

International Radioactive Metals Acceptance Guidelines

Revision 6

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Date: _____Reason for
Cancellation: _____

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1. RADIOACTIVE METALS MANAGEMENT

1.1. Purpose and Scope

This document provides Radioactive Metals 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 metal to this facility.

EnergySolutions currently has two options by which it can receive and process/recycle metal from international customers. The first option is a general license and the second is a specific license, as defined below.

- 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.
- 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 radioactive material to be received and processed as well as the isotopes and amounts of each that can be received.
- 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 metal 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 metal 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.
- Specific packaging guidelines are defined in Attachment 7.1.
- 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.
- Examples of metals for recycle can be found in Attachment 7.3, Table 4 (this table simply lists the most common of each category).

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

<i>Bear Creek Facility</i>	<i>Main Office</i>
EnergySolutions, LLC Bear Creek Operations 1560 Bear Creek Road Oak Ridge, TN 37830	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 at <http://www.energysolutions.com/>)

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 metal to EnergySolutions Tennessee-based processing facilities require:

- Compliance with the RMAG (including all requirements in Attachment 6.1 Specific RAM Packaging and Shipping Guidelines).
- Valid contract mechanism established with EnergySolutions prior to shipment.
- Shipment scheduling through the designated EnergySolutions 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 for quantities of Special Nuclear Material (SNM) exceeding 0.49 grams per shipment or Source Material exceeding 0.49 kilograms per shipment (10 CFR 70.4 and 10 CFR 40.4– 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 metals are imported for 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 METALS 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 metals • Metal items containing/coated with 50 ppm or greater levels of PCBs must have coating 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. All other lead shapes or items will be evaluated on a case-by-case basis. Lead blankets cannot be recycled.

- 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. Schematic diagrams shall 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. Large Components for Recycling

EnergySolutions will evaluate all large components >18,100 kgs (> 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. Metals Expressly Prohibited from Import

Metals 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), 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. (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
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 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
4.1.3	Large Components

7. ATTACHMENTS

7.1. Specific Metal Packaging and Shipping Guidelines

7.2. Table 3 — Components, Materials, and Wastes with Special Restrictions per: 10 CFR 110 Import/Export Evaluations for Applicability of Appendices

7.3. Table 4 — Examples of Metal Melt Material

Attachment 7.1, Specific Metal Packaging and Shipping Guidelines

All metals 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. Deviations shall require prior written approval from *EnergySolutions*.

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.

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 Metals for Recycle

Tanks and Components
Piping
Valves
Empty Waste Drums
Light gauge Metals
Welding rods
Metal cans
Metal mop buckets
Heavy Gauge Tools
Tools

NOTE: Call your *EnergySolutions* Technical Representative for questions regarding metals not listed on this table