hazard Analysis (JHA)-11028

2.2 Source References

- Toxic Substances Control Act, Title 40 Code of Federal Regulations Part 761
- U.S. Army Corps of Engineers, February 2001, EM 200-1-3, *Requirements for the Preparation of Sampling and Analysis Plans*
- U.S. Environmental Protection Agency, November 2001, *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, Region 4, Environmental Compliance Branch, Athens, GA., Appendices B and C
- Nuclear Criticality Safety Approval (NCSA) GEN-015, The On-Site Generation, Handling, and Storage of Fissile/Potentially Fissile Material

3.0 COMMITMENTS

None

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Precautions

4.1.1 The sampling personnel performing the task of material sampling shall comply with the requirements of the CP2-HS-2000, *Worker Safety and Health Program*, and any JHAs that address safety and health.

4.1.2 The sampling personnel also shall comply with additional requirements as described in the JHA, Sampling and Analysis Plan/Sampling and Analysis Event Plan (SAP or SAEP) and the radiological work permit (RWP) if required. Keep 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.

4.1.3 Ensure that a minimum of two people are always present and within visual range of each other at all times during any sampling activity.

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

4.1.5 When necessary, cover the ground with cloth or other nonskid material to eliminate or reduce a slipping hazard.

4.1.6 Ensure that approved eyewash is available and operational near the work location.

4.1.7 Handle waste generated during decontamination of fissile or potentially fissile sampling equipment and devices according to CP3-WM-1036, *Nuclear Criticality Safety Implementation Requirements for Handling and Storage of Fissile and Potentially Fissile Waste*.

4.1.8 Handle waste generated during decontamination of non-fissile sampling equipment and devices according to CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*

4.2 Limitations

4.2.1 JHA-11028, Decontamination of Equipment, RWP, Industrial Hygiene Work Permit, (IHWP) and SAP or SAEP, as applicable, should be referred to for detailed limitations and other requirements associated with the work environment.

4.2.2 Additional cleaning and decontamination procedures and methods may be required because of differing contaminant characteristics.

4.2.3 Comply with all posted requirements pertaining to any given sampling location, if applicable.

5.0 PREREQUISITES

5.1 **If** necessary, Ensure Radiological Control (RADCON) and Safety & Health personnel have been notified before initiating decontamination to determine required surveys and monitoring requirements for RWP and IHWP.

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

NOTE:
The items listed may be used as a guide, but may **NOT** be a complete list.

5.2.1 Refer to the task-specific JHA(s); SAP or SAEP, if applicable; and the RWP (if one is required) to determine what instruments, supplies, materials, and equipment are needed to safely execute the decontamination activities.

- Soap (phosphate-free laboratory detergent such as Liquinox®)
- Solvent, as applicable (Penetone, 409, or approved equivalent)
- Tap water
- Analyte-free (deionized) water
- Organic- or analyte-free water
- Nitric acid, as applicable
- Steam cleaner or high pressure hot water washer capable of generating a pressure of at least 2500 pounds per square inch (PSI) and producing hot water and/or steam greater than or equal to (≥) 200°F, with a soap compartment, as applicable
- Natural bristle brushes
- Buckets
- Aluminum foil, plastic wrap, zipper-type plastic bags, and clean plastic trash-size bags
- Plastic sheeting or other impermeable liner for decontamination area
- Paper towels, clean cloths, or rags
- Spill control kit
- Absorbent pads
- Personal protective equipment (PPE)
- Indelible marking pens
- Eyewash Station

5.2.2 Assemble the necessary equipment, tools, and supplies to ensure that sufficient materials and equipment are available for the decontamination activities.

5.2.3 **If** it is necessary to construct a temporary decontamination area, **then** locate area close to the work site to ensure that contaminants are not spread or transferred to other equipment.

5.2.4 Determine whether sampling equipment and devices are expected to be radiologically and/or chemically contaminated, as needed.

5.2.5 **If** known or potential radiological contamination is suspected, t**hen** construct decontamination area using clean material locating in an area that is posted as a Contaminated Area.

5.2.6 **If** known or potential chemical contamination only is suspected, **then** construct decontamination area in an area known to be free of surface contamination.

NOTE:

Impermeable plastic sheeting should **NOT** have any seams, rips, or tears.

5.2.7 Place impermeable plastic sheeting on surface to ensure decontamination area is capable of containing all decontamination fluids.

NOTE:

Release of surveyed sampling equipment and devices to other areas must be approved by RADCON

5.2.8 Ensure RADCON has surveyed sampling equipment and devices prior to being re-located.

5.2.9 Ensure sawhorses or racks constructed to hold sampling equipment or devices while being decontaminated are high enough above the floor of the decontamination area (for example, at least two feet) to prevent equipment from being splashed.

5.2.10 Refer to the manufacturer's instruction manual before selecting a cleaning or decontamination approach for specific field test equipment or instrumentation (for example, pH meters, thermometers, dissolved oxygen meters) to avoid the possibility of damage to instrument components.

6.0 INSTRUCTIONS

6.1 General Requirements

Sampler

6.1.1 **When** sampling equipment or devices are used to collect samples containing oil, grease or other hard to remove materials, rinsing the equipment several times using pesticide-grade acetone, hexane, or petroleum ether may be needed before proceeding with initial cleaning.

6.1.2 Clean sampling equipment or devices with tap water and soap using a brush to remove particulate matter and surface films.

NOTE:

Sampling equipment and devices may be cleaned with soap and high pressure steam or hot water as an alternative to brushing if appropriate and necessary.

Sampling equipment and devices that are cleaned with soap and high pressure steam or hot water should be placed on racks or saw horses at the decontamination area.

Polyvinyl Chloride (PVC) or plastic items should **NOT** be cleaned with steam or hot water pressure.

6.1.3 Rinse sampling equipment or devices thoroughly with tap water.

NOTE:

Solvent and 10% nitric acid rinsates are to be collected in separate containers for treatment or proper disposal as waste

Solvent or nitric acid rinsates should **NOT** be placed in the temporary decontamination area.

6.1.4 **If** required by the SAP or SAEP, **then** rinse Teflon® and glass sampling equipment and devices with a 10% nitric acid solution.

6.1.5 Rinse sampling equipment and devices thoroughly with analyte-free water.

NOTE:

Do **NOT** solvent rinse PVC or plastic items.

6.1.6 **If** required by the SAP or SAEP, **then** rinse or decontaminate sampling equipment and devices thoroughly with an appropriate solvent (for example, when collected samples undergo trace organic or inorganic constituent analyses).

NOTE:

Do **NOT** apply a final rinse with analyte-free water following a rinse with organic or analyte-free water.

A. **After** solvent rinse, **then** rinse sampling equipment and devices with an organic or analyte-free water and air dry.

B. **If** organic or analyte-free water is **NOT** available, **then** allow sampling equipment and devices to completely air dry.

C. Handle fissile or potentially fissile decontamination waste according to CP3-WM-1036.

D. Handle non- fissile decontamination waste according to CP3-WM-1037.

6.1.7 Label decontaminated sampling equipment and devices that have been placed into RAD bags for storage.

6.1.8 **If** sampling equipment is used in a contamination area (CA), **then** contact RADCON to survey equipment.

6.1.9 Handle decontaminated sampling equipment and devices wearing clean, chemical resistant gloves to prevent recontamination.

6.1.10 Store new or cleaned (decontaminated) sampling equipment and devices separately from contaminated equipment.

6.1.11 **If** necessary, **then** prepare equipment rinsate blanks in according to CP4-ES-2704, *Trip, Equipment and Field Blank Preparation*.

6.1.12 Additionally, document any deviations or difficulties encountered in the field concerning sample collection or related activities according to CP4-ES-2700, *Logbooks and Data Forms*.

6.2 Well Sounder or Tape Decontamination

NOTE:

Only the portion of the well sounder cable or tape that has a potential to come into contact with contamination needs to be cleaned.

Sampler

6.2.1 Wash with soap and tap water.

6.2.2 Rinse with tap water.

6.2.3 Rinse with analyte-free water **and** air dry.

6.2.4 Label decontaminated measuring equipment and devices that have been placed into RAD bags for storage.

6.2.5 **If** sampling equipment is used in a CA, **then** contact RADCON to survey equipment before tagging and labeling.

6.2.6 Handle decontaminated measuring equipment and devices wearing clean, resistant gloves to prevent recontamination.

6.3 Pump Decontamination

CAUTION:

In order to avoid damage to pumps or other devices operated by a controller, make sure that the controller does **NOT** become wet during cleaning and decontamination activities.

6.3.1 Pump soapy water through the hose to flush out any residual purge water.

6.3.2 Scrub the exterior of the contaminated hose, pump, and electrical cord, with soap and tap water, using a brush or wipe.

6.3.3 Rinse the soap from the outside of the hose, pump, and electrical cord with tap water.

6.3.4 Rinse the hose with analyte-free water.

6.3.5 Pump tap water through the hose to flush out soapy water (approximately 1 gallon).

6.3.6 Pump analyte-free water through the hose to flush out the tap water.

6.3.7 **If** the pump has a reverse mode, **then** purge with the pump in reverse mode.

6.3.8 Rinse the tap water residue from the outside of hose, pump, and electrical cord with analyte-free water (approximately ¼ gallon) **and** let dry.

6.3.9 Tag **and** label equipment.

6.3.10 **If** sampling equipment is used in a CA, **then** contact RADCON to survey before tagging and labeling.

6.4 Polychlorinated Biphenyl Contaminated Sampling Equipment

6.4.1 Contact Waste Management for guidance on handling Polychlorinated Biphenyl (PCB) waste.

NOTE:

PCB contaminated sampling equipment (CSE) must be decontaminated and verified clean according to Toxic Substance Control Act (TSCA) specifications.

Any equipment to be reused that was suspected to have come in contact with material labeled as PCB and/or a PCB source Greater than or equal to (≥) 50 parts per million (ppm) is considered to be PCB CSE.

Do **NOT** leave PCB CSE unattended.

6.4.2 Following the sampling event:

- Wipe all PCB CSE free of loose liquids and materials at the sampling point.
- Double-wrap PCB CSE in plastic bags.
- Place PCB label on plastic bags.
- Transport bags to decontamination location.

NOTE:

The production of free liquid waste should be avoided.

- Decontaminate PCB CSE by swabbing with 100% penetone, hexane or approved equivalent with dampened rags.
- Double-wrap decontaminated equipment in plastic.
- Place PCB label on plastic.
- Store decontaminated equipment in a cabinet labeled PCB Dedicated Equipment Storage Cabinet.

6.4.3 Perform verification sampling on sampling equipment.

1. Obtain a 100-cm^2 wipe sample from an area on the equipment that was most likely contaminated.

2. Submit sample to the laboratory for analysis.

- **If** the result for the 100-cm^2 wipe is less than (<)10 ug/wipe, **then** deem equipment non-TSCA **and** decontaminate sampling equipment.
- **If** the result for the 100-cm^2 wipe is greater than (>)10 ug/wipe, **then** dispose of the PCB CSE as PCB waste.

NOTE:

All waste produced from the decontamination operations of PCB contaminated sampling equipment is considered PCB waste.

7.0 ACCEPTANCE CRITERIA

None

8.0 POST PERFORMANCE WORK ACTIVITIES

Sampler

8.1.1 Record all decontamination activities on the CP4-ES-2702-F01, *Decontamination Log*.

8.1.2 **If** necessary, ensure sampling equipment and devices are surveyed by RADCON after decontamination.

NOTE:

Decontaminated sampling equipment and devices may be wrapped in aluminum foil or plastic after surveyed and by RADCON.

Sampler

8.1.3 Handle disposable sampling equipment, devices, plastic sheeting and decontamination waste according to the requirements in CP3-WM-1037 for non-fissile waste and CP3-WM-1036 for fissile or potentially fissile waste.

9.0 RECORDS

9.1 Records Generated

The following records may be generated by this procedure:

CP4-ES-2702-F01, *Decontamination Log*

Forms are to be completed in accordance with CP3-OP-0024, *Forms Control*.

9.2 Records Disposition

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

Appendix A – Acronyms/Definitions

ACRONYMS

CA - contamination area

CSE – contaminated sampling equipment

D&R - Deactivation & Remediation

DOE - U.S. Department of Energy

JHA – job hazard analysis

IHWP – Industrial Hygiene Work Permit

NCSA—Nuclear Criticality Safety Approval

PCB - Polychlorinated Biphenyl

PPE – personal protective equipment

PPM – part per million

PSI- pounds per square inch

PVC – polyvinyl chloride

RADCON-Radiological Control

RWP – radiological work permit

SAP/SAEP - sampling and analysis plan/sampling and analysis event plan

TSCA – toxic substances control act

DEFINITIONS

Analyte-Free (Deionized) Water – Tap water treated by passing through a standard deionizing resin column. It should contain no detectable heavy metals or other inorganic compounds at or above method detection limits as defined by a standard inductively coupled Argon Plasma Spectrophotometer (or equivalent) scan.

Equipment Rinsate Blank – A sample of analyte-free water poured over and/or through decontaminated sampling equipment. The purpose of the equipment rinsate blank is to assess the adequacy of the decontamination process.

Nitric Acid (10%) Solution – A solution made from reagent-grade nitric acid and deionized water.

Organic-/Analyte-Free Water – Tap water treated with activated carbon and deionizing units. At a minimum, it must meet the analytical criteria of analyte-free water and should contain no detectable pesticides, herbicides, or extractable organic compounds, and no volatile organic compounds above minimum detectable levels as determined by the U.S. Environmental Protection Agency Region 4 laboratory for a given set of analyses.

Appendix A – Acronyms/Definitions (continued)

PCB CSE – Any equipment to be reused that is suspected to have come in contact with PCB- labeled material and/or a PCB source 2 to 50 ppm.

Solvent – Pesticide-grade isopropanol. Use of a solvent other than pesticide-grade isopropanol (for example, pesticide-grade acetone, hexane, petroleum ether) for sampling equipment cleaning and decontamination purposes must be justified in the SAP or SAEP.

Tap Water – Water from any municipal water treatment system. Untreated potable water is **NOT** an acceptable substitute for tap water.