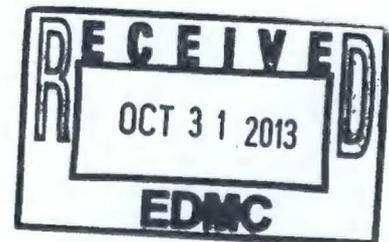


River Corridor Closure Contract

Treatment Plan for Macroencapsulation of 300-FF-2 Operable Unit Debris



October 2013

For Public Release

Washington Closure Hanford

Prepared for the U.S. Department of Energy, Richland Operations Office
Office of Assistant Manager for River Corridor



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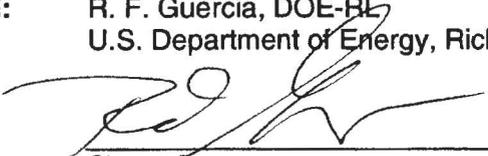
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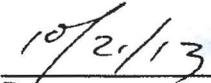
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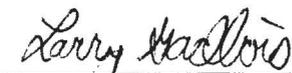


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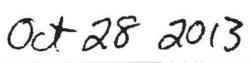


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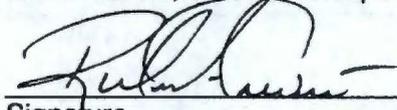
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Signature

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Closure Contract** 

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1.0 INTRODUCTION

Washington Closure Hanford is the River Corridor Closure contractor for the U.S. Department of Energy, Richland Operations Office at the Hanford Site. As part of River Corridor Closure scope, Washington Closure Hanford is responsible for performing both removal and remedial actions within the 300-FF-2 Operable Unit.

One common waste stream generated during both removal and remedial actions is debris. A significant amount of this debris was contaminated during past operations with hazardous materials regulated by the *Resource Conservation and Recovery Act of 1976* (RCRA). Consequently, the contaminated debris designates as both a federal hazardous waste and a State of Washington dangerous waste in accordance with *Washington Administrative Code* (WAC) 173-303-140. Both federal and state regulations enact land disposal restrictions (LDR) for certain wastes without prior treatment. It is the purpose of this document to establish the required treatment methods for hazardous/dangerous debris subject to LDR in order to satisfy disposal requirements at the Environmental Restoration Disposal Facility (ERDF). This plan also satisfies the requirements for on-site treatment contained within the *Remedial Design Report/Remedial Action Work Plan for the 300 Area*, DOE/RL-2001-47, Rev. 3, and the *Removal Action Work Plan for 300 Area Facilities*, DOE/RL-2004-77 Rev. 2.

2.0 PURPOSE

The purpose of this treatment plan is to describe the process for macroencapsulation of hazardous/dangerous debris in accordance with 40 *Code of Federal Regulations* (CFR) 268.45 and WAC 173-303-140(2)(a), "Treatment Standard for Hazardous Debris."

3.0 SCOPE

The scope of this treatment plan encompasses any LDR debris generated during 300-FF-2 Operable Unit remedial and removal actions being conducted pursuant to both the 300-FF-2 Interim Record of Decision and three 300 Area Action Memoranda.

WAC 173-303-040 defines debris as:

"Debris means any solid material exceeding 60 mm particle size that is intended for disposal and that is: A manufactured object; or plant or animal matter; or natural geologic material. However, the following materials are not debris: Any material for which a specific treatment standard is provided in 40 CFR Part 268 Subpart D (incorporated by reference in WAC 173-303-140(2)(a));...Intact containers of hazardous waste that are not ruptured and that retain at least 75% of their original volume. A mixture of debris that has not been treated to the standards provided by 40 CFR 268.45 and other material is subject to regulation

as debris if the mixture is comprised primarily of debris, by volume, based on visual inspection.”

4.0 TREATMENT PLAN

4.1 WASTE DESCRIPTION

Waste addressed by this treatment plan will meet the definition of debris. Common examples include, but are not limited to, the following materials contaminated with and/or composed of hazardous/dangerous waste that are subject to LDR:

- General building demolition materials (e.g., concrete, brick, steel, wood)
- Piping and valves
- Lead shielding (e.g., bricks, sheets, blankets)
- Batteries
- Leaded glass
- Hot cells
- Gloveboxes
- Ducting
- High-efficiency particulate air filters
- Sumps/pumps
- Shielded casks/containers
- Mechanical equipment/components.
- Tanks and vessels
- Reactor and reactor components

4.2 HAZARDOUS/DANGEROUS CONSTITUENTS

The primary RCRA hazardous/dangerous constituents associated with debris consists of heavy metals and can exist as (1) residual contamination from process operations, (2) elemental form (e.g., lead brick), or (3) contain hazardous/dangerous constituents as an integral component of the article (e.g., leaded glass).

The eight RCRA hazardous/dangerous metals include arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. In addition, LDR debris could be contaminated with “F”-listed constituents from past operations.

4.3 TREATMENT METHOD

The treatment requirements in 40 CFR 268.40 were generally established for a homogeneous waste stream. Because of the range of sizes and the heterogeneous nature of debris and the difficulties in handling and processing it, the U.S. Environmental Protection Agency established in 40 CFR 268.45 a set of alternative standards that can be used to treat contaminated debris. These alternative standards include encapsulating (immobilization technologies) the debris in order to prevent hazardous constituents from leaching into the environment. Debris treated with these alternative treatment standards meet LDR requirements.

For radioactively contaminated cadmium, mercury (excluding elemental form), or silver containing batteries and radioactive lead solids, the treatment standard listed in 40 CFR 268.40 is macroencapsulation.

The performance and/or design and operating standard for macroencapsulation are defined in 40 CFR 268.45 Table 1 as:

“Encapsulating material must completely encapsulate debris and be resistant to degradation by the debris and its contaminants and materials into which it may come into contact after placement (leachate, other waste, microbes).”

- The waste must be completely enclosed by the encapsulating material.
- The encapsulating material must act as a barrier so that exposure to leaching media is substantially reduced. This means the material should have limited porosity and not be easily breached.
- The encapsulating media must be resistant to chemical attack by the waste and other active material that could be encountered in the landfill.

The alternative treatment standard requirements do not necessitate testing to demonstrate the effectiveness of the methodology.

5.0 TREATMENT OPERATIONS

Debris eligible for treatment under this plan cannot contain free liquids. If free liquids are present, they must be absorbed or removed and treated as required by state and federal regulations before the waste is macroencapsulated.

Secondly, debris cannot exhibit the characteristics of ignitability, corrosivity, or reactivity. If the debris does display a characteristic, it must be deactivated prior to encapsulation. Once these conditions are met, LDR debris can be macroencapsulated.

5.1 METHODS OF MACROENCAPSULATION

This treatment plan employs use of three methods that may be used in combination to macroencapsulate debris:

1. Use of grout/cement
2. Use of polyurea coating
3. Use of water-based epoxy coating*

*NOTE: Use of water-based epoxy coating is only allowed on the 309 Plutonium Recycle Test Reactor. Use of water-based epoxy coating on any other debris, requires EPA approval.

Use of any other macroencapsulation materials not identified above will require a modification of this treatment plan.

Macroencapsulation will consist of three primary methods.

1. Addition of grout/cement to debris following placement in containers. Containers may vary in size and shape and include, but are not limited to, the following:
 - a. ERDF cans
 - b. Steel boxes
 - c. 208-L (55-gal) drums.
2. Application of polyurea coating to debris by spray-on or traditional hand application methods.
3. Application of water-based epoxy coating to debris by spray-on or traditional hand application methods.

There are certain instances when the size, configuration, or transportation requirements for debris require the use of a composite approach to macroencapsulation. It is acceptable to encapsulate debris with a composite of concrete/grout, polyurea coating, and/or water-based epoxy coatings.

5.2 EQUIPMENT AND SUPPLIES

- Excavator(s)
- Heavy equipment for loading and/or moving containers
- Grout/cement (either supplied offsite or prepared onsite)
- Water supply
- Hand tools
- Personal protective equipment
- Air monitors
- Spray and/or painting tools
- Plastic sheeting.

5.3 MOBILIZATION FOR MACROENCAPSULATION

- Develop procedures/work packages, to include radiological work permits and job hazard analysis, for specific macroencapsulation operations.
- Ensure personnel are trained and qualified to perform operations.
- Prepare area to perform macroencapsulation (e.g., setup of postings, barriers, containment).

5.4 MACROENCAPSULATION PROCESS

For grout/cement operations:

- Prepare container to ensure 100% encapsulation of the waste debris.
- Place debris into chosen containers.
- Fill container with grout/cement ensuring debris is completely covered.
- Close container and allow to cure per engineering direction.

For polyurea and water-based epoxy operations:

- Apply coating to exposed surfaces that require treatment with chosen technique.
- Allow coating to cure/dry per engineering direction.
- Visually inspect surfaces to ensure complete coverage.

NOTE: Grout/cement must flow to the extent it will fill hollow debris items and void spaces within the container. This material will be ASTM C150 Type I-II, or equivalent.

5.5 WASTE DISPOSAL

Macroencapsulated debris will be disposed of at ERDF. A waste profile will be developed and approved by the Waste Operations organization prior to disposal at ERDF.

5.6 AIR MONITORING

Air monitoring will be performed in accordance with the *Removal Action Work Plan for 300 Area Facilities* (DOE/RL-2004-77, Rev. 2, Appendix B) and/or the *Air Monitoring Plan for the 300 Area Central Sites Remedial Action* (WCH 2011), as appropriate.

6.0 REFERENCES

40 CFR 268.40, "Treatment Standards for Hazardous Waste," *Code of Federal Regulations*, as amended.

40 CFR 268.45, "Treatment Standards for Hazardous Debris," *Code of Federal Regulations*, as amended.

DOE/RL-2004-77, 2007, *Removal Action Work Plan for 300 Area Facilities*, Rev. 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901, et seq.

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

WCH, 2011, *Air Monitoring Plan for the 300 Area Central Sites Remedial Action*, UCM Document Number 157961, March 2011, Washington Closure Hanford, Richland, Washington.

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