International Radioactive Metals Acceptance Guidelines

Revision 11

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- [X] Non-Proprietary
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- [ ] New
- [ ] Title Change
- [X] Revision
- [ ] Rewrite
- [ ] Cancellation

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1. RADIOACTIVE METALS MANAGEMENT

1.1. Purpose and Scope

This document provides Radioactive Metals Acceptance Guidelines (RMAG) for the Energy*Solutions* (ES) Bear Creek facility located in Oak Ridge, Tennessee. The RMAG provides minimum requirements that international customers must meet to ship metal for beneficial reuse[1] or recycle[2] to this facility. Any metal to be shipped for purposes other than beneficial reuse or recycle shall follow the guidelines found in WAG-502, *International Radioactive Material Acceptance Guidelines*.

The minimum requirements are as follows:

- Radiological acceptance criteria as provided in Table 1.
- Metal for beneficial reuse or recycle requiring prior ES evaluation and approval before shipping as listed in Table 2 – Metal for Beneficial Reuse or Recycle Requiring Prior Approval and Possibly Special Pricing.
- Components and Materials with Special Restrictions per 10 CFR 110.8, Attachment 7.2, Table 3, Components and Materials with Special Restrictions per 10 CFR 110.8, List of Nuclear Facilities and Equipment under NRC Export Licensing Authority**.**
- Specific packaging guidelines defined in Attachment 7.1.
- Examples of metals for beneficial reuse or recycle can be found in Attachment 7.3, Table 4 (this table simply lists the most common of each category of material).

Radioactive metal that does not meet the RMAG may be accepted after evaluation of data **PRIOR** to the shipment of metal to the Bear Creek facility. The radioactive metal received at ES that does not meet the RMAG and has not been evaluated and approved by ES may be subject to additional processing surcharges and/or returned at the customer's expense.

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 customer who ships radioactive metal to ES for processing must have a valid contract mechanism in place prior to shipment that includes a Return of Material clause (processed or unprocessed) as prescribed by E*S*' Tennessee Radioactive Materials licenses. In special cases, for beneficial reuse, when radioactive metal cannot be returned due to the customer not having an active license or unable by its regulatory agency or some other restriction to accept the radioactive metal back from ES, the Return of Material clause can be exempted. ES will request the Return of

[1] Metals for beneficial reuse are melted and cast into radiation shielding and/or other reuse products that are used in the nuclear industry and remain subject to a radioactive materials license via a License to License transfer.

[2] Metals with surface radiological contamination only may be surveyed and released for unrestricted use and recycle with special approval. Metals with inaccessible surface or volumetric radiological contamination cannot be released for unrestricted use.

Material clause exemption from ES' Tennessee Radioactive Materials licenses and the exemption shall be in place prior to the customer shipping the radioactive metal.

1.2. Approval for Metal receipt

ES evaluates the customer's description of the metal inventory following a formal procedure through its Out of WAG[3] (OOW) Committee. ES advises the customer promptly of OOW's evaluation and, where appropriate, confirms in writing that the inventory is acceptable for beneficial reuse or recycling. **This approval for beneficial reuse or recycling expires after one year and if the metal has not been shipped by then OOW will need to review inventory details as re-evaluated by the customer to consider a new approval**.

Following Approval from OOW, the Customer is able to agree shipment arrangements with ES in the usual consignor/consignee manner in accordance with the appropriate contract mechanism in place.

1.3. ES Facility Information

ES Facility	*Main Office*
Energy*Solutions* Services, Inc. Bear Creek Operations (BCO) 1560 Bear Creek Road Oak Ridge, TN 37830	Phone Number: +1 865-481-0222 Customer Service: +1 865-220-1230 Customer Service Fax: +1 865-220-1612

2. REFERENCES AND FORMS

2.1. References

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

2.1.2. 40 CFR 261, Identification and Listing of Hazardous Wastes

2.1.3. 40 CFR 279.11, Used Oil Specifications

2.1.4. Tennessee Rule, Chapter 0400-20-13, Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material

2.1.5. ES Tennessee Radioactive Material Licenses (current amendments)

2.2. Forms (can be found at EnergySolutions.com Customer Portal)

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

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

[3] Waste Acceptance Guidelines (WAG) is domestic nomenclature and equivalent to RMAG for international metal.

3. SHIPPING, PACKAGING, AND DOCUMENTATION REQUIREMENTS

3.1. A completed Shipment Summary Form (WAG-502-F1) shall accompany all shipments unless ES acts as a broker on behalf of the customer.

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

3.3. Special Nuclear Material (SNM) exceeding 0.49 grams and Source Material (SM) exceeding 0.49 kilograms, along with Safeguards and Foreign Obligation materials, must be documented and reported per IAEA guidelines. This documentation must be provided to ES prior to shipment departure. Upon receipt of these materials, ES will document and report transactions to NMMSS on DOE/NRC Form 741.

3.4. Test documentation and/or certification for any package requiring such paperwork as set forth in either IAEA (International Standards) or 49 CFR (American Standards) must accompany shipment including such packages (e.g., Type A Package).

4. RADIOACTIVE METALS ACCEPTANCE GUIDELINES

NOTE

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

4.1. Bulk Metals

4.1.1. Bulk metals (pipe, pumps, valves, tools, file cabinets, etc.) may be melted for beneficial reuse and/or recycling. Carbon steel and stainless steel are the preferred alloys for beneficial reuse and/or recycling.

4.1.2. Metal pieces larger than 4.88 meters x 2.44 meters x 2.44 meters (16 ft x 8 ft x 8 ft) require approval prior to shipping.

4.1.3. Metal piece in excess of 9,080 kilograms (20,000 pounds) per single piece require approval prior to shipping.

4.1.4. 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
Zirconium
Titanium
Magnesium Thorium
Metals exceeding 20 mR/hr contact
Metals coated with asbestos
Lead
Galvanized metal with zinc weight percentage >1% of the galvanized metal weight
Stellite
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.

4.2. **Lead (Pb)**

4.2.1. Lead received at Bear Creek must have a determined product path designated for the lead. If there is no product demand or path to legitimately recycle, lead will not be accepted.

4.2.2. Lead bricks, sheets, and shapes that have not been deformed, melted, or significantly gouged are acceptable for beneficial reuse and recycling. Lead shot, wool and blankets are not accepted. All other lead shapes or items will be evaluated on a case-by-case basis.

4.2.3. Lead shall be packaged separately from non-lead materials. The lead package must be labeled as Lead.

4.2.4. Lead-encased metal shapes (LEMS) are accepted for lead extraction and lead recycling if the customer provides documentation that the lead was not exposed to radioactive material. If documentation cannot be provided, the lead will be assumed to have been in contact with radioactive material and can be accepted for beneficial reuse. All LEMS are considered OOW and require approval prior to shipment.

4.2.5. 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).

4.3. Large Components

ES will evaluate large components >18,100 kgs (>39,900 pounds) that do not fit into a standard ISO freight container for receipt on a case-by-case basis for beneficial reuse and/or recycling. Specific examples of large components include heat exchangers, steam generators, low pressure turbines, tanks, closed vessels, and reactor pressure vessels.

4.4. Stored or Residual Energy

All potentially hazardous stored or residual energy present in any metal for processing, and especially equipment that has not been disassembled, must be identified. Systems, components, or equipment, including batteries which have residual energy must be relieved, drained, disconnected, restrained, and otherwise rendered deactivated and stable. Hazardous energy items shall be marked as "deactivated" or be marked "Danger - hazardous energy" if hazardous energy has not been addressed.

Potential stored energy would include electrical, mechanical, pneumatic (air), hydraulic, steam, gravity, etc. Examples include springs, static eliminators, capacitors, batteries, elevated movable machine parts, hydraulic systems, pressurized liquid/gas systems, cylinders, etc.

Information such as technical manuals, drawings, or manufacturer information related to equipment with stored or residual energy must be provided to ES OOW for evaluation prior to the shipment of metal or equipment with stored or potential energy. Any removal, disabling, or by-passing of a barrier or safety device intended to protect individuals from stored or residual energy shall be identified.

Any item where the potential or residual energy cannot be released by the customer is considered to be outside routine pricing arrangements and ES shall require the customer to accept a Special Quote with respect to this item before ES can agree to accept it.

4.5. Metals Prohibited from Import

Metals with PCB (bulk produce waste) concentration of ≥50 ppm are prohibited from import, as well as wastes defined as hazardous waste per 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 without the authorization of the USEPA and the exporting country's appropriate regulatory agency.

4.6. Beryllium Contaminated Metal

4.6.1. Beryllium ***contaminated metal may refer to:***

- Isotopic beryllium
- Elemental beryllium
- Beryllium compounds (beryllium oxide, beryllium fluoride, etc.)

4.6.2. Radioactive metal for processing will be considered as beryllium contaminated if any of the following criteria are exceeded.

Descriptor	Criteria
Loose contamination	0.2 µg/100 cm^2 elemental, or 30,000 dpm/100 cm^2 radiological
Percent Contamination	0.1% by weight

4.6.3. Any shipment, package, or container that arrives with beryllium placarding, labeling, markings, etc., without prior approval will be placed on hold and investigated prior to processing.

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 and MUST be approved prior to shipment (Form WAG-502-F3, Nonstandard Material Approval – International).

Table 1. Radiological Acceptance Criteria – SI Units

A. RADIATION AND CONTAMINATION LEVEL OF METAL		
Metal Type	**Contact Dose Rate**	**Removable Contamination (Bq/cm^2)[1]**
Metal for Beneficial Reuse and/or Recycling through Metal Melt	≤ 200 μSv/hr	≤8 β–γ ≤1 α
Lead for Casting	≤ 50 μSv/hr	0.1 α for uranium and daughters, 0.08 α for transuranics and thorium, and less than 4 β–γ

[1]Customer may apply a fixative such as a PCB-free paint where removable contamination exceeds these levels. Customer should limit the amount of fixative applied as much as practicable.

B. RADIONUCLIDE CONCENTRATION	
Radionuclide concentration per package shall not exceed the following limits without prior evaluation and approval.	
Metals for Beneficial Reuse	**Limiting Values**
All Nuclides	≤ 5000 Bq/gm
H-3	≤ 1000 Bq/gm
C-14	≤ 1000 Bq/gm
Co-60	≤ 40 Bq/gm
Ni-63	≤ 5000 Bq/gm
Sr-90	≤ 35 Bq/gm
Cs-137	≤ 5000 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

6. METALS REQUIRING PRIOR APPROVAL

The items listed in Table 2 require advance approval from ES 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 ES without prior approval, it will be subject to waste processing surcharges or returned at the customer's expense.

Table 2 – Metal for Recycle 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, ES reserves the right to review for approval radioactive metals for beneficial reuse and/or recycle that originate from decommissioning projects
General	All cask shipments (minimum of 3 days prior to release of shipment)
General	Wooden or fiber outer containers and poly-wrapped flatbed loads
General	Shipments requiring specialty container or dunnage returns
All	Metal that does not meet the ES WAG or requires expedited processing
4.1.2	Metal pieces larger than 4.88 meters x 2.44 meters x 2.44 meters (16 ft x 8 ft x 8 ft) per individual piece or combination of integral pieces
4.1.3	Metal pieces heavier than 9,080 kilograms (20,000 pounds) per single piece
4.1.4	Bulk Metals that require special evaluation
4.2	Lead, LEMS
4.3	Large Components
4.4	Stored of Residual Energy
4.6	Beryllium Contaminated Metal
Table 1	When levels in Table 1 are exceeded

7. ATTACHMENTS

7.1. Specific Metal Packaging and Shipping Guidelines

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

7.3. Table 4 — Examples of Metal Melt Material

7.1. Attachment 7.1, Specific Metal Packaging and Shipping Guidelines

All metals shipped to ES 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 ES.

Any equipment not shipped in its original or intended configuration should be noted on manifest additional notes page or form WAG-502-F3, Nonstandard Material Approval - International. An example would be a compactor or baler that was normally operated in a vertical configuration and now being shipped in a horizontal configuration possibly creating additional pressure applied to certain components.

When metals are imported for beneficial reuse and/or recycling, specific care must be taken to minimize non-recyclable material used for shoring or contamination control.

Attachment 7.2, Table 3.
Components and Materials 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 Beneficial Reuse and/or Recycle

Empty Drums
Light Gauge Metals
Welding rods
Metals Cans
Metal Mop Buckets and presses
Heavy Gauge Metal
Tools
Tanks and Components
Piping
Valves

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