

International Radioactive Material Acceptance Guidelines

Revision 9

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☒ Non-Proprietary

☐ Proprietary

☐ Restricted Information

☐ Safeguards Information

☐ Sensitive Security Information

☐ New

☐ Title Change

☒ Revision

☐ Rewrite

☐ Cancellation

Reason for
Cancellation:

Table of Contents

Section	Page
1. RADIOACTIVE MATERIAL MANAGEMENT	3
2. REERENCES AND FORMS.....	4
3. SHIPPING, PACKAGING, AND DOCUMENTATION REQUIREMENTS.....	4
4. RADIOACTIVE MATERIAL ACCEPTANCE GUIDELINES	5
6. WASTES REQUIRING PRIOR APPROVAL	12

1. RADIOACTIVE MATERIAL MANAGEMENT

1.1. Purpose and Scope

This document provides Radioactive Material Acceptance Guidelines (RMAG) for EnergySolutions Services, Inc. Tennessee-based Commercial Waste Processing (CWP) facility at Bear Creek. The RMAG provides minimum requirements that international customers must meet to ship radioactive material (RAM) to this facility.

EnergySolutions currently has two options by which it can receive and process RAM from international customers. The first option is a specific license and the second is a general license, as defined below. Reciprocal authorization is also required from country of origin.

- A specific license, as detailed in Title 10, Code of Federal Regulations, Part 110 (10 CFR 110) - Subpart C, is issued to EnergySolutions and it specifies in detail the type of RAM to be received and processed as well as the isotopes and amounts of each that can be received.
- A general license allows EnergySolutions to operate within the parameters set forth in, 10 CFR 110 – Subpart C for materials imported for resource recovery and recycling.
- Additional restrictions beyond those discussed in the RMAG apply to materials listed in Attachment 7.2, Table 3; Components, Materials, and Wastes with Special Restrictions per 10 CFR 110.8, List of Nuclear Facilities and Equipment under NRC Export Licensing Authority.

All RAM must be shipped in accordance with TS-R-1, International Atomic Energy Agency (IAEA): Regulations for the Safe Transport of Radioactive Material.

Each generator must have authorization from their regulator to accept returned material, processed or unprocessed, prior to shipping to the Bear Creek Facility.

Each generator who ships RAM to EnergySolutions for processing must have a valid contract mechanism in place that includes a Return of Material clause as prescribed by EnergySolutions' Tennessee Radioactive Materials licenses.

- Radiological acceptance criteria are provided in Table 1.
- Special waste types requiring prior EnergySolutions evaluation and approval before shipping are listed in Table 2 – Waste Requiring Prior Approval and Possibly Special Pricing.
- Components, Materials, and Wastes with Special Restrictions per: 10 CFR 110.8 are listed in Attachment 7.2, Table 3.
- Specific packaging guidelines are defined in Attachment 7.1.
- Examples of incinerable material, compactable material, and metals for recycle material can be found in Attachment 7.3, Table 4 (this table simply lists the most common of each category of material).

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

Bear Creek Facility

EnergySolutions Services, Inc.
Bear Creek Operations
1560 Bear Creek Road
Oak Ridge, TN 37830

Main Office

Phone No.: 865-481-0222
Customer Service: 865-220-1230
Customer Service Fax: 865-220-1612

2. REFERENCES AND FORMS

2.1. References

None

2.2. Forms (can be found in the Customer Portal)

2.2.1. WAG-502-F1, Shipment Summary Form-International

2.2.2. WAG-502-F3, Nonstandard Material Approval-International

3. SHIPPING, PACKAGING, AND DOCUMENTATION REQUIREMENTS

3.1. Shipment of RAM to EnergySolutions Tennessee-based processing facility requires:

- Compliance with the RMAG (including all requirements in Attachment 7.1 – Specific RAM packaging and Shipping Guidelines).
- Valid contract mechanism established with EnergySolutions prior to shipment.
- Shipment scheduling through the designated Technical representative, regardless of carrier.

3.2. A completed Shipment Summary Form (WAG-502-F1) shall accompany all shipments.

3.3. A valid Category 2 Tennessee Radioactive Materials License-for-Delivery unless EnergySolutions acts as a broker on behalf of the generator.

3.4. DOE/NRC Form 741 (or equivalent) for quantities of Special Nuclear Material (SNM) exceeding 0.49 grams per shipment or source materials exceeding 0.49 kilograms per shipment (10 CFR 40.4 – Definitions and 10 CFR 70.4 – Definitions).

- 3.5. Test documentation and/or certification for any package requiring such paper work as set forth in either IAEA (international standards) or 49 CFR (American Standards) must accompany shipment including such packages (e.g., Type A Package).
- 3.6. When materials are imported for energy recovery or recycling under a general license (as specified in 10 CFR 110.20 – General License information), specific care must be taken to minimize non-recyclable material used for shoring or contamination control.

4. RADIOACTIVE MATERIAL ACCEPTANCE GUIDELINES

NOTE

See Table 2 for waste that requires advance approval from EnergySolutions prior to shipment. Contact your Sales Director or Account Executive regarding advance approval and receipt schedules.

4.1. Resource Material accepted under a General License (per 10 CFR 110)

4.1.1. Bulk Metals Recycling

- a. Bulk metals (pipe, pumps, valves, tools, file cabinets, etc.) may be melted for recycling. Carbon steel and stainless steel are the preferred alloys for recycling.
- b. Metal pieces larger than 4.88 meters x 2.44 meters x 2.44 meters (16 ft x 8 ft x 8 ft) or any single metal piece in excess of 9,080 kilograms (20,000 pounds) requires out of WAG approval.
- c. 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)

• Non ferrous metals such as brass, bronze, cadmium, copper, chromium, inconel, monel, etc. • Molybdenum • Uranium metals • Tantalum • Tungsten • Zirconium • Titanium • Aluminum • Stellite • Tin	• Metals coated with asbestos • Alloys with melting points above 1649 degrees C • Galvanized metal with zinc weight percentage >1% of the galvanized metal weight • Crushed metal items that contain entrained nonmetallic materials • Bulk metals containing >2% incinerables by weight (e.g., wire insulation, paint, or other coatings) • Oil or solvent contaminated metals • Mercury-contaminated metal • Metal items containing/coated with 50 ppm or greater levels of PCBs must have coatings removed.
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4.1.2. Lead (Pb)

- a. Lead bricks, sheets, and shapes that have not been deformed, melted, or significantly gouged are accepted for recycling and beneficial reuse. Lead shot, wool and blankets are not accepted for recycle.
- b. Lead shall be packaged separately from non-lead materials. The lead package must be labeled as Lead.
- c. Lead-encased metal shapes (LEMS) are accepted for removal of the encasing material and survey and recycling. All LEMS are considered out of WAG and require approval prior to shipment.
- d. Where possible schematic diagrams should be provided for all LEMS prior to shipping. Each LEM shall be marked so it can be linked to the provided diagram(s).

4.1.3. Oil

Oil may be accepted for incineration for the purpose of energy recovery. Oils for energy recovery must not be hazardous as defined in 40 CFR 261, Subpart C – Characteristics of Hazardous Waste and must not exceed allowable levels in Table 1 of 40 CFR 279. 11, and will also require submission of analytical data for approval. Samples of these oils must be collected and analyzed in accordance with the United States Environmental Protection Agency (USEPA) publication SW-846 entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*.

- a. Direct Processing - Oils such as diesel, #4, #6, etc. and lubricating oils meeting the following specifications are accepted for direct processing.

Heating value	≥ 10,256 cal/g
Viscosity	≤40 weight (≤100 ssu)*
Solids content	≤10% by volume
Aqueous liquid content	≤10% by volume

*The above guidance on oil viscosity indicates a grade of 40 or less.

4.2. Waste Material accepted under a Specific License, per 10 CFR 110

4.2.1. Oil

- a. Low BTU Oils - Oils that do not meet the specifications in 4.1.3 will require enhancement with diesel oil, kerosene or other additives to support combustion. These oils must also comply with 40 CFR 261, 40 CFR 279, USEPA SW-846, and will also require submission of analytical data for approval.

- b. Synthetic Fluid - Most synthetic fluids, including Fyrquel electro-hydraulic control (EHC) fluid are acceptable as undiluted but must be labeled SYNTHETIC FLUID.

c.

4.2.2. Aqueous Liquid, Sludge, and Resin

- a. Aqueous liquids are acceptable and must meet the following parameters:

See Note 1	Incineration	Waste Water Evaporator	Liquid Evap System	Drum Oven
pH	5 to 9	>2 and <12.5	>2 and <12.5	>2 and <12.5
Solids Content by Volume excluding settled sludge	<1.0%	<1%	<1.0%	<1.0%
Oil Content by Volume	<1.0%	No visual sheen	<1.0%	<1.0%
Chelating Agent by Volume	<1.0%	<1.0%	<1.0%	<1.0%
Flash Point °F (°C)	>140 (>45.8)	>250 (>106.9)	>200 (>79.1) (Note 2)	>200 (>79.1) (Note 2)
Oil (mg/L)	N/A	N/A	N/A	N/A
Gross Beta-Gamma (μCi/ml) (Bq/ml)	N/A	<1.0E-3 (<37)	<1.0E-3 (<37)	N/A
Gross Alpha (μCi/ml) (Bq/ml)	N/A	<1.0E-5 (<3.7E-1)	<1.0E-6 (<3.7E-2)	N/A
Beryllium (mg/L)	N/A	N/A	<0.02	N/A
Note 1: Chemical agents present in the waste stream shall be identified.				
Note 2: Actual Flash Point result needed to determine proper processing plan.				

- b. Sludges are considered to be liquids or semi-solids not meeting the above solids criteria because of special incineration handling requirements.

4.2.3. Bulk Dry Active Waste (DAW) for Incineration

RAM consisting of paper, plastic, cloth, rubber, and wood are acceptable. Polyvinyl chloride materials >10% by mass and metal are not candidates for incineration. However incidental small amounts of metal such as nails in boards may be acceptable upon approval.

4.2.4. Large Components for Recycling

EnergySolutions will evaluate all large components >18,100 kilograms (> 39,900 pounds and will not fit into a standard ISO freight container) for receipt on a case-by-case basis for surface preparation and recycling. Specific examples of large components include heat exchangers, steam

generators, low pressure turbines, tanks, closed vessels, and reactor pressure vessels.

4.2.5. Compaction, Packaging, and Return to Customer

In an effort to help international generators maximize storage space on their sites, EnergySolutions will evaluate processing material in order to densify/volume reduce the material for return to generator.

4.2.6. Sources and Standards

Non-metallic sources/standards (e.g. plastic and epoxy) may be acceptable for incineration if activity is <37 kBq per cc (<1 μ Ci per cc). Surface deposited metal sources/standards (e.g. 50 mm Tc-99 disk source) may be acceptable for recycling if total alpha activity is <900 kBq (<0.025 μ Ci) , and total beta activity is <9,000 kBq (<0.25 μ Ci).

4.2.7. Infectious/Medical Waste

- a. Infectious and potentially infectious wastes are accepted after sterilization or other treatment by the generator such as autoclaving or use of bleach to render the wastes noninfectious. Infectious and potentially infectious wastes are materials that are:
- b. Generated in the diagnosis, treatment, immunization of humans or animals, or
- c. Generated through research involving such beings (including the production or testing of biologicals) that are contaminated or potentially contaminated with infectious agents known or suspected to cause human illness.
- d. Sharps as defined by 49 CFR 173.134 means any object contaminated with a pathogen or that may become contaminated with a pathogen through handling or during transportation and also capable of cutting or penetrating skin or a packaging material. Sharps includes needles, syringes, scalpels, broken glass, culture slides, culture dishes, broken capillary tubes, broken rigid plastic, and exposed ends of dental wires. Sharps will require out of WAG approval prior to shipment.

4.2.8. Small Sharp Objects

Small sharp objects such as broken glass, knives, scalpel blades, and other small sharp metal objects will require out of WAG approval prior to shipping.

4.2.9. Oil

Oil is accepted for energy recovery via incineration provided it meets the definition of On-Specification Used Oil listed below or is non-hazardous.

- a. Oils for incineration will require submission of analytical data or process knowledge for approval.

- b. On-Specification Used Oil Table

On-Specification Used Oil	
Constituent/Property	Allowable Level
Arsenic*	5 ppm or less
Cadmium*	2 ppm or less
Chromium*	10 ppm or less
Lead*	100 ppm or less
Flashpoint***	100° F or higher***
PCBs	Less than 2 ppm
Total Halogens**	1,000 ppm or less

* This specification is for Total Metals (per above specifications), not TCLP.

**Total halogen concentrations 1,000 ppm but less than 5,000 ppm may be acceptable provided the presumption of mixing has been successfully rebutted. Used Oil (as defined by 40 CFR 279.1) means any oil that has been refined from crude oil, or any synthetic oil, that has been used and as a result of such use is contaminated by physical or chemical impurities.

***Flashpoint $\geq 100^{\circ}$ F and $< 140^{\circ}$ F require prior approval due to increased storage requirements.

- c. Direct Processing - Oils such as diesel, #4, #6, etc. and lubricating oils meeting the above specifications for used oil or is non-hazardous are accepted for direct processing if they meet the following criteria.

Solids content	$\leq 10\%$ by volume
Aqueous liquid content	$\leq 10\%$ by volume

- d. Synthetic Fluid - Most synthetic fluids, including Fyrquel electro-hydraulic control (EHC) fluid and Mobil SHC lubricating fluids are acceptable as undiluted but must be labeled SYNTHETIC FLUID. All Synthetic Fluid must meet the On-Specification Oil Criteria or be non-hazardous.

4.3. Materials Expressly Prohibited from Import

Materials contaminated with Beryllium and Polychlorinated Biphenyls (PCB) are expressly prohibited from import, as well as wastes defined in 40 CFR 261 as Resource Conservation and Recovery Act (RCRA), Off-specification used oil as defined in 40 CFR 279 and wastes defined in U. S. Code: Title 15 Chapter 53 - Toxic Substances Control.

5. RADIOLOGICAL GUIDANCE

Radiological acceptance criteria are defined in Table 1, Radiological Acceptance Criteria – SI Units. Levels of radiation and radionuclide concentrations exceeding those detailed in Table 1 may be accepted on a case-by-case basis, but **MUST** be approved prior to shipment (Form WAG-502-F3, Nonstandard Material Approval – International).

Table 1. Radiological Acceptance Criteria – SI Units

A. RADIATION LEVEL OF WASTE		
Waste Type	μSv/hr @ Contact with Waste	Contamination, Fixed or Removable (Bq/cm²)
Metal for Recycling through Melting	≤ 200	≤8 β-γ ≤1 α
Dry, Active Wastes for Processing	≤ 1,000	Not Applicable
Lead for Casting *	< 50	0.1 α, for Uranium and daughters, 0.05 α for transuranics and Thorium, and less than 1 β-γ

B. RADIONUCLIDE CONCENTRATION	
Radionuclide concentration per package shall not exceed the following limits without prior evaluation and approval.	
Metals for Recycle	Limiting Values
All Nuclides	5000 Bq/gm
Co-60	20 Bq/gm
Cs-137	5000 Bq/gm
Ni-63	5000 Bq/gm
Sr-90	35 Bq/gm
Pu-241	800 Bq/gm
Total Transuranics (sum of Am-241, Pu-238, Pu-239, Cm-243, Cm-244)	20 Bq/gm
Special Nuclear Material	0.49 grams
Source Material	0.49 kgs
Other Waste Streams	Limiting Values
Total, all radionuclides with >5-yr half-lives <i>except</i> H-3 and C-14	≤ 11 kBq/cc
Total, H-3 and C-14	≤ 1 kBq /cc
Other mixed fission and activation products, Z <84	≤ 200 kBq /cc
Th-232	≤ 40 kBq /m3 or 1E-5 gm Th /cc of waste
Depleted Uranium or Natural Uranium as metal or oxide	≤ 120 kBq / m3 or 6e-6 gm U/cc of waste
TRUs and Ra-226 for processing	≤ 90 Bq/g and less than 1% of activity
No shipment shall equal or exceed 10 CFR 110, Appendix P Category 2 quantities of radionuclides (Sum of Fractions Applies)	
Special Nuclear Material	0.49 grams
Source Material	0.49 kgs

6. WASTES REQUIRING PRIOR APPROVAL

The items listed in Table 2 require advance approval from EnergySolutions prior to shipment. Additionally, these items shall be specifically identified on the Shipment Summary Form (WAG-502-F1), which is to be included with the shipment. Contact your account executive regarding advanced approval and receipt schedules. If the following

material is shipped to EnergySolutions 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 Possibly Special Pricing Consideration

Ref. Section	Requirement
General	Non-radiological hazards shall be identified
General	Due to the non-routine nature of the types of wastes generated during decommissioning projects, EnergySolutions reserves the right to review for approval radioactive wastes that originate from decommissioning projects
General	All cask/OOW shipments (minimum of 3 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 EnergySolutions WAG or requires expedited processing
4.1.1.b	Metal pieces larger than 16 ft. × 8 ft. × 8 ft.(4.88 meters x 2.44 meters x 2.44 meters) per individual piece or combination of integral pieces
4.1.1.b	Metal pieces heavier than 20,000 lbs. (9,080 kilograms) per single piece
4.1.1.c	The following metals for recycling require special evaluation
	- Non-ferrous metals such as brass, bronze, aluminum, cadmium, copper, Inconel, monel, nickel, and chromium - Molybdenum; uranium metals, tantalum, zirconium - Metals that have residues of oils and solvents that can combust during melting process - Titanium, metals coated with asbestos, lead - Galvanized metal - Metal items containing >2% incinerable by weight (e.g. wire insulation, paint, other coatings) - Magnesium thorium - Metals exceeding 200 µSv/hr (20 mR/hr) contact - Stellite - Tin - Crushed metal items that contain entrained nonmetallic materials - Bulk metals containing >2% incinerable by weight (e.g., wire insulation, paint, or other coatings) - Mercury-contaminated metal
4.1.2	Lead, LEMS
4.2.4	Large Components
4.2.6	Sealed sources
4.2.7.d	Sharps as defined in 49 CFR 173.134
4.2.8	Small Sharp Objects
4.2.8.b	Used Oil Flashpoint ≥100 ° F and < 140 ° F

7. ATTACHMENTS

- 7.1. Specific RAM Packaging and Shipping Guidelines
- 7.2. Table 3 — Components, Materials, and Wastes with Special Restrictions per: 10 CFR 110.8 Import/Export Evaluations for Applicability of Appendices
- 7.3. Table 4 — Examples of Incinerable, Compactable, and Metal Melt Material

Attachment 7.1, Specific RAM Packaging and Shipping Guidelines

All RAM shipped to EnergySolutions, shall be delivered in qualified containers per IAEA standards and 49 CFR standards. As a minimum, containers shall meet IP-1 standards. Any deviations shall require prior written approval from EnergySolutions.

Unless prior written approval is provided, all containers without lifting devices over 34 kilograms (75 lbs.) must be palletized, excluding standard drums 113 liter to 321 liter (30-gal to 85-gal). Cubic yard boxes may be double stacked provided they contain legs or have 2" x 4" 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 incinerated with the boxes, unless requested to be returned with the conveyance.

Material Types

The guidance provided in this attachment applies to packaging for the following material types.

- DAW in Bulk Containers for Sorting, Compaction, and Incineration
- DAW for Direct Compaction
- Aqueous Liquids for Direct Incineration
- Animal/Biological Waste for Direct Incineration
- DAW in Non-Bulk Containers for Direct Incineration
- Resins and Sludges for Drying/Incineration
- Oil for Direct Incineration
- Non-RCRA Liquid Scintillation Vials Shipments
- Cask Shipments
- Small Sharp Objects

DAW in Bulk Containers for Sorting, Compaction, and Incineration, or Compaction and Return

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

NOTE

Bulk containers larger than 2.8 cubic meter (100 ft³) containers shall be capable of being off-loaded through the end. Also note that large cargo containers of DAW accepted at EnergySolutions are limited to top and end-loading sealand type containers. Intermodals may be acceptable with prior approval.

2. **Hot particle waste** received in packages other than 55-gal drums or EnergySolutions inner-pack boxes must be size reduced prior to receipt to less than 76 cm W x 96 cm L x

112 cm H (30" W x 38" L x 44" 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

3. **High Dose Rate Waste >2 mSv/hr (>200 mR/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.
4. **Co-mingled incinerable/compactable waste** for sorting shall be positioned in the bulk container to allow off-loading first. DAW for compaction or incineration which is packaged within the same bulk container (e.g., metal boxes, cargo containers) as wastes that require other processing methods (i.e., metals processing) 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 as wastes for sorting and incineration are also subject to the specific waste packaging guidelines for the applicable processing method.

DAW for Direct Compaction

1. EnergySolutions requires the customer ensure waste packaged for direct compaction has been sorted to remove non-conforming materials.
2. Package DAW for direct compaction in 208 liter (55-gal) steel drums or EnergySolutions-provided inner-pack (IP) boxes. EnergySolutions provided inner packs shall not exceed a gross weight of 385 kilograms (850 pounds).

NOTE

EnergySolutions does not consider inner-pack boxes strong-tight containers. Therefore, inner-pack boxes must be shipped inside another qualified outer container.

3. Do not place large metal pieces, such as piping, rods, or steel bars, in the drum or inner-pack box vertically. Place other miscellaneous metal pieces either horizontally or diagonally in the inner-pack box or drum.
4. **Asbestos (friable and non-friable) material received for compaction in packages other than 208 liter (55-gal) drums or EnergySolutions inner-pack boxes** must be size reduced prior to receipt to less than 76 cm W x 96 cm L x 112 cm H (30" W x 38" L x 44" H). Asbestos shall be double bagged using six mil polybags, and marked with the required asbestos warning labels.

Aqueous Liquids for Direct Incineration

1. Put the primary containers in outer-packs to provide double containment in the event of leakage or spillage from the primary container.

2. Use of 113 liter to 321 liter (30-gal to 85-gal) non-leaking polyethylene containers for liquids and sludges is acceptable. In addition, ensure the containers are compatible with the liquids being transported.
3. Over-packed packages containing liquids may be packaged within the same bulk container as materials that require other processing methods; however, the packages need to be segregated by use of partitions. Materials for sorting and incineration should be positioned in the bulk container to allow off-loading first.
4. Bulk quantities of aqueous liquids are acceptable in certified tankers and certified portable tanks designed with forklift pockets compatible with standard fork trucks per IAEA standards and 49 CFR standards.
5. Drums shall not be double stacked in ISO freight containers.

Animal/Biological Waste for Direct Incineration

1. **Inner Wrapping:** Double wrap animal/biological waste that contains liquids or could decompose to produce liquids/fluids using two 4-mil clear poly-bags. Close each bag by heat sealing or taping. Put the bag into a cardboard box or fiberboard drum, with a minimum of 2 in. of incinerable absorbent in the bottom. In all instances, use boxes/drums with no metal parts.

Wrap other animal/biological waste, including contaminated nonmetal laboratory equipment and trash, in one 4-mil clear poly-bag. Heat seal or tape the bag prior to placing it into the cardboard box or fiberboard drum. Biological wastes shall not be mixed with non-incinerables in the same container.

2. **Outer Container:** Only one generator's waste shall be placed in an individual box/drum. Use cardboard boxes or fiberboard drums with no metal parts. Securely close each box/drum with duct tape so that all edges or flaps are not visible. The box or drum is limited to a maximum of 53 cm x 53 cm x 53 cm (21" x 21" x 21") and 34 kilograms (75 lbs) gross weight per package.

Clearly mark each package with the generator's name, and number the package to correspond with the manifested entry. Mark the top of the container, **THIS END UP**. Mark at least two opposite sides of the container, **BIOLOGICAL WASTE — FOR INCINERATION ONLY**. Note: DO NOT mark containers as BIOHAZARDOUS. Biohazardous means the same as infectious at EnergySolutions.

Animal carcasses/tissue shall arrive frozen at EnergySolutions.

3. **Bulk Container Packaging:** All packaging requirements for individual packages apply to each package in the bulk container.

Packages containing animal/biological waste may be packaged within the same bulk container as wastes that require other processing methods; however, the packages need to be segregated by use of partitions. Wastes for sorting and incineration should be positioned in the bulk container to allow off-loading first.

DAW in Non-Bulk Containers for Direct Incineration

1. EnergySolutions will work with generators on an individual basis to develop programs and procedures for direct incineration of material. Each generator **MUST** be approved by EnergySolutions to participate in a direct incineration program prior to shipping materials. The following items are typical requirements for a direct incineration program, but there may be more depending on individual circumstances:
 - Package limited to one cubic meter with no single dimension greater than one meter and gross weight not to exceed 100 kilograms (220 lbs.)
 - No metal on or inside the package
 - No free standing liquids in the same package with DAW for direct incineration
 - Material shall be double bagged and heat-sealed or taped
2. Clearly mark each package with the generator's name, address, contact name, and phone number; number the package to correspond with the manifest entry. Each package shall contain only one generator's material.

Resin and Sludge for Drying/Incineration

Resins and sludges may be packaged in steel or poly liners provided the liner is overpacked in a cask and the resin/sludge can be transferred directly from the liner while in the cask. Liners placed directly on the floor of the conveyance or bulk container (e.g., Sealand) are strictly prohibited. EnergySolutions will accept DOT drums designed for liquids, DOT portable tanks (with fork pockets), and DOT-certified tankers. Small (<30 gallons) polyethylene containers must be overpacked.

NOTE

The preferred packaging for low-dose-rate *sludges* <500 $\mu\text{Sv/hr}$ (<50 mRem/hr) for incineration is steel or poly drums or boxes (preferably 1.4 m³ (50 ft³) type.

Dewatering laterals that contain multiple-cartridge filters (filter trees) make liners unusually difficult to empty and should be avoided.

Oil for Direct Incineration

1. Synthetic fluids, including EHC fluids, must be packaged in separate freight containers from petroleum-based oils.
2. Use of 113 liter to 321 liter (30-gal to 85-gal) non-leaking polyethylene containers for oil is acceptable. In addition, ensure the containers are compatible with the oil being transported.
3. Put the primary containers in steel or poly outer-packs to provide double containment in the event of leakage or spillage from the primary container.

4. Over-packed packages containing oil may be packaged within the same bulk container as materials that require other processing methods; however, the packages need to be segregated by use of partitions. Oils should be positioned in the bulk container to allow off-loading first.
5. Drums shall not be double stacked in ISO freight containers.

Non-RCRA Liquid Scintillation Vials

Liquid Scintillation Vials (LSVs) are acceptable only if packaged in accordance with the following.

Fiberboard containers —

- Shall be double-bagged in sturdy and leak-resistant polyethylene liners. Add enough incinerable absorbent in each bag (e.g., saw dust, corn cobs) to absorb double the amount of liquid contained in the package. Non-incinerable absorbent material (e.g., kitty litter and diatomaceous earth or vermiculite) is not accepted without prior approval.
- Must not exceed 50 kilograms (110 lbs.) container gross weight. Wood cribbing and/or pallets may be required as specified by the beginning of Attachment 1 for containers over 34 kilograms (75 lbs.)

Poly or Fiber drums —

- If packaged in open head drum, shall be double-bagged, containing enough incinerable absorbent to absorb double the amount of liquid contained in the package.
- Packages exceeding 34 kilograms (75 lbs.) need to be palletized or loaded with wood runners underneath the packaging.
- Poly and fiber drums for direct incineration shall not have a metal closure ring.

Cask Shipments

6. All cask shipments require prior approval from *EnergySolutions*.
7. Customers using an NRC-licensed or other cask not owned by *EnergySolutions* or subsidiaries shall ensure that *EnergySolutions* is a “Registered User” of the licensed cask prior to shipment to an *EnergySolutions* facility.
8. Third-party cask documents (Certificate of Compliance, Safety Analysis Report and handling and maintenance procedures and drawings) shall be made available to *EnergySolutions* as the NRC Registered User of the cask prior to shipment of the cask to an *EnergySolutions* facility.
9. Individual internal packages need to be clearly marked to match the itemized manifest line items on NRC Form 541. Additional description of package/loading configuration (e.g. super-sack, drum pallet, rigging) needs to be noted on Shipment Summary Form.

10. 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.
11. 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-EnergySolutions 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-EnergySolutions 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.

- Disposal container with wire rope/synthetic slings and shackles shall have the shackle pins zip tied or otherwise secured to prevent loosening or backing out.
- 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.

Small Sharp Objects

Sharp objects such as broken glass, knives, scalpel blades, and other small sharp metal objects shall be bagged separate from other waste and labelled with "Small Sharp Objects" on the outer packaging.

**Attachment 7.2, Table 3
Components, Materials, and Wastes with Special Restrictions per: 10 CFR 110.8, List of
Nuclear Facilities and Equipment under NRC Export Licensing Authority**

App.	Description
A	Nuclear Reactor Equipment
B	Gas Centrifuge Enrichment Plant Components
C	Gaseous Diffusion Enrichment Plant Assemblies and Components
D	Aerodynamic Enrichment Plant Equipment and Components
E	Chemical Exchange or Ion Exchange Enrichment Plant Equipment and Components
F	Laser-Based Enrichment Plant Equipment and Components
G	Plasma Separation Enrichment Plant Equipment and Components
H	Electromagnetic Enrichment Plant Equipment and Components
I	Reprocessing Plant Components
J	Uranium Conversion Plant Equipment and Plutonium Conversion Plant Equipment
K	Equipment and Components for the Production of Heavy Water, deuterium, and Deuterium Compounds
M	Categorization of Nuclear Material
N	Lithium Isotope Separation Facilities, Plants, and Equipment
O	Fuel Element Fabrication Plant Equipment and Components

NOTE: See 10 CFR 110 for details

**Attachment 7.3, Table 4
Examples of Incinerable Material, Compactable Material and Metal Melt**

Incinerable	Compactable	Metal Melt
Paper and Paper Towels	Large PVC Components	Empty Waste Drums
Tyvek Coverall, booties and Hoods	Insulation and Fire Blankets	Light Gauge Metals
Plastic booties	Ventilation Filters That Contain Metal	Welding rods
Rubber Booties	Metal Reinforced Air Hoses	Metals Cans
Plastic suits	Electrical Cable	Metal Mop Buckets and presses
Rubber Gloves		Heavy Gauge Metal
Plastic and glass bottles		Tools
Wood		Tanks and Components
Cardboard		Piping
Mop heads – dry or damp		Valves
Smears/filter papers		
Cloth		
Rope and nylon slings		
Floor Buffing Pads		
Safety Shoes		
Cotton Gloves		
Vircraft hoods		
Floor sweepings, dust bane, stay dry, etc.		

NOTE: Call your EnergySolutions Technical Representative for questions regarding materials not listed on this table.