Supplemental Waste Acceptance Criteria for the Environmental Restoration Disposal Facility

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

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## Terms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>ACM</td>
<td>asbestos-containing material</td>
</tr>
<tr>
<td>ALARA</td>
<td>as low as reasonably achievable</td>
</tr>
<tr>
<td>APTT</td>
<td>approval to treat</td>
</tr>
<tr>
<td>DOE</td>
<td>U.S. Department of Energy</td>
</tr>
<tr>
<td>DOT</td>
<td>U.S. Department of Transportation</td>
</tr>
<tr>
<td>Ecology</td>
<td>Washington State Department of Ecology</td>
</tr>
<tr>
<td>EPA</td>
<td>U.S. Environmental Protection Agency</td>
</tr>
<tr>
<td>ERDF</td>
<td>Environmental Restoration Disposal Facility</td>
</tr>
<tr>
<td>HTD</td>
<td>hard to detect</td>
</tr>
<tr>
<td>N/A</td>
<td>not applicable</td>
</tr>
<tr>
<td>OWTF</td>
<td>onsite waste tracking form</td>
</tr>
<tr>
<td>PPE</td>
<td>personal protective equipment</td>
</tr>
<tr>
<td>RACM</td>
<td>regulated asbestos-containing material</td>
</tr>
<tr>
<td>RadCon</td>
<td>radiation control organization</td>
</tr>
<tr>
<td>RCRA</td>
<td><em>Resource Conservation and Recovery Act of 1976</em></td>
</tr>
<tr>
<td>RO/RO</td>
<td>roll-on/roll-off</td>
</tr>
<tr>
<td>SBW</td>
<td>standard bulk waste</td>
</tr>
<tr>
<td>SHW</td>
<td>special handling waste</td>
</tr>
<tr>
<td>SOF</td>
<td>sum of fractions</td>
</tr>
<tr>
<td>SWAC</td>
<td>supplemental waste acceptance criteria</td>
</tr>
<tr>
<td>WMO</td>
<td>Waste Management Officer</td>
</tr>
<tr>
<td>WSRP</td>
<td>waste shipping and receiving plan</td>
</tr>
</tbody>
</table>
1 Purpose

The supplemental waste acceptance criteria (SWAC) is established to communicate more specific requirements to ensure safe and compliant handling and disposal of waste in the Environmental Restoration Disposal Facility (ERDF). The SWAC does not affect nor relieve regulatory (e.g., U.S. Department of Transportation [DOT] and Resource Conservation and Recovery Act of 1976 [RCRA]) requirements.

2 Introduction

Waste streams may be divided into three categories based on packaging, handling, and disposal methods: standard bulk waste (SBW), special handling waste (SHW), and materials addressed in a waste shipping and receiving plan (WSRP). Chapters 3 and 4 describe the characteristics of SBW and SHW. Wastes that do not meet these characteristics require a WSRP (Chapter 5) in order to be received and disposed at ERDF.

3 Standard Bulk Waste

SBW refers to waste streams that meet the criteria provided in this chapter and can be accepted for routine disposal off of dump ramps at ERDF.

3.1 Packaging

All SBW destined for disposal at ERDF must be loaded according to the following requirements:

1. Shipping conveyances are required to have a covering (e.g., tarp) to prevent the waste from escaping the conveyance. The covering is not required to be air tight and small gaps may be present; however, the covering must be adequate to keep the waste, regardless of its physical characteristics, from escaping the conveyance during transport to ERDF.

2. Black polyethylene or equivalent (6 mm minimum thickness) liners will be deployed in roll-on/roll-off (RO/RO) bulk shipping containers before adding waste. ERDF may require clear or colored liners for some waste streams that have a higher potential to spread contamination. After waste is added, each liner must be closed in a manner to prevent opening during transportation and container-handling operations. The following items do not require liners:

   • Liners are not required for non-DOT radioactive materials (white onsite waste tracking forms [OWTFs] only) waste composed of pure debris with very little soil or fine material. Should dumping conditions warrant, ERDF reserves the prerogative to require liners for specific debris waste streams. This will be communicated to waste generators via email.

   • Dump trucks, truck and pup combinations, and superdumps are not required to use liners. However, ERDF may determine that conditions warrant their use. This will be communicated to waste generators via email.

   • Green ERDF RO/RO and nonradioactive hazard class 9 (i.e., blue DOT) ERDF RO/RO are not required to use poly liners. However, ERDF may determine that conditions warrant their use. This will be communicated to waste generators via email.
3.2 Radiological Contamination and Radiation Limits

The limits listed in this section are provided by the radiation control organization (RadCon) for the protection of personnel involved with disposing, spreading, and compacting waste at ERDF.

Note: Waste with values less than the limits listed here may be shipped without further evaluation for radiological concerns with respect to disposal.

1. Bulk dumped waste with loose (smearable) surface contamination of 300,000 dpm/100 cm² beta-gamma or 10,000 dpm/100 cm² alpha.

2. Bulk dumped waste with fixed contamination of 300 mR/hr beta-gamma or 30,000 dpm/100 cm² alpha.

3. All ERDF RO/ROs with radiation level readings of greater than or equal to 5 mR/hr gamma when measured at 0.3 m (1 ft) from the surface of the ERDF RO/RO require prior notification of the ERDF Waste Management Officer (WMO) for incorporation into the 3-week schedule.

4. All waste packages with radiation level readings of greater than or equal to 80 mR/hr gamma when measured at 0.3 m (1 ft) from the surface of the container (prior to application of additional shielding or distance barriers to the container) require a minimum 24-hour notification. Containers reading greater than or equal to 800 mR/hr at 30 cm will not be offered into the transportation system until direction is provided by the ERDF Waste Management Officer (WMO). This requires close coordination with the ERDF WMO and normally entails notification several days prior to actual shipment. Results of radiological surveys shall be provided via email to the ERDF WMO and the RadCon Supervisor or RadCon Engineer at the time of notification.

5. Soil or other waste that has the potential to generate airborne contamination must be evaluated by the RadCon engineer from the waste generating organization to determine the potential impact to ERDF operations. No soil (waste) shall subject workers to greater than 2% of the annual limit of intake, based on the criteria in the latest revision of RC-100-4.2, Estimating Airborne Radioactivity Levels. The evaluation shall use a 1,500 hour work year for determining the annual limit of intake.

6. Bulk dumped waste streams with >90% (by activity) hard to detect (HTD) radionuclides C-14, Fe-55, Ni-63, Se-79, Tc-99, Pd-107, Eu-155, or H-3 will require special radiological survey techniques. A WSRP must be developed (see Chapter 5) for receipt and disposal of RO/ROs that contain these waste streams. Drums, boxes, or other disposable containers that contain these waste streams and that will require opening at ERDF may also require a WSRP.

3.2.1 ERDF Authorization Basis Considerations

Nonbulk waste shipments having DOT Type B quantities of direct dose radionuclides (e.g., beryllium-7, cobalt-58, cobalt-60, manganese-53, and ruthenium-103) or an adjusted HC-3 sum of fractions (SOF) ≥0.81 (Line 11 on the OWTF) may require a WSRP. Contact ERDF Engineering prior to shipping waste.

3.3 Industrial Hygiene

Wastes that do not require skin or respiratory protection beyond normal work clothes (level D personal protective equipment [PPE]) in order to be handled by workers are acceptable. The waste generator’s staff shall notify the ERDF certified industrial hygienist, or designee, via email or at the in-person ERDF 3-week rolling schedule meeting, of waste to be shipped to ERDF that has the potential to require
additional PPE (e.g., skin or respiratory protection). Waste generator’s industrial hygiene sample results shall be made available to ERDF personnel upon request.

3.4 Physical Limits

Wastes must meet the physical limits described in this section to be eligible for routine disposal (i.e., no WSRP required). Any individual piece of concrete, steel, pipe, miscellaneous metal, building debris, structural steel, or conduit shall not exceed 1.2 m (4 ft) in width, 1.2 m (4 ft) in depth, or 5.2 m (17 ft) in length for RO/RO containers. Concrete in super dumps shall not exceed 1.2 m (4 ft) in width, 1.2 m (4 ft), and 1.5 m (5 ft) in depth without the permission of the Waste Transportation Manager. Nonconcrete long items in super dump trucks shall not exceed 4.6 m (15 ft) in length. Exceptions, including other types of conveyances, will only be accepted on a case-by-case basis and will require a WSRP. The presence of concrete slabs, blocks, or boulders >1.2 m (4 ft) in any dimension or objects over 3.3 m (10 ft) long in an RO/RO container or other conveyance shall be noted on the OWTF in accordance with the guidance provided in the current revision of PRC-PRO-WM-53829, ERDF Waste Acceptance Process.

3.4.1 Concrete Debris

It is preferred that concrete be reduced to rubble with a maximum dimension of approximately 0.3 m (1 ft). However, economics, as low as reasonably achievable (ALARA) considerations, and availability of specialized equipment may dictate that large blocks and boulders be shipped, provided that they meet the following criteria:

- Concrete blocks or slabs and large boulders must meet the physical limits stated in Section 3.4 and must be loaded toward the rear of the container/conveyance.

- The presence of concrete blocks or slabs and large boulders must be noted on the accompanying OWTF in accordance with the guidance provided in PRC-PRO-WM-53829.

3.4.2 Steel Debris

The presence of metal of any length shall be noted on the OWTF in accordance with the guidance provided in PRC-PRO-WM-53829.

Steel plates and structural steel members shall not be forced to fit into RO/RO containers/conveyances by bending or folding as they are being placed into RO/RO containers/conveyances. Bent or folded steel must have the ability to be easily placed into RO/RO containers/conveyances and to leave the container/conveyance during dumping. Steel plates and structural steel members should be bedded on soil or cribbing, whenever possible. Protrusions that may pierce, gouge, or otherwise damage the container or conveyance shall be removed or adequately padded to protect the container/conveyance. Steel plates and structural steel members may be shipped with larger amounts of soil in RO/RO containers/conveyances, but they must be placed in a stable configuration that will not cause waste to be ejected from the container/conveyance during handling.

Pipes or tubes may be flattened by the waste generator. Flattened pipes/tubes shall not have any voids exceeding 15 cm (6 in.) at any point in the pipe or tube after being flattened. Table 1 applies to any pipes/tubes that are not flattened (Section 4.7 provides further direction regarding pipe disposal).
### Table 1. Pipe Disposal

<table>
<thead>
<tr>
<th>Inner Diameter (in.)</th>
<th>Split</th>
<th>Grout</th>
<th>Soil Bedding</th>
<th>Packaging</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤6</td>
<td>N/A</td>
<td>N/A</td>
<td>May be intermixed with soil</td>
<td>Loose</td>
<td>Shall not be bundled; RACM may be left on&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>&gt;6 ≤18</td>
<td>N/A</td>
<td>Yes, pipe ends must allow free flow</td>
<td>Soil bedding should be used</td>
<td>Must be shipped separate from other waste</td>
<td>RACM may be left on&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>&gt;18 ≤48</td>
<td>Shall be split in half</td>
<td>N/A</td>
<td>Soil bedding should be used</td>
<td>Nest&lt;sup&gt;c&lt;/sup&gt;</td>
<td>RACM shall be removed&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>&gt;48</td>
<td>Shall be split in thirds</td>
<td>N/A</td>
<td>Soil bedding should be used</td>
<td>Nest&lt;sup&gt;c&lt;/sup&gt;</td>
<td>RACM shall be removed&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Fittings and valves &gt;18</td>
<td>N/A</td>
<td>Yes, pipe shall be removed as close to fitting/valve as possible</td>
<td>Soil bedding should be used</td>
<td>Must be shipped separate from other waste</td>
<td>RACM may be left on&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Notes: Intact transite pipe (i.e., cement asbestos pipe) shall be considered RACM.

Questions regarding definition of pipe (e.g., length versus diameter) shall be referred to the Waste Management Officer.


b. RACM, such as thermal system insulation, must be properly wetted, double-wrapped on the pipe, and labeled, and it requires a WSRP per Chapter 5 of this document. As an alternative to double-wrapping on the pipe, the container may be double lined. The interior contamination levels of such pipes/tubes must be within the contamination levels specified in Chapter 3. Tearing or ripping of wrapping should be avoided through careful handling and preventive techniques. Pipe ends of >6 in. pipe should be configured to permit piercing at ERDF to allow free flow of grout into the pipe for pipe requiring grouting.

c. Split piping shall be placed one length inside the other (maximum of three pieces) with the open side up. Placing more than three pieces of split piping into a container/conveyance requires a WSRP.

d. Removed RACM shall be packaged and labeled separately, per asbestos handling procedures.

N/A = not applicable

RACM = regulated asbestos-containing material

### 3.4.3 Rebar

All rebar must be cut as close to flush with the surface of concrete blocks or slabs as possible, consistent with maintaining personnel radiation exposure ALARA. Rebar that is attached to concrete rubble should be no more than 0.6 m (2 ft) long. Rebar should be cut into lengths of approximately 1.2 m (4 ft) and mixed with soil to the extent practical. Rebar pieces from decontamination and decommissioning projects where soil is not common can be placed in bulk RO/RO containers/conveyances with other hard debris. Rebar configuration and placement within RO/RO containers/conveyances must ensure that the rebar cannot damage either the walls or floor of the container/conveyance or its tarp during loading and unloading. Rebar balls present handling difficulties at ERDF and could cause equipment damage. Clearly note their presence in a container/conveyance on the accompanying OWTF.
3.5 Asbestos-Containing Material

Asbestos-containing material (ACM) includes both regulated asbestos-containing material (RACM) and non-RACM. A minimum of one liner is required for ACM. Waste containing ACM shall be discussed with the WMO at the 3-week planning meeting. ACM will generally be disposed as SBW. However, the WMO may determine that other disposal methods are more appropriate, based on information about the waste provided by the generator. Air monitoring data gathered by the waste generator while ACM is being excavated, loaded into containers, or otherwise handled shall be communicated to the ERDF Disposal Certified Industrial Hygienist.

4 Special Handling

Special handling methods have been developed at ERDF to allow safe disposal of waste streams that cannot be disposed as SBW due to the waste form. Waste generators having a waste stream listed in this chapter may utilize the predetermined special handling methods associated with the waste stream. The WMO shall be notified of wastes utilizing one or more of these methods at the in-person ERDF 3-week rolling schedule meeting. In special circumstances, notification may be made via email no less than 24 hours prior to offering the shipment into the transportation system. Packaging descriptions in this chapter do not take precedence over DOT requirements. All waste described in this chapter must meet the radiological contamination and radiation limits of SBW (Section 3.2). Refer to PRC-PRO-WM-53829 for documentation requirements for special handling waste.

4.1 Packaged Waste Without Voids

Packaged waste (e.g., boxes, drums, and wrapped or otherwise enclosed objects) with contents that meet the Section 3.2 radiological limits and arrival at ERDF with all voids adequately filled\(^1\) will be handled in the same manner as SBW.

Packaged waste that is adequately filled\(^1\), but with contents exceeding the radiological limits of Section 3.2 internally, is acceptable for disposal using the place-and-cover disposal method. Packages must be able to maintain their integrity during handling and covering at ERDF to be eligible for this disposal method. Final determination as to whether waste is acceptable for this methodology rests with the WMO and the ERDF RadCon engineer.

4.2 Hazardous Debris Treatment

Hazardous debris treatment performed at ERDF is described in CP-59970, *Environmental Restoration Disposal Facility Debris Treatment Plan, formerly WCH-546 Rev. 1*. The plan describes the immobilization treatment methods used at ERDF and the waste generators’ regulatory permission required for treatment at ERDF. A WSRP is required for hazardous debris waste treatment that takes place inside the ERDF trench (see Chapter 5). All other hazardous debris treatment at ERDF shall be performed outside of the trench. An approval to treat (APTT) form, signed by the appropriate regulator (U.S. Environmental Protection Agency [EPA] or Washington State Department of Ecology [Ecology]) and the U.S. Department of Energy (DOE) is required for ERDF to treat the waste.

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\(^1\) Adequately filled applies to waste items that are at least 90% filled as required by ERDF-00011, *Environmental Restoration Disposal Facility Waste Acceptance Criteria formerly WCH-191 Rev 4*, Section 4.3.5. The fill material shall have long-term stability (e.g., cement grout, sand, and polyurethane foam) and compressive strength of at least 140 lb/in\(^2\). Contact the ERDF resident engineer prior to using polyurethane foam.
4.3 Hazardous Waste Stabilization

Hazardous waste that requires stabilization treatment for RCRA metals and meets the radiological contamination limits of SBW (Section 3.2), but does not meet the regulatory definition of debris, may be treated at ERDF. While not requiring a WSRP, this waste requires extensive coordination with ERDF prior to shipment in order to develop and receive regulatory approval of a treatment plan. An APTT form, signed by the appropriate regulator (EPA or Ecology) and DOE, is required for ERDF to treat the waste.

4.4 Empty Conex Boxes, Office Trailers, or Other Large Containers

Conex boxes, office trailers, or other large containers that can be collapsed by ERDF heavy equipment and that meet SBW contamination limits will be placed into the disposal trench and crushed.

4.5 Nonreleasable Retired Rolling Stock

Rolling stock equipment (e.g., trucks, dozers, and trackhoes) that meets SBW contamination limits may be disposed at ERDF. Rolling stock is placed or driven into the disposal area and prepared for disposal. Collection and disposal of hazardous materials, liquids, and batteries are the responsibility of the waste generating organization that is sending the rolling stock to ERDF.

4.6 Tumbleweeds

Tumbleweeds are acceptable for disposal in ERDF. Disposal of this waste is wind sensitive, which may delay actual disposal.

4.7 Void Fill Pipe

Pipe from 6 to 18 in. in diameter and pipe fittings and valves, as shown in Table 1, may be filled with grout at ERDF. The pipe must meet SBW contamination limits on inner and outer surfaces and shall not be pinched, shut, or otherwise closed in a manner that would preclude the free flow of grout through the pipe. Pipes greater than 18 in. should be split as shown in Table 1.

Grout filling pipes or other vessels greater than 18 in. diameter at ERDF require a WSRP. A cost benefit analysis and regulatory screening will be required to demonstrate that flood grouting is preferable to putting the pipe or vessels in an acceptable configuration from the onset.

4.8 Flatbeds

Loads on flatbed trucks and ERDF flats must be placed on dunnage or pallets in a manner that allows safe offloading from the chosen conveyance using the ERDF forklift. Wastes placed on pallets shall be securely strapped or banded to pallets. Contact the WMO prior to shipping for forklift and crane lift capacities.

4.9 Packaged Waste with Voids

Packaged waste (e.g., boxes, drums, and wrapped or otherwise enclosed objects) that is not adequately filled (see footnote 1 in Section 4.1) and with contents that meet the radiological limits of Section 3.2 internally shall be packaged in a manner that allows for easy access to the interior of the package for void filling. Final determination of void fill methodology rests with the WMO. Voids within and between waste objects in the package shall be situated to allow soil or grout, as determined by the WMO, to fill them. Wooden boxes used for this purpose must be able to withstand the hydraulic head of grout without leaking or bursting. Packaged waste that does not meet the radiological limits of Section 3.2 internally
and that requires void fill at ERDF requires a WSRP (see Chapter 5). Waste that requires void fill and does not meet Section 3.2 radiological limits internally will not be accepted for disposal unless the packaging is equipped with high-efficiency particulate air filter protection or valved fill and vent ports.

5 Waste Shipping and Receiving Plans

Wastes not falling into the categories of SBW or SHW require a WSRP.

The WSRP is a requirements document that contains physical, radiological, and industrial hygiene information about the waste (as appropriate); specific requirements for packaging, shipping, and disposal of the waste; hazards specific to the waste; and ERDF procedures or work packages that will be employed to handle the waste at ERDF. As noted in ERDF-PRO-EN-54025, Waste Shipping and Receiving Plans, determining the packaging in the WSRP is an iterative process. Handling, treatment, and/or disposal processes at ERDF may require changes to proposed packaging. A WSRP may pertain to a specific waste item or to an entire waste stream. Waste generators with waste that does not fall into either SBW or SHW categories, as described, shall contact the WMO regarding the need for a WSRP. It may also be advisable to generate a WSRP for wastes or waste streams that require complex arrangements or coordination for proper handling and disposal. A WSRP is developed according to ERDF-PRO-EN-54025. Refer to PRC-PRO-WM-53829 for additional documentation requirements for WSRPs.

Hazardous debris treated inside the ERDF trench must be authorized according to CP-59970 and accompanied by a WSRP. The APTT form(s) for the waste must be referenced in the WSRP.

6 References


