Waste Acceptance Guidelines at the Memphis Facility

Revision 4

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1. RADIOACTIVE WASTE MANAGEMENT

1.1. Purpose and Scope

This document provides Waste Acceptance Guidelines (WAG) for Energy*Solutions* Services, Inc. at Memphis. The WAG provides minimum requirements the domestic generator must meet to ship radioactive material to the Memphis facility.

Material that does not meet the WAG may be accepted after evaluation of data **PRIOR** to shipment of waste. Material received at Energy*Solutions* that does not meet the WAG and has not been evaluated and approved by Energy*Solutions* will be subject to additional waste processing surcharges and/or returned at the generator's expense.

- Radiological acceptance criteria are provided in Table 1 – General Radiological Criteria
- Special waste types requiring prior Energy*Solutions* evaluation and approval before shipping are listed in Table 2 – Waste Requiring Prior Approval and Possibly Special Pricing
- Specific waste packaging guidelines are defined in Attachment 1- Specific Waste Packaging and Shipping Guidelines

Energy*Solutions* conducts routine review of material that does not meet the WAG during "Out-of-WAG" meetings. If the material is approved, additional instructions for packaging, shipping, and scheduling will be provided as required.

1.2. OOWAG Expiration

OOWAG approvals generally expire one year after approval and will need to be re-evaluated by both the customer and OOWAG Committee after one year.

1.3. EnergySolutions Facility Information

Memphis Facility Address	*Mailing Address*	*Main Office*
Energy*Solutions* Services, Inc. 1790 Dock Street Memphis TN 38106	Energy*Solutions* PO Box 13464 Memphis TN 38113	Phone No.: 901-774-1337 Customer Service Fax: 901-942-3307

2. REFERENCES AND FORMS

2.1. References

2.1.1. 40 CFR 261, Identification and Listing of Hazardous Wastes

2.1.2. 40 CFR 268.7, Testing, Tracking, and Record Keeping Requirements for Generators, Treaters, and Disposal Facilities

2.1.3. 10 CFR 20, Appendix G Requirements for Transfers of Low-Level Radioactive Waste Intended for Disposal at Licensed Land Disposal Facilities and Manifests

2.1.4. Tennessee Rule, Chapter 0400-10-.32, Licensing of Shippers of Radioactive Material Into or Within Tennessee

2.1.5. Tennessee Rule, Chapter 0400-20-12, Physical Protection of Category 1 and Category 2 Quantities of Radioactive MaterialES Tennessee Radioactive Material Licenses (current amendments)

2.2. **Forms**

2.2.1. WAG-001-F1, Shipment Summary Form

2.2.2. WAG-001-F2, BWAP Profile Form

2.2.3. WAG-502-F3, Nonstandard Material Approval – International (Segmentation to BCO)

3. SHIPPING, PACKAGING, AND DOCUMENTATION REQUIREMENTS

3.1. Shipments of waste to Energy*Solutions* Tennessee-based processing facilities require

- Compliance with the WAG (including requirements in Attachment 1 Specific Waste Packaging and Shipping Guidelines.).
- Valid contract mechanism established with Energy*Solutions*.
- Shipment scheduling through the designated Memphis Broker, regardless of carrier.

3.2. International projects will be submitted through the facility nonstandard acceptance process prior to receipt to ensure all of the risks are identified and addressed prior to receipt.~~All waste is subject to special packaging and shipping requirements as described in Attachment 1.~~

3.3. **All waste is subject to special packaging and shipping requirements as described in Attachment 1.**

3.4. A completed Shipment Summary Form (WAG-001-F1) shall accompany all shipments.

3.5. A valid Category 2 Tennessee Radioactive Materials License-for-Delivery is required unless ES acts as a broker on behalf of the customer.

3.6. Uniform Low-Level Radioactive Waste Manifest (540/541 forms) accompanying shipment, except UN2908. For equipment an isotopic breakdown of the manifested activities is required.

3.7. DOE/NRC Form 741 for quantities of Special Nuclear Material (SNM) exceeding 0.49 grams per shipment or source materials exceeding 0.49 kilograms per shipment.

3.8. Type A test documentation for each Type A package. Test documentation must accompany shipment for each package.

3.9. Disposal site documentation (see Section 6).

3.10. For shipments involving multiple manifests (Broker Shipments) include a Consolidation Sheet (NRC Form 542) that summarizes each Generator's waste and provide the following for each generator: number of packages, weight, volume, total activity, total SNM and total Source material. A sample Consolidation Sheet can be provided upon request.

3.11. For shipments containing refrigeration equipment, refrigerant and oil must be verified as drained.

3.12. For shipments containing Formerly Characteristic Hazardous Waste a Land Disposal Restriction (LDR) Form or a Certification in accordance with 40 CFR 268.7 (Reference 2.1.3).

4. WASTE ACCEPTANCE GUIDELINES

NOTE

See Table 2 for waste that requires advance approval from Energy*Solutions* PRIOR to shipment. Contact the Memphis Broker regarding advance approval and receipt schedules.

4.1. Sludges and Resins

4.1.1. Packages shall not arrive bulging and under pressure. If any package arrives bulging or under pressure, additional pricing to handle the container may be required.

4.1.2. Resins with container contact dose rates in excess of 80 mR/hr require prior approval.

4.2. Dewatered Liquid Cartridge Filters

Dewatered liquid filters may be acceptable for receipt, however require the following documentation:

a. A summary included on the Shipment Summary Form detailing the filters being shipped and how they are packaged in the inbound shipment. This includes notification of bagged or packaged filters in a sea land of Bulk DAW or packaged exclusively in a liner/box/drum, etc. for processing.

b. Total count of filters on a shipment and an isotopic for each filter. Data for each filter should also include weight, dose rate, and volume or dimensions.

4.3. Metals

4.3.1. *Bulk Metals*

a. Bulk metals may be processed through decontamination or volume reduction for burial. See Table 2 for dimensions and prior approval requirements.

b. The following metals are specifically excluded from import (incidental quantities of the metals listed below may be accepted on a case-by-case basis and MUST be approved prior to shipment).

Not Candidates for Melting (requires OOW review and approval)
Non-ferrous metals such as brass, bronze, aluminum, cadmium, copper, Inconel, Monel, nickel, and chromium.
Molybdenum

Uranium metals
Tantalum
Tungsten
Zirconium
Titanium
Magnesium thorium
Metals exceeding 20 mR/hr contact
Metals coated with asbestos
Lead
Tin
Oil or solvent contaminated metals
Crushed metal items that contain nonmetallic materials
Alloys with melting points above 1649 degrees C
Bulk metals containing >2% incinerable by weight (e.g. wire insulation, paint, other coatings)
Components/materials that are not recyclable that are mixed with or associated with metal for recycle, to the extent that the mix is RCRA hazardous, i.e., leaded glass in a metal glove box.

4.3.2. ***Lead (Pb)***

a. Lead blankets are accepted for possible decon or burial.

b. All lead shall be packaged separately from non-lead materials and labeled as containing lead.

c. Lead-encased metal shapes (LEMS) are accepted for burial. All LEMS are considered out of WAG and require approval prior to shipment. Schematic diagrams shall be provided for all LEMS prior to shipping.

4.4. **Bulk Dry Active Waste (DAW)**

Waste consisting of paper, plastic, cloth, rubber, wood, and light gauge and small metal pieces are acceptable.

4.5. **Explosives**

Waste cannot be accepted that is readily or potentially capable of detonation or explosive decomposition/reaction at normal temperature and pressure; detonation or explosive reaction if subjected to a strong initiating source or heat under confinement; explosive reaction with water; or defined as an explosive by 49 CFR 173.50.

4.6. **Compressed Gases**

Aerosol cans that are empty, punctured, and at atmospheric pressure are acceptable for processing.

4.7. **Hot Particle Waste**

Hot particle waste shall be double bagged, or wrapped in plastic, and marked (see Attachment 1 for additional details). The waste generator must reduce hot particle packages to less than 30″W×38″L×44″H for waste designated for disposal.

4.8. **Bulk Waste Assay Program**

4.8.1. All BWAP processing requires a full isotopic distribution, including a 10 CFR 61 profile, for all waste and a TCLP analysis for each campaign of sludge. Use the WAG-001-F2 form (Bulk Waste Assay Program Profile) to communicate waste matrices to the Memphis Broker. All wastes to be processed through BWAP must have an approved Bulk Waste Assay Profile form (WAG-001-F2).

4.8.2. Waste forms specifically excluded from BWAP processing include:

- Tires

4.8.3. Liquids are accepted if shipped in bulk volumes of 5,000 gallons or greater. There is no minimum volume for absorbed liquids.

4.9. **Tanks and Other Closed Vessels**

Tanks and other closed vessels may be accepted for processing after evaluation and provided that they are completely empty, non-RCRA, and all PCB and asbestos components/coatings identified and removed.

4.10. **Trans-Shipments for Direct Disposal**

Waste that meets low-level radioactive waste package and waste form disposal requirements is accepted, after evaluation, for trans-shipment from the facility directly to a licensed low-level radioactive waste disposal site. Appropriate inspection criteria will be developed based on waste-streams, profile, and disposal destination.

4.11. **Conditions requiring Emergency Response Plan**

Any shipment containing **Plutonium**, **Uranium**, **Uranium Hexafluoride** etc. that ***may*** require the implementation of a site emergency response plan (in accordance with Chapter 0400-20-10.13, RHS 7-2 and associated subparts) will go through the out of WAG process to ensure less obvious possession limits are accounted for before receipt of the shipment. This evaluation is done in conjunction with other license conditions, regulatory obligations, processing and safety evaluations that, at a minimum, shall include approval from the disciplines of Shipping and Receiving, Operations, Health and Safety, Radiological Safety and Environmental Compliance.

4.12. Category 1 and 2 Quantity of Materials

Shipment of radioactive material in quantities in excess of the table below must be approved in advance of shipment. In addition, the shipper of record shall contact Energy*Solutions* Radiation Safety Officer (RSO) and facility Broker prior to shipment's departure to coordinate expected arrival time of the shipment.

Category 1 and 2 Quantity of Materials[3]

Radionuclide [1]	TBq [2]	Curies [2]
Co-60	0.3	8.1
Cs-137	1	27
Gd-153	10	270
Ir-192	0.8	22
Pu-238	0.6	16
Ra-226	0.4	11
Se-75	2	54
Sr-90 (Y-90)	10	270
Yb-169	3	81

[1] If more than one radionuclide is being shipped, the sum of fractions rule applies.
[2] The primary values used for compliance with this Order are TBq. The curie (Ci) values are rounded to two significant figures for informational purposes only.
[3] The Table is abbreviated based on site possession limits.

4.13. Non-Conforming Material

4.13.1. If Energy*Solutions* identifies any non-conforming material, the customer will be contacted for proper disposition. The waste will be put in dispute. Additional charges may apply based on the dispute resolution path.

5. RADIOLOGICAL GUIDANCE

General radiological criteria are defined in Table 1.

6. SPECIAL DISPOSAL-SITE REQUIREMENTS

6.1. Clive, Utah

For low-level radioactive waste (LLRW) to be disposed of at Energy*Solutions'* disposal facility in Clive, generators must ensure that all radionuclides in the LLRW shipment are within Class A limits.

Energy*Solutions* requires approval from the low-level radioactive waste compact of origin, or for states unaffiliated with a low-level radioactive waste compact, the state of origin, to the extent a state can exercise such approval. Prior to receiving an initial low-level radioactive waste shipment for disposal from a generator, Energy*Solutions* requires documentation that the waste has been approved for export.

Table 1 – General Radiological Criteria

A. RADIATION LEVEL OF WASTE		
Waste Type	**mRem/hr @ Contact With Waste**	**Contamination, Fixed or Removable (dpm/100cm^2)**
Dry Active Waste (DAW)	≤ 200	Not Applicable

Metal	≤ 200	See Table1 B. below
Bulk Waste Assay	≤ 50 microR/hr	Not Applicable
Sludges and resins	≤ 20	Not Applicable

B. REMOVABLE EXTERNAL CONTAMINATION (see Note 1)

Radiation Type	Package	Waste	
	dpm/100 cm^2	Average dpm/100 cm^2	Not to Exceed dpm/100 cm^2
β–γ ***except*** for Sr, I, and Ra	≤ 1,000	≤ 500,000	1,000,000
β–γ for Sr-90, I-126, I-131, and I-133	≤ 100	≤ 50,000	100,000
β–γ for I-125, I-129, and Ra-228	≤ 20	≤ 5,000	10,000
α ***except*** for TRUs, Ac, Ra, and Th	≤ 100	≤ 50,000	100,000
α for TRUs, Ac-227, Ra-226, Th-228/230	≤ 20	≤ 5,000	10,000

Note 1: Generator shall provide notification when the specified contamination levels may be exceeded based on qualitative or quantitative data. Energy*Solutions* does not assume or expect that generators conduct external contamination swipes on waste.

C. RADIONUCLIDE CONCENTRATION (see Note 2)

Radionuclide concentration per package (e.g., drum or inner-pack box) shall not exceed the following group or individual limits.

Radionuclides	Limiting Values
Total, all radionuclides with >5-yr half-lives ***except*** H-3, C-14 and Tc-99	≤ 0.3 μCi/cm^3
Total, H-3 and C-14	≤ 0.03 μCi/cm3
Other mixed fission and activation products, Z <84	≤ 25 mCi/ft3
Tc-99	≤ 100 μCi/ft3
Th-232	≤ 5 mCi/ft3 or 100 lb Th/ft3 waste
U-238 as metal or oxide	≤ 15 mCi/ft3 or 100 lb U/ft3 waste
Depleted Uranium contaminated materials	≤ 18 nCi/g
TRUs for processing	≤ 0.1 nCi/g and less than 1% of activity
TRUs for trans-shipment	≤ 10 nCi/g
Ra-226	≤ 10 nCi/g
Other SNM/source material (U-233, U-235, or uranium enriched in U-233/235)	Special approval required

Note 1: Sr-90 and I-129 must be < 2% of the total β–γ activity
Note 2: Disposal sites may have more restrictive concentration limits

7. WASTES REQUIRING PRIOR APPROVAL

The items listed in Table 2, require advance approval from Energy*Solutions* prior to shipment. Additionally, these items shall be specifically identified on the Shipment Summary Form (WAG-001-F1), which is to be included with the shipment. Contact the Memphis Broker regarding advanced approval and receipt schedules. If the following material is shipped to Energy*Solutions* without prior approval, it will be subject to waste processing surcharges or returned at the generator's expense.

Table 2 – Waste Requiring Prior Approval and Special Pricing Consideration

Ref. Section	Requirement
General	Non-radiological hazards shall be identified

Ref. Section	Requirement
General	Due to the non-routine nature of the types of wastes generated during decommissioning projects, Energy*Solutions* reserves the right to review for approval radioactive wastes that originate from decommissioning projects
General	All cask/OOW shipments (minimum of 5 business days prior to arrival of shipment)
General	Wooden or fiber outer containers and poly-wrapped flatbed loads
General	Shipments requiring specialty container or dunnage returns
All	Waste that does not meet the Energy*Solutions* WAG or requires expedited processing
4.1	Resins greater than 80 mR/hr
4.2.1	Dewatered liquid cartridges filters
4.3	Metal pieces larger than 16 ft. × 8 ft. × 8 ft. per individual piece or combination of integral pieces
4.3	Metal pieces heavier than 20,000 lbs. per single piece
Error!	LEMS
4.8	Hot particle waste
4.9	Tanks and other closed vessels
4.10	Trans-shipments for direct disposal
4.12	Emergency Response Plan required
4.12	Category 1 and 2 Quantities of Material. Please note: manifests for exceeding these quantities must be submitted at least 10 -business days prior to the actual shipment arriving at the facility.
Table 1	When contamination levels in Table 1 are exceeded

8. **ATTACHMENTS**

   Attachment 1, Specific Waste Packaging and Shipping Guidelines

9. **CONTACTS**

All wastes shipped to Energy*Solutions*, shall be delivered in a manner consistent with the requirements of 49 CFR. Wood, fiberboard, super-sack containers, 20' sealand containers weighing more than 43,000 lbs or waste shipped in 40' containers require special coordination for offloading purposes.

Unless prior written approval is provided, all containers without lifting devices over 75 lb must be palletized, excluding standard drums (i.e. 30, 55, or 85-gal). Cu. Yd. boxes may be double stacked provided they contain legs or have 2"x4" wood spacer boards sized to fit the containers placed vertically on the floor and between the boxes in order to be removed by a Fork Lift without manual lifting. The boards will be considered sacrificial and disposed of along with the boxes, unless requested to be returned with the conveyance.

Waste Types

The guidance provided in this attachment applies to packaging for the following waste types. See Energy*Solutions* Waste Acceptance Guidelines for waste form guidance and required documentation.

- DAW in Bulk Containers for Sorting Disposal or return to customer DAW in Non-Bulk Containers
- Resins and Sludges for Disposal
- Potentially Clean Waste for BWAP
- Cask Shipments

DAW in Bulk Containers for Sorting Disposal or return to customer

1. Place waste to be sorted inside poly-bags and load the poly-bags into bulk containers.

   NOTE

   Bulk containers larger than 100 ft³ containers shall be capable of being off-loaded through the end. Also note that large cargo containers of DAW accepted at Energy*Solutions* are limited to top and end-loading sealand type containers. Intermodals may be acceptable with prior approval.

2. Segregate materials with different radionuclide content or total activity from the remaining materials. Identify these materials separately on the manifest.
3. **Hot particle waste** received in packages other than 55-gal drums or Energy*Solutions* inner-pack boxes must be size reduced prior to receipt to less than 30″Wx38″Lx44″H. Hot particle waste shall be double bagged, or wrapped in plastic, and marked on the outermost container:

   CONTAINS HOT PARTICLE WASTE—DO NOT OPEN

4. **High Dose Rate Waste >200 mRem/hr** received in packages such as bags, boxes or other discrete items shall be clearly marked and visible upon opening and unloading of bulk waste containers. The use of colored tape, paint or other clearly marked identifier may be used.
5. **Co-mingled waste** for sorting shall be positioned in the bulk container to allow off-loading first. DAW that is packaged within the same bulk container (e.g., metal boxes, cargo containers) as wastes that require other processing methods (i.e., metals processing, BWAP) shall be either segregated by use of partitions or placed in separate containers within the bulk

package and must be clearly labeled. Materials needing other processing methods that are packaged within the same bulk container are also subject to the specific waste packaging guidelines for the applicable processing method.

Potentially Clean Waste (PCW) for BWAP

1. General PCW Packaging Guidelines
   - PCW may be packaged in 55-gal drums. Energy*Solutions* prefers that large quantities of drums be banded and placed on pallets for shipping.
   - PCW may be packaged in "super sacks," on pallets, or in B-25 or B-12 type containers. Maximum package size is 4′W× 6′L× 4′H and 9,500 lb net waste weight.
   - PCW may be packaged in 20' sealand containers or intermodals. Maximum container weight is approximately 43,000 lb gross weight.
2. **"Co-mingled" PCW and Radioactive Waste Packaging Requirements**
   - Notify the Memphis Broker prior to a "co-mingled" shipment.
   - Do not co-mingle packages and segregate PCW from radwaste inside shipping container (i.e., use cargo nets or equivalent to segregate load).
   - Clearly identify PCW by using proper markings, labels, etc.
   - Load PCW into shipping container so that it can be unloaded **AFTER** the radwaste is unloaded.
3. **"Special" PCW Packaging Requirements**

3.1. ***Low-Density Trash PCW***

- Package PCW trash in clear plastic bags (no radiation markings and/or labeling) weighing less than approx. 50 lbs. each.

3.2. ***Sludges PCW***

- Package PCW sludges in metal drum, boxes, or equivalent.
- An internal plastic bag or liner should be placed in drum or box before filling.
- Each "batch" of sludge waste must be sampled and analyzed (by TCLP methods) for hazardous metals. This TCLP analysis must be included with each waste shipping manifest.
- No freestanding liquid.

3.3. ***Water-Filtration Media (i.e., resin, charcoal) PCW***

- Package PCW filtration media in metal drums, boxes, or equivalent.
- No freestanding liquid.

3.4. ***High-Density (i.e., metals, soil, concrete, asphalt) PCW***

- Package high-density waste in metal drums, boxes, super sacks, sealands, intermodals, or equivalent.
- Notify the Memphis Broker prior to any shipment of overweight containers or very large metal components (i.e., tanks, equipment).
- Maximum dimensions for large metal components are 5' x 5' x 5'.

- Maximum container weight is 43,000 lbs. gross weight.

Cask Shipments of High Radioactivity Waste

1. All cask shipments require prior approval from Energy*Solutions*.
2. Customers using an NRC-licensed or other cask not owned by Energy*Solutions* or subsidiaries shall ensure that Energy*Solutions* is a "Registered User" of the licensed cask prior to shipment to an Energy*Solutions* facility.
3. Third-party cask documents (Certificate of Compliance, SAR, and handling and maintenance procedures and drawings) shall be made available to Energy*Solutions* as the NRC Registered User of the cask prior to shipment of the cask to an Energy*Solutions* facility.
4. Individual internal packages need to be clearly marked to match the itemized manifest line items on 541. Additional description of package/loading configuration (e.g. super-sack, drum pallet, rigging) needs to be noted on Shipment Summary Form.
5. Any external smearable levels on packages inside cask exceeding 1,000 dpm/100 cm2 beta/gamma and 100 dpm/100 cm2 alpha requires prior notification.
6. All shipments shall strictly comply with the applicable Certificate of Compliance for the cask in use (i.e., lid torquing, sealing gaskets, weight restrictions, and shoring requirements).

    - Liners containing "grapple bails" are to be identified on the Waste Manifest Form. If the liners have non-Energy*Solutions* supplied bails, the customer must provide the proper grapple lifting device and instructions or procedure for its use. These are to be provided prior to or at the time the liner is offered for shipment. The customer-provided grapple lifting device may need to be made available at later times to move the liner within the facility.

        NOTE

        Liners containing non-Energy*Solutions* grapple bails must have appropriate lifting cables attached if the above criteria cannot be met.

        CAUTION

        Customer-provide grapple lifting devices may have to be shipped separate from the liner if liner requires overweight permit.

    - All drums shall be palletized and pallets shall have proper lifting devices attached. Boxes shall be equipped with appropriate lifting devices or palletized.
    - Disposal container and/or pallet shall have the lifting device secured at the top of the container(s). This is to prevent the cable from becoming caught under or between the container(s) or pallet.

        NOTE

        Lifting devices shall be of sufficient length to allow retrieval and crane hook-up without physically entering the cask. Ensure lifting devices are secured as to prevent them from getting trapped between packages and cask wall.

    - For shipments consisting of high-integrity containers, the pallets on which the containers are placed are considered sacrificial since the pallets are used for proper placement in the concrete vaults.

- When using liners to ship high rad DAW, "wide mouth" liners must be used if the liner is to be returned to the customer. "Small mouth" liners will be cut up and processed as waste.
- When using pallets, the containers shall be positioned to remain balanced and stable on the pallet when lifted clear of the cask.
- When tall, slender containers (i.e., demineralizers) are loaded on a pallet inside a cask, the containers shall be tied or secured together at the tops to prevent containers from falling off the pallets during off-loading. This is not required for a single tier of drums that are placed on a pallet.
- Palletized drums inside a cask shall be loaded to prevent shifting of drums resulting in increased radiation levels measured outside the cask.
- Soft side packages shipped in cask shall be closed per manufacturer's specifications and shall include appropriately rated and accessible lifting devices.

CONTACTS

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