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CP4-ER-2701 **FRev. 0**	**TITLE**: Large Equipment Decontamination	Page 1 of 16

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TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE 3
1.1 Purpose 3
1.2 Scope 3
2.0 REFERENCES 3
2.1 Use References 3
2.2 Source References 4
3.0 COMMITMENTS 4
4.0 PRECAUTIONS AND LIMITATIONS 4
4.1 Precautions 4
4.2 Limitations 5
5.0 PREREQUISITES 5
5.1 Training 5
5.2 Planning and Coordination 5
5.3 Quality Assurance or Quality Control 5
5.4 Field Preparations 5
6.0 INSTRUCTIONS 7
6.1 Segregation of Field Equipment 7
6.2 Decontamination Pad 7
6.3 Decontamination of Large Field Equipment and Equipment Components 9
6.4 Decontamination of Downhole Drill Rig and Drilling Equipment 12
6.5 Decontamination Steps 13
7.0 ACCEPTANCE CRITERIA 14
8.0 POST PERFORMANCE WORK ACTIVITIES 14
9.0 RECORDS 14
APPENDIX A – ACRONYMS/DEFINITIONS 15

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure describes the methods for removing chemical and radioactive contaminants from large equipment and equipment components used in field investigations and demolition activities. For decontamination of sampling equipment and devices that come into contact with the sample matrix, see CP4-ES-2702, *Decontamination of Sampling Equipment and Devices.*

Decontamination of large equipment and equipment components, due to differing contaminant characteristics, may require additional cleaning and decontamination procedures and methods. Additional requirements may be stated in the task-specific Work Package (WP). The objectives of decontamination are to remove contaminants from surfaces, mitigate the spread of contaminants to other uncontaminated surfaces, and to minimize personnel exposure and waste volume.

1.2 Scope

This procedure shall be used for decontamination of large equipment and equipment components used for activities self-performed by the Deactivation & Remediation (D&R) Contractor personnel and subcontractor personnel.

Exceptions:

This procedure does **NOT** apply when decontamination activities involve fissile/potentially fissile material.

2.0 REFERENCES

2.1 Use References

- CP2-HS-2000, *Worker Safety and Health Program*
- CP2-SM-1000, *Activity Level Work Planning and Control Program*
- CP3-HS-2003, *Hazard Communication*
- CP3-OP-0208, *Required Reading Crew Briefing*
- CP3-RP-1108, *Posting and labeling*
- CP3-RP-1109, *Radioactive Contamination Control and Monitoring*
- CP3-TR-0102, *Conduct of Training*
- CP3-QA-3001, *Issues Management*
- CP3-WM-0022, *Waste Water Accumulation, Storage, and Disposal*
- CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*
- CP3-WM-3015, *Waste Packaging*

2.2 Source References

- CP2-RP-0001, *Radiation Protection Program*
- CP2-WM-0012, *Four Rivers Nuclear Partnership, LLC, Paducah Deactivation and Remediation Project Polychlorinated Biphenyls Mitigation Plan*
- CP3-QA-1001, *Graded Approach*
- CP3-RP-1104, *Radiological Area Entry Control*
- CP4-ES-2702, *Decontamination of Sampling Equipment and Devices*
- JHA-11028, *Decontamination of Equipment*
- U.S. Environmental Protection Agency, Region 4, Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, November 2001.

3.0 COMMITMENTS

None

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Precautions

4.1.1 The D&R Contractor has developed project and site-specific plans that address safety and health, environmental compliance, and radiation protection. The decontamination team (including subcontractor personnel, as directed) performing the task of decontaminating large field equipment and equipment components and related activities shall comply with the requirements of those plans, which include the following:

- CP2-HS-2000, *Worker Safety and Health Program*
- CP2-RP-0001, *Radiation Protection Program*

4.1.2 The decontamination team (including subcontractor personnel, as directed) will comply with additional requirements as described in the task-specific Work Package, Industrial Hygiene Work Permit (IHWP), and the Radiological Work Permit (RWP) (if one is required), which define the work area(s) and discuss expected radiological and non-radiological hazards, required training, personal protective equipment (PPE) requirements, hazard controls, etc.

4.1.3 The decontamination team (including subcontractor personnel, as directed) will participate in the development and/or review of the task-specific Job Hazard Analysis (JHA). Prior to beginning work, the decontamination team (including subcontractor personnel, as directed) will be briefed on, read, and sign off on the RWP, and IHWP (if one is required) and the task-specific JHA.

NOTE:

If performing decontamination, which could include using hazardous chemicals, **then** the hazards and controls, associated with the chemicals shall be addressed as part of the Work Control and JHA process.

4.2 Limitations

Refer to the task-specific JHA, RWP, IHWP, and WP, as applicable, for detailed limitations and other requirements associated with the work environment.

5.0 PREREQUISITES

5.1 Training

- Ensure personnel perform work according to CP2-HS-2000, *Worker Safety and Health Program,* and applicable JHA.
- Prior to performing any action steps identified in this procedure, the user shall complete any applicable training in accordance with their Position Assignment Form (PAF) according to CP3-TR-0102, *Conduct of Training,* and CP3-OP-0208, *Required Reading Crew Briefing.*

5.2 Planning and Coordination

Perform planning and coordination of work activities according to CP2-SM-1000, *Activity Level Work Planning and Control Program,* **and** incorporate Integrated Safety Management System (ISMS) - Environmental Management System (EMS) principles, which are designed to maintain a safe and effective work and physical environment that controls exposure to chemical, radiological, and physical stress consistent with established D&R Contractor and U.S. Department of Energy (DOE) standards, procedures, and orders.

5.3 Quality Assurance or Quality Control

5.3.1 Any departures from the requirements specified in the approved, task-specific WP or this procedure are to be authorized through the Project's Responsible Manager or Supervisor or designee.

5.3.2 Any deviations from this procedure and one-time difficulties encountered in the field are to be documented according to CP3-QA-3001, *Issues Management*.

5.4 Field Preparations

NOTE:

The items listed in this section may be used as a guide, but may **NOT** represent a complete list. Refer to the task-specific JHA(s), WP and the RWP (if one is required) to determine what supplies, materials and equipment are needed to safely execute the decontamination activities.

5.4.1 Assemble the necessary equipment, tools, and supplies for decontamination activities including but **NOT** limited to:

- Tap water

- Natural bristle or wire brushes
- (If required) A Steam cleaner capable of generating a pressure up to 3,000 pounds per square inch (psi) and producing hot water and/or steam greater than 200°F, with a soap compartment **or** a high pressure washer capable of generating a pressure up to 3,000 psi.
- Buckets
- Plastic sheeting or other impermeable liner for decontamination pad
- Aluminum foil
- Spill control kit
- Absorbent pads
- PPE and other safety equipment specified by the JHA, IHWP, and RWP
- SDS, as applicable
- Indelible marking pens

5.4.2 Submit Safety Data Sheets (SDS) for chemicals that will be used for sampling, cleaning, and decontamination according to CP3-HS-2003, *Hazard Communication*, to the D&R Contractor Hazardous Materials Information System (HMIS) Coordinator for approval prior to the chemicals being brought on-site.

5.4.3 Ensure copies of all appropriate SDSs are available at the decontamination location.

5.4.4 Store un-used cleaning materials according to the following:

- Keep soap in clean plastic, metal, or glass containers.
- Store solvents in the unopened original containers. Solvents may be applied using a low pressure nitrogen system fitted with a Teflon® nozzle or by using Teflon® squeeze bottles.
- Keep water in clean tank(s), hand pump sprayer(s), squeeze bottle(s), or apply directly from a hose.

5.4.5 Notify RADCON personnel prior to start of work.

5.4.6 Ensure all needed equipment, tools, and supplies have been gathered to safely and successfully complete the cleaning and decontamination activities.

6.0 INSTRUCTIONS

Field Crew or Operator

6.1 Segregation of Field Equipment

6.1.1 Notify the responsible Facility Manager(s) prior to transferring contaminated equipment between facilities to ensure chemical and/or radiological inventory requirements are maintained.

6.1.2 Store or stage large field equipment and equipment components to be decontaminated separately from clean (decontaminated) field equipment and equipment components.

6.1.3 Ensure equipment and equipment components that have been surveyed are tagged by a Radiological Controls (RADCON) Technician (RCT) after decontamination.

6.1.4 As required, wrap large field equipment or equipment components in plastic (as practicable) and ensure RADON has tagged as clean.

6.1.5 Decontamination date is to be noted **and** marked on wrapped decontaminated equipment **and** components, **or** segregated into designated storage racks or areas as necessary.

6.1.6 Store clean (decontaminated) large field equipment in a contaminant-free environment, preferably in an area upwind of the decontamination area to prevent recontamination.

NOTE:

Decontaminated equipment should be handled only by personnel wearing clean gloves.

6.1.7 **If** the equipment or equipment component is **NOT** to be immediately reused, **then** cover with plastic sheeting **or** wrap in aluminum foil to prevent re-contamination.

6.2 Decontamination Pad

NOTE:

Decontamination of large field equipment and equipment components are to be conducted at the designated decontamination area for the facility, if available, or at a temporary decontamination pad preferably located close to the work site so that contaminants are **NOT** spread during movement of vehicles.

Radiological Control Technician (RCT)

6.2.1 **If** potentially radiologically contaminated large field equipment and equipment components are to be removed from a radiological area for decontamination, **then** the equipment shall first be surveyed by an RCT to determine removable and/or fixed surface contamination levels for comparison to the criteria in CP3-RP-1109, *Radioactive Contamination Control and Monitoring*.

6.2.2 Tag surveyed field equipment and equipment components according to with CP3-RP-1108, *Posting and labeling*, prior to being relocated.

6.2.3 Release surveyed large field equipment and equipment components to other areas if approved by the RCT according to CP3-RP-1109, *Radioactive Contamination Control and Monitoring*.

6.2.4 **If** it is necessary to construct a temporary decontamination pad, **then** determine whether the large field equipment and equipment components are expected to be radiologically and/or chemically contaminated.

CAUTION:

For Known or Potential Radiological Contamination – it is preferable that the decontamination pad be constructed of clean material in an area that is already posted as a Contaminated Area. Also, to the extent possible, select a location within the Contaminated Area that has little to no surface contamination.

NOTE:

This approach avoids contamination of a previously uncontaminated area.

6.2.5 **If** the temporary decontamination pad is constructed in a clean, currently un-posted area, **then** request RADCON to screen the area and provide postings according to CP3-RP-1108, *Posting and Labeling*.

CAUTION:

For Known or Potential Chemical Contamination Only– it is preferable that the decontamination pad is constructed of clean material in an area known or believed to be free of surface contamination or that contains similar contaminants. The temporary decontamination pad shall be set up in a manner as to prevent runoff from leaving the area.

Field Crew/Operator

NOTES:

Step **6.2.6** may be accomplished either by constructing the pad with one corner lower than the rest or by installing a lined, temporary sump or pit in one corner or along one side of the pad.

The decontamination pad should be covered, if practicable, when not in use to prevent the accumulation of precipitation.

Sawhorses or racks should hold equipment being decontaminated high enough above the floor of the decontamination pad (for example, at least two feet) to prevent equipment from being splashed.

6.2.6 **If** a decontamination pad is needed, **then** construct on a level paved surface if possible that facilitates the capture, removal, **and** control of wastewater and precipitation (if any).

A. Line the decontamination pad with an impermeable material with no seams, rips, or tears. This material either should be easily replaced (such as, disposable) or repairable.

B. Place sawhorses or constructed racks capable of supporting equipment/components on the decontamination pad.

6.2.7 **If** large equipment and/or equipment components can be relocated for cleaning, relocate to C-752-C decontamination pad for further cleaning according to the following:

A. Notify Facility Manager for approval to relocate equipment to C-752-C.

B. Identify bay that can be used and relocate equipment to designated bay.

C. Place sawhorses or racks constructed to hold equipment components on the decontamination pad.

6.3 Decontamination of Large Field Equipment and Equipment Components

Field Crew or Operator

NOTES:

This section describes the decontamination of larger equipment and components such as track propelled equipment, backhoes, etc. **NOT** included in other sections of this procedure.

The following steps are to be used for all sampling equipment used to collect routine samples undergoing trace organic or inorganic constituent analyses. This section applies to, but is **NOT** limited to, well casings, well screens, or split-spoon samplers used to obtain samples for chemical analyses.

Section **6.4** outlines the decontamination of the downhole drill rig and drilling equipment (augers, drill stems, rods, tools, and associated equipment) involving the collection of soil samples for trace organic and inorganic constituent analyses and for the construction of monitoring wells to be used for the collection of groundwater samples for trace organic and inorganic constituent analyses.

Decontamination is required for large field equipment or equipment components that touch or enter the ground **and** parts of the equipment that become splattered with potentially-contaminated material.

6.3.1 **If** necessary, perform any maintenance on the equipment to repair hydraulic leaks as identified by the Supervisor.

6.3.2 **If** necessary for successful decontamination activities on track hoes or backhoes, **then** remove all access covers and plates including drive plates inside the tracks, engine cover plates under the engine compartment, etc. allowing access into these areas for inspection and decontamination activities.

NOTE:

Material removed in steps **6.3.3** and **6.3.4** is considered to be contaminated until sampling results or RADCON smears have been completed for those items.

6.3.3 **If** necessary remove any excess material from the storage compartment and cab including rubber floor mat.

6.3.4 Use hand tools or other approved mechanical means to remove bulk material including but not limited to grit, dirt, grease, etc. attached to the equipment or component.

6.3.5 Package waste generated according to CP3-WM-3015, *Waste Packaging*.

6.3.6 Move the equipment and/or component to the designated decontamination pad or area for additional decontamination activities.

6.3.7 Decontamination of equipment will be conducted in the order below.

1) Radiological Contamination

2) Other Hazardous Constituents

6.3.8 Clean and decontaminate all equipment at a designated area (decontamination pad) on the site.

6.3.9 Ensure the decontamination pad meets the specifications of Section **6.2**.

6.3.10 Clean surfaces with tap water and soap using a brush, if necessary, to remove particulate matter and surface films.

NOTE:

PVC or plastic items shall not be steam cleaned. These items shall be cleaned with tap water and soap using a brush, if necessary, to remove particulate matter and surface films.

6.3.11 **If** unable to clean surfaces as described in Step **6.3.10**, **then** clean using a pressure washer **or** steam clean large field equipment and equipment components using soap and a high pressure hot water washer capable of generating a pressure up to 3,000 psi and producing hot water and/or steam greater than 200ºF.

6.3.12 Continue cleaning operation until equipment or equipment component is free of waste material to the extent possible.

NOTES:

Components to be steam cleaned or pressure washed may be placed on racks or saw horses at least two feet above the floor of the decontamination pad for ease of cleaning.

When using a steam or high pressure washer for decontamination of equipment, means to capture overspray should be implemented to reduce the risk of a potential spread/release of contaminants.

6.3.13 Rinse thoroughly with tap water.

NOTES:

Solvent rinseates shall be collected in separate containers for treatment or proper disposal.

No solvent rinseates shall be placed in the pit or sump.

Do not solvent rinse PVC or plastic items.

6.3.14 **If** necessary, **then** rinse thoroughly with an appropriate solvent to remove the materials.

6.3.15 Repeat Steps **6.3.10** through **6.3.14** until the large equipment or equipment component is clean enough to allow a radiological survey by the RCT.

6.3.16 Once equipment and/or equipment component is dry, request RADCON to perform a radiological contamination survey.

NOTES:

Solvents are **NOT** miscible with water therefore the equipment must be completely dry prior to use.

After field cleaning, equipment should be handled only by personnel wearing clean gloves to prevent recontamination.

6.3.17 **If** contamination is discovered by RADCON, **then** repeat decontamination activities until the radiological survey is satisfactorily completed.

6.3.18 Move the equipment away (preferably upwind) from the cleaning area to prevent recontamination.

NOTE:

If plastic sheeting becomes soiled, **then** it is no longer acceptable for covering clean equipment.

6.3.19 Ensure decontaminated equipment to be stored is properly tagged or labeled according to section **6.1**.

6.3.20 **If** large field equipment and/or equipment components were decontaminated in the field, **then** perform the following:

A. Notify Waste Engineer for direction.

B. **If** approval is granted for disposal, **then** dispose waste according to CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*.

C. **If** water will be transferred to an approved treatment facility for further processing, **then** transfer according to CP3-WM-0022, *Waste Water Accumulation, Storage, and Disposal*.

6.3.21 **If** large equipment and/or equipment components were cleaned at C-752-C decontamination pad, **then** perform the following:

A. Dispose of water according to CP3-WM-0022.

B. Dispose of waste according to CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*.

6.4 Decontamination of Downhole Drill Rig and Drilling Equipment

NOTES:

This section outlines the decontamination of downhole drill rigs and drilling equipment (augers, drill stems, rods, tools, and associated equipment) involved in the collection of soil samples and for the construction of monitoring wells.

This Section is to be used for drilling activities involving the collection of soil samples for trace organic and inorganic constituent analyses and for the construction of monitoring wells to be used for the collection of groundwater samples for trace organic and inorganic constituent analyses.

Cleaning and decontamination of all equipment should occur at a designated area (decontamination pad) on the site. The decontamination pad should meet the specifications of Step **6.2**.

The drill rig shall be clean of any contaminants that may have been transported from another hazardous waste site to minimize the potential for cross-contamination.

Field Crew or Operator

6.4.1 Associated drilling and decontamination equipment, well construction materials, and equipment handling procedures shall meet these minimum specified criteria:

A. All downhole angering, drilling, and sampling equipment shall be sandblasted before use if painted and/or there is a buildup of rust, hard or caked matter, etc., that **CANNOT** be removed by steam, pressure wash cleaning (soap and high pressure hot water), or wire brushing.

B. Sandblasting should be performed prior to arrival on-site or well away from the decontamination pad and areas to be sampled.

C. Any portion of the drill rig, backhoe, etc., that is over the borehole (kelly bar or mast, backhoe buckets, drilling platform, hoist or chain pull-downs, spindles, cathead, etc.) shall be steam or pressure wash cleaned (soap and high pressure hot water) and wire brushed (as needed) to remove all rust, soil, and other material that may have come from other hazardous waste sites before being brought on-site.

D. Printing and/or writing on well casing, tremie tubing, etc., shall be removed before use. Emery cloth or sand paper can be used to remove the printing and/or writing.

NOTE:

Most well material suppliers can supply materials without the printing and/or writing if specified when ordered.

E. The drill rig and other equipment associated with the drilling and sampling activities shall be inspected to insure that all oils, greases, hydraulic fluids, etc., have been removed, and all seals and gaskets are intact with no fluid leaks.

F. PVC or plastic materials such as tremie tubes should be inspected. Items that **CANNOT** be cleaned are not acceptable and should be discarded.

6.4.2 Decontaminate large field equipment or equipment components that touch or enter the ground **and** parts of the equipment that become splattered with potentially contaminated material according to Step **6.5.1**.

6.4.3 Any portion of the drill rig, backhoe, etc., that is over the borehole (kelly bar or mast, backhoe buckets, drilling platform, hoist or chain pull-downs, spindles, cathead, etc.) that has been splattered with potentially contaminated material shall be steam or pressure wash cleaned (soap and high pressure hot water) between boreholes according to Step **6.5.2**.

6.5 Decontamination Steps

Field Crew or Operator

NOTES:

The following is the standard procedure for field cleaning augers, drill stems, rods, tools, and associated equipment. This procedure does **NOT** apply to well casings, well screens, or split-spoon samplers used to obtain samples for chemical analyses, which should be cleaned as outlined in Section **6.3**.

Solvents, laboratory detergent, and rinse waters used to clean equipment shall not be reused during field decontamination.

6.5.1 Clean with tap water and soap using a brush, if necessary, to remove particulate matter and surface films. Steam or pressure wash cleaning (Step **6.5.2**) may be necessary to remove matter that is difficult to remove with the brush.

6.5.2 Equipment that is to be steam or pressure wash cleaned may be placed on racks or saw horses at least two feet above the floor of the decontamination pad.

6.5.3 As an alternative to brushing, steam or pressure wash clean equipment using soap and a high pressure hot water washer capable of generating a pressure not to exceed 3,000 psi and/or producing hot water and/or steam greater than 200ºF.

NOTE:

When using a steam or high pressure washer for decontamination of equipment, means to capture overspray should be implemented to reduce the risk of a potential spread or release of contaminants.

6.5.4 Equipment that is hollow or has holes that transmit water or drilling fluids (such as, hollow-stem augers, drill rods, etc.) shall be cleaned on the inside with vigorous brushing, steam or pressure wash cleaned as described in Step **6.5.3**.

6.5.5 Rinse thoroughly with tap water.

NOTES:

After field cleaning, equipment should be handled only by personnel wearing clean gloves to prevent recontamination.

When there is concern for low-level contaminants, it may be necessary to clean this equipment between borehole drilling and/or monitoring well installation using the procedure outlined in Section **6.3**.

6.5.6 Ensure Tagged, labeled, cleaned and decontaminated equipment is stored according to section **6.1**.

7.0 ACCEPTANCE CRITERIA

None

8.0 POST PERFORMANCE WORK ACTIVITIES

8.1.1 Dispose of rags, scrub pads, etc. and other nonhazardous waste according to CP3-WM-1037.

8.1.2 Deliver hazardous waste generated to a Satellite Accumulation Area (SAA) **or** waste Generator Manager 90-day storage area.

8.1.3 **If** a decontamination pad was constructed, **then** at the completion of site activities, disassemble the decontamination pad after waste has been removed and rinse water and/or precipitation has been pumped into containers for treatment or disposal as Investigation Derived Waste (IDW) if required.

8.1.4 Backfill any temporary pit or sump with the material designated by the supervisor.

9.0 RECORDS

None

Appendix A – Acronyms/Definitions

ACRONYMS

EMS – Environmental Management System

FLM – Front Line Manager

HMIS – Hazardous Materials Information System

IDW – investigation derived waste

IHWP – Industrial Hygiene Work Permit

ISMS – Integrated Safety Management System

JHA – Job Hazard Analysis

PPE – personal protective equipment

PSI – pounds per square inch

RADCON – radiological control

RCT – Radiological Control Technician

RWP – Radiological Work Permit

SDS – Safety Data Sheets

WP – work package

DEFINITIONS

Analyte free water (deionized water) - Tap water that has been treated by passing through a standard deionizing resin column. At a minimum, the finished water should contain no detectable heavy metals or other inorganic compounds (for example, at or above analytical detection limits) as defined by a standard inductively coupled Argon Plasma Spectrophotometer (ICP) (or equivalent) scan. Analyte-free water obtained by other methods is acceptable, as long as it meets the above analytical criteria.

Field Crew/Operator – The person(s) performing the technical aspects of this procedure.

Supervisor - The person (or designee) responsible for ensuring that decontamination activities are performed in accordance with the current, approved WP and associated procedures and approving (or coordinating the approval of) deviations there from. Specific position titles with these responsibilities may be designated as project technical lead, sampling manager, lead engineer, sampling team leader, front line supervisor, or task leader.

Appendix A – Acronyms/Definitions (continued)

Radiological Area - Any area within a controlled area defined as a "radiation area," "high radiation area," "very high radiation area," "contamination area," "high contamination area," or "airborne radioactivity area."

Solvent - Pesticide-grade isopropanol. Use of a solvent other than pesticide-grade isopropanol (such as, pesticide-grade acetone, hexane, petroleum ether) for equipment cleaning and decontamination purposes must be justified in the WP. After the waste material is removed, the equipment must be subjected to the standard cleaning procedure. Because these solvents are not miscible with water, the equipment must be completely dry prior to use.

Tap Water - Water from any municipal water treatment system. Untreated potable water is not an acceptable substitute for tap water.