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Title: Guidance Document for Mult-Facility Recycle/Reuse/Free Release of Metals from Radiological Control Area

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Los Alamos
NATIONAL LABORATORY

## DISCLAIMER

# Guidance Document for Multi-Facility Recycle / Reuse / Free Release of Metals from Radiological Control Areas

Los Alamos National Laboratory
Number: LA-UR-XX
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## 1. Introduction

### 1.1 Overview

Approximately 15% of the Low Level Waste (LLW) produced at Los Alamos consists of scrap metal equipment and materials. The majority of this material is produced by decommissioning and modification of existing facilities. To address this waste stream, Los Alamos has developed a scrap metal recycling program that is operated by the Environmental Stewardship Office to minimize the amount of LLW metal sent for LLW landfill disposal.

Past practice has supported treating all waste metals generated within RCA's as contaminated. Through the metal recycling project, ESO is encouraging the use of alternatives to LLW disposal. Diverting RSM from waste landfill disposal protects the environment, reduces the cost of operation, and reduces the cost of maintenance and operation at landfill sites. Waste minimization efforts also results in a twofold economic reward: The RSM has a market value and decontamination reduces the volume and therefore the amount of the radioactive waste to be buried within landfills.

### 1.2 In this Document

**1.3 Document Hierarchy**

This document provides guidance for integrating standards from current documents applicable to the release of scrap metals from RCA's. DOE Order 5400.5, "Radiation Protection of the Public and the Environment" is the primary governing document.

**1.4 Document Ownership**

The Environmental Management's Environmental Stewardship Office is responsible for the content of this document.

**1.5 Organizations**

The recycling program for metal originating in an RCA is under the direction of Environmental Management's Environmental Stewardship Office Program (EM/ESO) and the Solid Waste Management Organization (SWO).

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## 2.0 Purpose

This document was created to provide an integrated, systems approach for minimizing the amount of metal released from RCA's into landfill disposal. This system approach includes an algorithm to assist generators in determining cost effective

contaminated metals, waste acceptance criteria for metal melt, etc. Attachments to this document provide densities of common release criteria for bulk contaminated metals.

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## 3.0 Scope

This guidance can be used for determining the disposition of all surface and volume contamined metals generated within Radiological Control Areas (RCAs) at LANL. This standard applies to all Laboratory operations, including facilities under the LANL Decommissioning program located at LANL.

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## 4.0 Definitions and Acronyms

**4.1 Definitions**

**Activation-** the process if inducing radioactivity by irradiation (for example, charged particle beams).

**Cost/benefit analysis-** An analysis designed to find the most cost effective method for the given benefits of a given process or activity.

**Low-level waste-** Waste that contains radioactivity, and is not classified as high-level waste, transuranic waste, or spent nuclear fuel, as defined in DOE Order 5820.2A, "Radioactive Waste Management." Test specimens of fissionable material irradiated for research and development only, an not for the production of power or plutonium, may be classified as low level waste, provided the concentration of transurancis is less than 100 nCi/g of waste.

**Nonradioactive waste-** Waste that meets the appropriate release criteria for both surface and volume contamination. Nonradioactive waste can be released to an appropriate facility that is not licensed to accept radioactive material, such as a sanitary or hazardous waste landfill.

**Volume contamination-** Radioactive contamination dispersed throughout a matrix in excess of the appropriate release criteria. Examples of volume contamination applicable to this regulation include metals activated by irradiation (for example, beams of charged particles) and smelted metals (where the smelting

process distributes previous surface contamination throughout the entire volume of the metal).

**Waste generator-** Any individual and his or her line management having direct responsibility for operations that generate waste (for example, a research scientist or his project manager). A waste generator may be a member of the organization responsible for the facility or site where the waste was generated. Waste generators have responsibility for the characterization, storage, and disposal of the waste they generate.

**4.2 Acronyms**

| | |
|---|---|
| RadCon | U.S. Department of Energy Radiation Control Manual |
| RCA | Radiological Control Area |
| RCT | Radiological Control Technician |
| RSM | Radioactively contaminated scrap metal |

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## 5.0 RCA Metal Reuse / Recycle and Release Guidance

Options for disposition of metals include free release of metals, surface decontamination, metal melt, and release of volumetrically contaminated material using DOE Order 5400.5 guidance. The decision flow diagram (Figure 1) has been designed to assist the waste generators on deciding the appropriate waste stream for the metals leaving Radiologically Controlled Areas (RCAs). The ultimate disposition of these metals is dependent upon the type of metal (i.e. ferrous or non-ferrous), radiological characteristics (surface contamination levels, activation levels, etc.), physical characteristics that would make decontamination difficult (such as internal contamination of pipes, metal structures with many irregular planes, etc.), the value of the metal itself, and the value of the item to be decontaminated in it's current form.

**5.1 Free Release**

LANL/JCI may release scrap metal to the public which meets the surface contamination free release criteria of DOE Order 5400.5, Chapter II, Table 1. (Attachment 2). If the surface contamination is below DOE Order 5400.5 Table 1 values, the metals may be released upon approval of the cognizant ESH-1 group leader.

Such metals will be released directly from the project site to the Johnson Control World Services Inc. (JCI) subcontractor and will be accompanied by the disclosure statement signed by a cognizant ESH-1 Team Leader. (Attachment 1). Be sure to remove all radiation labels from free released metals.

**5.2 Decontamination**

One alternative to landfill disposal is the decontamination of radioactive materials with surface contamination, thereby reducing the total volume of waste sent to landfill. RSM can be decontaminated by various methods. Surface contaminated metals leaving RCA's may be decontaminated using one of the following decontamination mechanisms; grit blasting, carbon dioxide pellet blasting ($CO_2$), sponge blasting, etc. See the

decontamination diagram for information for choosing the correct technologies for various metals. Decontaminated metals must be surveyed to proved effectiveness. If the metals meet the surface contamination free release limits stated in Appendix 3 they may be released to a metal recycler.

**5.5 Decision Flow Diagram**

A Cost / Benefit algorithm has been incorporated into a decision flow diagram presented in Figure 1. This diagram is designed to assist the generator in determining the best alternative for the disposition of metals waste. A discussion of how to implement the decision flow diagram is presented in this section and implementation examples are presented in Section 5.3.

The first activity to be conducted upon declaring metals leaving RCA's waste, is to have an RCT survey the metal to determine radiation and contamination levels. If the metals do not exceed the surface contamination release limits provided in Attachment 3, then they may be free released. Section 5.1.1 provides details on the free release procedures.

If the RCA metal does not meet 5400.5 free release criteria, then the burial volume, weight, and bulk density must be calculated to be input into the decision low diagram. In addition, a realistic estimation of achievable volume reduction should be made.

After the weight, burial volume and surface area are calculated use the formulas on the cost / benefit algorithm to determine the most cost effective disposal option for the metals.

A determination must be made as to the depth of the contamination. Volume contaminated metals cannot be decontaminated, and are therefore only candidates for landfill (Section 5.1.6) and metal melt (Section 5.1.4). Surface contaminated materials con be decontaminated, sent to landfill or metal melt, depending upon which is the most cost effective.

If the surface contamination levels are 10,000 or more times above the DOE 5400.5 surface free release criteria the diagram indicates that landfill or metal met are the best options. Heavily contaminated surfaces can increase the cost of decontamination, by increasing the labor hours needed to perform the decontamination and by increasing the amount of secondary waste generated.

If metal melt is the least expensive option, then assure that the metals need to meet the SEG Waste Acceptance Criteria (OP 4-35) provided in Attachment 6 of this document. SEG will take title to RSM meeting Table 1 criteria. Metals not meeting criteria within Table 1, but meeting criteria in Table 2 may be sent to metal melt for fabrication of shield blocks, or waste containers, which are sent back to LANL.

When it is not practicable or cost effective for metals to be melted, landfill is the only option. Since landfill costs are based on volume, instituting volume reduction can greatly decrease disposal costs. Simple volume reduction can be achieved by cutting large items of RSM into smaller sections, sorting similar sections together, or filling void spaces in transportainers with smaller sections of RSM. Additional compaction may instituted if the waste generator has access to equipment to do so. These techniques should be taken into account before estimating burial volume for use in the decision flow diagram.

**5.6 Implementation Decision Flow Diagram**

Four scenarios are provided to demonstrate the application of the cost/benefit decision flow algorithm. Each of the metal wastes will be evaluated using the algorithm until a decision on how to appropriately release the metal is reached.

*Scenario 1:* A laboratory site with a history of radiological contamination is being decommissioned and decontaminated. Among the various types of suspect contaminated materials are 150 feet of 8" square steel I-beams that weigh 3,000 lbs. Using the cost/benefit algorithm and the decision flow diagram, determine the most cost effective outcome for these metals.

Once the I-beams have been declared as waste originating in an RCA, a preliminary direct reading radiation survey is performed, as well as a large area smear survey. The results indicate that the contamination levels meet free release facility acceptance criteria.

Volume reduction may occur only to the extent of efficiently stacking the beams in order to reduce the bulk volume. Total surface area is calculated as follows:

Surface Area: $(0.20\ ft^2/lb) \times (3{,}000\ lbs.) = 600$

Weight (given): 3,000 lbs.

Volume (estimate): $(1100\ lb./m^3) \times (3{,}000\ lbs.) = 2.7\ m^3$

Next, the costs of each release option are identified:

**DECON:** $(\$5.00 / ft^2) \times (600\ ft^2) = \$3{,}000$

**METAL MELT**: $(\$1.75/lb.) \times (3{,}000\ lbs.) = \$5{,}250$

**LANDFILL:** $(\$45.00 / ft^3) \times (600\ ft^3) = \$4333$

Volume contamination is not a concern due to the origin of the metal. A preliminary survey indicates that the surface contamination levels exceed DOE Order 5400.5 release levels. The structure of the beams indicates that inaccessible contaminated surfaces are not a concern. Because DECON was calculated to be the least expensive option, the recommended release option of the contaminated I-beams is **DECON**.

*Scenario 2:* At this same site, aluminum ductwork is being removed. It is assumed to be surface contaminated based on knowledge of process. There is 200' of 12" diameter duct work material weighing 2,000 lbs. Applying the cost/benefit analysis and the decision flow diagram, determine the most cost-effective outcome of these metals.

The metals are declared as waste originating in an RCA. Assume that the surveying reveals that the metals will meet the centralized free release facility criteria. The surface area of the non-compacted duct-work is calculated.

Surface Area (estimate): (0.60 $ft^2$/lb.) (2,000 lb.) =1200 $ft^2$

The cost of all three options are calculated:

**DECON:** ($5.00) x (1,200 $ft^2$) = $6,000

**METAL MELT**: ($1.75/lb.) (2,000 lbs.) =$3500

**LANDFILL:** ($45.00/$ft^3$) x (1200 $ft^3$) = $5,400

**FREE RELEASE:** ($750/$m^3$) x (1100 lb./m3) x (2000 lb) = $1363

Volume contamination and inaccessible surface contamination are not concerns in this case due to the nature and origin of the metal pieces. The most cost effective alternative is **FREE RELEASE.**

*Scenario 3:* The aluminum ductwork mentioned above does not meet CFRF acceptance criteria. Also, compaction capability is available and may reduce the bulk volume to 80 $ft^3$.

**DECON:** ($5.00) x (1257) = $6285

**METAL MELT**: ($1.75 /lb.) x (2,000 lb.) = $3500

**LANDFILL:** ($45.00 /$ft^3$) x (80 $ft^3$) = $3600

In this case **METAL MELT** is the most cost effective alternative.

*Scenario 4:* A radioactive material processing facility is disposing of a piece of equipment that weighs 5,000 lbs. and occupies 600 $ft^3$ of space. It is composed of four different types of metals, three of which are nickel alloys. Based on knowledge of process, the equipment contains high levels of activity internally (inaccessible) and low levels externally. The total contaminated surface area is estimated to be 550 $ft^2$. Using cost/benefit analysis and the decision flow diagram, determine the most cost effective release alternative for these metals.

Once the equipment is declared as a waste originating in an RCA, assume that surveying indicates that the contamination levels greatly exceed the Centralized Free Release Facility acceptance criteria. Volume reduction is not feasible due to the nature of the equipment and the high contamination levels detected. Surface area and weight have already been established. Release option costs are determined.

Surface area: (0.20 $ft^2$/lb) x (5,000 lbs.) = 550 $ft^2$
volume (estimate): (5,000 lb.) (1100 lb./ $m^3$)=4.54 $m^3$

**DECON**: ($5.00/$ft^2$) x (550 $ft^2$) =$5,000

**METAL MELT:** ($1.75/lb) x (5,000 lbs) = $8750

**LANDFILL**: ($1589.00/$m^3$) x (4.54 $m^3$) =$7214

DECON appears to be the most appropriate alternative. It is not feasible, however, due to the presence of internally contaminated surface. The appropriate disposition is therefore radioactive **LANDFILL.**

DECON = ($5.00/ft2) × (550 ft2) = $2,750

METAL MELT = ($1.49/lb) × (5,000 lbs) = $7,450

LANDFILL = ($90.00/$ft^3$) × (600 $ft^3$) = $54,000

The equipment would not be considered to be volumetrically contaminated based on the previous examples, but does have contaminated surfaces inaccessible to DECON operations. Although DECON was determined to be the most cost-effective option, it is not feasible. Continuing on the flow diagram,

METAL MELT is cheaper than LANDFILL disposal. However, because the equipment is composed of more than one type of metal, it does not meet the Waste Acceptance Criteria required for METAL MELT. The equipment is therefore most suitable for LANDFILL disposal, despite the fact that the other tow options are more cost effective.

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## 6.0 References


*LANL Radiological Control Manual*, Los Alamos National Laboratory Controlled Document, LM107-01.1 (1994)

"Guidance On The Approved Limits For The Release of Contaminated Materials And Property Containing Residual Radioactive Material" (DOE) Memorandum, 1996)

"Radiation Protection of the Public and the Environment", Department of Energy Order 5400.5

"Removing Waste from Radiological Controlled Areas", Los Alamos National Laboratory controlled document LS105-05.0 (1995)

"Radiation Protection of the Public and the Environment", Los Alamos National Laboratory Standard (LS) 104.05

# Guidance Document for Multi-Facility Recycle / Reuse / Free Release of Metals from Radiological Control Areas

**Attachment 1**

Los Alamos National Laboratory
Number: XXX-XX
Issue Date: 8/15/97

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## DISCLOSURE FROM FOR UNCONDITIOAN LRELEASE OF SCRAP METALS FROM AN RCA

To/MS:
From/MS:
Phone/FAX:
Symbol:
Date:

Environmental Management /
Pollution Prevention Program
Los Alamos, New Mexico 87545

**SUBJECT: DISCLOSURE STATEMENT: UNCONDITIONAL RELEASE OF SCRAP MATERIAL**

The material accompanying this disclosure statement was generated at the Los Alamos National Laboratory (LANL). Although some of the material accompanying this disclosure statement may be contaminated with low levels of radioactive contamination, all of this material meets the legal requirements for free-release, as outlined below.

DOE Order 5400.5 is the document which establishes the legal limits and responsibilities of EOE owned, contractor operated facilities (such as LANL) when releasing low-level surface contaminated (or potentially contaminated)equipment and material to the general public. DOE Order 5400.5 Table 1 (attached) contains the release criteria for radioactive surface contamination. DOE Order 5400.5 says in part:

> *The generic surface contamination guidelines provided in Table 1 are applicable to existing structures and equipment. These guidelines are generally consistent with standards of the Nuclear Regulatory Commission (NCR) (NCR 1982) and functionally equivalent to Section IV, "Decontamination for Release for Unrestricted Use," of Regulatory Guide 1.86, but apply to nonreactor facilities. These limits apply to both interior equipment and building components that are potentially salvageable or recoverable scrap.*

In addition, the LANL RadCon Manual imposes a more stringent requirement, i.e. the contamination on the material must be As Low As Reasonably Achievable (ALARA), and the release must be approved by the ESH-1 group leader or designee (LM107.07.0 Article 422.2)

As an ESH-1 team leader, I have been given the approval authority of LM 107-01 Article 422.2, and I certify with my signature both that this material meet the release criteria stated above, and that the levels of radioactive contamination are ALARA.

Name/Title Signature Date

Note: A copy of this disclosure statement must accompany each load released to the JCI scrap metal subcontractor.

Copy: Project File
ESH-1 Project File

CC: Mike Shepard, JCI/SPRM, MS: A199

# Guidance Document for Multi-Facility Recycle / Reuse / Free Release of Metals from Radiological Control Areas

**Attachment 2**
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**DOE ORDER 5400.5**
**SECTION 5**

## DOE ORDER 5400.5 SECTION 5

The following excerpt is from DOE Order 5400.5 Section 5, Release of Property Having Residual Radioactive Material.

a. Release of Real Property. Release of real property (land and structures) shall be in accordance with the guidelines and requirements for residual radioactive material presented in Chapter IV. These guidelines and requirements apply to both DOE-owned facilities and to private properties that are being prepared by DOE for release. Real properties owned by DOE that are subject to the requirements of Section 120(h) of the comprehensive Environmental Response Compensation and Liability Act (CERCLA), as amended, concerning hazardous substances, and to any other applicable Federal, State, and local requirements. The requirements of 40 CFR Part 192 are applicable to properties remediated by DOE under Title I of the Uranium Mill Tailings Radiation Control Act (UMTRA).

b. Release of Personal Property. Personal property, which potentially could be contaminated, may be released for unrestricted use if the results of a survey with appropriate instruments indicate that the property is within the contamination limits presented in Figure IV-1.

c. Release of Materials and Equipment.
   (1) Surface Contamination Levels. Prior to being released, property shall be surveyed to determine whether both removable and total surface contamination (including contamination present on and under any coating) is greater than the levels given in Figure IV-1 and that the contamination has been subjected to the ALARA process.

   (2) Potential for Contamination. Property shall be considered to be potentially contaminated if it has been used or stored in radiation areas that could contain unconfined radioactive material or that are exposed to beams of particles capable of causing activation (neutrons, protons, etc.).

   (3) Surveys. Surfaces of potentially contaminated property shall be surveyed using instruments and techniques appropriate for detecting the limits sated in Figure IV-1.

   (4) Inaccessible Areas. Where potentially contaminated surfaces are not accessible for measurement (as in some pipes, drains, and ductwork), such property may be released after case-because evaluation and documentation based on both the history of its use and available measurements demonstrate that the unsurveyable surfaces are likely to be within the limits given in Figure IV-1 (Table 2).
   (5) Records. The records of released property shall include:
      a) A description or identification of the property
      b) The date of the last radiation survey
      c) The identity of the organization and the individual who perform the monitoring operation
      d) The type and identification number of monitoring instruments;
      e) The results of the monitoring operation; and
      f) The identity of the recipient of the released material.

   (6) Volume Contamination. No guidance is currently available for release of material that has been contaminated in depth, such as activated material or smelted contaminated metals (e.g., radioactivity per unit volume per unit mass). Such materials may released if criteria and survey techniques are approved by ESH-1.

# Guidance Document for Multi-Facility Recycle / Reuse / Free Release of Metals from Radiological Control Areas

**Attachment 3**
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## SURFACE CONTAMINATION GUIDELINE FROM DOE ORDER 5400.5

## SURFACE CONTAMINATION GUIDELINES FROM DOE ORDER 5400.5

### TABLE 1: SURFACE CONTAMINATION GUIDELINES

| Radionuclides[2] | Average[3/4] | Maximum[5] | Removable[6] |
|---|---|---|---|
| Transuranics, I-125, I-129, Ra-226, Ac-227, RA-228, Th-230, Pa-231 | 100 | 300 | 20 |
| Th-Natural, Sr-90,I-129, I-131, I-133, Ra-223, Ra-224, U-232, Th-232 | 1,000 | 3,000 | 200 |
| U-Natural, U-235, U-238, and associated decay product, alpha emitters. | 5,000 | 15,000 | 1,000 |
| Beta-gamma emitter (radionuclides with decay modes other than alpha emission or spontaneous[7] fission) except Sr-90 and others noted above | 5,000 | 15,000 | 1,000 |

**Guidance Document for Multi-Facility Recycle / Reuse / Free Release of Metals from Radiological Control Areas**
**Attachment 5**
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## SEG WASTE ACCEPTANCE CRITERIA

# OP-4.35, Waste Acceptance Criteria
## Acceptance Criteria for Metal Melting

**Applicability**

These acceptance criteria are applicable to the melting of radioactively contaminated metals in SEG's Metal Melt Facility (MMF). Metals may be melted for many purposes including the production of shielding locks, finished steel for containers, or volume reduction prior to disposal.

**Metal Acceptance Criteria**

The following metals are acceptable for melting in SEG's Metal Melt Facility.

| | |
|---|---|
| Stainless Steel | Nickel alloys |
| Carbon Steel | Chromium alloys |
| Iron | Ferrous alloys |

* Alloys with melting points at or below 3,000° F.

Small quantities of copper, aluminum, brass, bronze, and stellite are acceptable as long as they do not exceed 1% by weight of the total metal. Small quantities of these metals may be consumed during the melting process, however, significant quantities may produce undesirable characteristics in shield blocks or containers material (i.e. cracks, poor surface finish, etc.) These metals will be incorporated into the melting process to the extendt practicable, however, quantities in excess of 1% by weight may be required to be processed by decontamination, compaction, or other means.

Metals unacceptable for melting include the following:

| | |
|---|---|
| Lead | **Zirconium |
| Tin | **Tungsten |
| Iron | **Tantalum |
| Other Heavy Metals | **Molybdenum |

** These refractory metals have melting points above 3,000°F.

Packages shall not contain more than trace amounts of magnesium or asbestos. Non-friable asbestos in he form of insulation or valve packing material may be received with prior approval from SEG. The nature and type of asbestos must be provided as well as the thermal decomposition temperature of the asbestos binder. This metal can be charged directly into the furnace, however, SEG must be able to verify the absence of liquid in or on any of the asbestos containing metal components.

**OP-4.35, Waste Acceptance Criteria (con't.)**

**Acceptance Criteria for Metal Melting**

Metals shall not contain more than 1% burnables, such as wire insulation or other coatings. Wood shoring within packages is acceptable as needed to adequately brace the metal from moving or shifting during transit. In addition, plastic or ploy wrapping is acceptable as necessary to control or prevent the spread of contamination.

Crushed metal items which contain entrained burnable materials such as wood, cloth, plastic or other nonmetallic material, require prior approval. These materials will generally require additional processing such as shredding to separate the burnable/nonmetallic material from the metal prior to melting. These separated materials will be processed by incineration, compaction, or other processes.

## Weight / Size Limitations

Maximum size for an individual piece or combination of integral pieces shall be limited to that which can be placed in a 20-foot sea/land container. Maximum weight of any single piece shall not exceed 20,000lb. Metal which exceeds these dimensions may be acceptable with prior approval from SEG. Cost associated with sectioning such larger pieces will be addressed between the client and the SEG Marketing Department.

## Radiological Criteria

Radiological criteria are established for two categories of metal processing; recycling and volume reduction. For the purpose of this section, metal recycling refers to the production of shield/container material for beneficial reuse in radiological applications. Volume reduction refers to processing non-recyclable metal for the purpose of disposal. Due to radiological limits for recycled products, the recycling criteria are more restrictive than the volume reduction criteria. In some cases, decontamination may be performed prior to melting to meet the metal recycling criteria.

## Metal Recycling

Tables 8-1 specifies the radiological limits applicable to metals received for metal recycling.

SEG will take title to these metals upon receipt and will be responsible for the deposition of any metal product produced by melting unless otherwise agreed to in advance by SEG.

Metals which exceed any other Table 8-1 limits require prior approval for acceptance. All attempts will be made to accept those metals for recycling as long as sufficient inventories of lower activity/ lower dose rate metals are available for blending to produce acceptable shield/container material. If inventories are not sufficient to permit blending, the metals may be received for volume reduction as long as the Table 8-2 limits are met.

**OP-4.35, Waste Acceptance Criteria (con't.)**
**Acceptance Criteria for Metal Melting**

## Volume Reduction

Table 8-2 specifies the radiological limits applicable to metals received for volume reduction.

The volume-reduced metal will be disposed of at the disposal site requested by the client or returned to the client for disposition.

Metals which exceed any of the Table 8-2 limits require prior approval for acceptance. All attempts will be made to accept these metals for volume reduction as long as the products can be produced which meets the applicable disposal site criteria.

## Packaging

Metals may be packaged in metal boxes (B-12's, B-25's, SEG metal melt boxes, etc.) or sea/land containers. Other containers may also be used with approval from SEG.

Metal boxes shall not contain commingled incinerables or compactible wastes (i.e. wood, plastic, paper, cloth, etc.). Wood shoring within packages is acceptable as needed to adequately brace the metal from moving or shifting during transit. In addition, plastic or ploy wrapping is acceptable as necessary to control or prevent the spread of contamination.

Incinerable / compactible waste packaged within the same sea / land container as metals shall also be subject to the packaging requirements of Enclosure 8.3.

## Receipt Criteria

The receipt requirements specified in the General Acceptance Criteria, Enclosure 8.2, shall also be met for sea / land containers which contain both metals and wastes to be sorted prior to processing by other means. (i.e. incineration and compaction).

## Disposition of Nonconforming Waste

Waste which does not meet these criteria will be dipositioned as required by regulations and as agreed to by the client or specified in the client's contract. Alternate processing will be billed at the appropriate rate specified in the contract for the applicable processing method.

Metals for volume reduction will be disposed of at an authorized disposal site requested by the client or returned to the client for disposition.

**OP-4.35, Waste Acceptance Criteria (con.'t)**
**Acceptance Criteria for Metal Melting**

**Table 8-1**
**Radiological Criteria for Metal Recycling**

*Radiation Levels*

| | |
|---|---|
| Surface-contaminated Metal | ≤ mRem / hr contact (unshielded) |
| Activated Metal | ≤.5 mRen / hr average |

Average does rates assume that additional metal will be available for blending to ensure the production of acceptable shield or container material.

*Rationuclide Limits*

The average radionuclide concentration shall not exceed the following limits averaged over the package or component.

| Radionuclide | Average Concentration |
|---|---|
| Total of all nuclides not listed below | ≤2.0 E-3 μCi / gm |
| H-3 | ≤1.0 E-5μCi / gm |
| C-14 | ≤ 3.0 E-5 μ / gm |
| I-129 | ≤1.0 E-7 μ ./ gm |
| Ra-226 (DOE only) | < nCi / gm |
| Ra-226 (Commercial) | Prior Approval Required |
| Tansuranics | ≤1.0 nCi / gm |
| Material (SNM)* | Prior Approval Required |

*Includes U-233; U-235, or uranium enriched in the isotopes U-233 or U-235

**OP-4.35, Waste Acceptance Criteria (con't.)**
**Acceptance Criteria for Metal Melting**

**Table 8-2**
**Radiological Criteria for Metal Volume Reduction**

*Radiation Levels*

| | |
|---|---|
| Surface Contaminated or Active Metals | ≤ 200 mRem / hr avg. contact (unshielded) |

*Radionuclide Limits*

The average radionuclide concentration shall not exceed the following limits averaged over the package or component.

| Radionuclide | Average Concentration |
|---|---|
| Total of all nuclides not listed below | ≤ 0.1 μCi / gm |
| Co-60 | ≤ 5.0 e-2 Ci / gm |
| C137 | ≤ 2.0 E-3 μCi / gm |
| H-3 | ≤ 1.0 E-5 μCi / gm |
| C-14 | ≤ 3.0 E-5 μCi / gm |
| I-129 | ≤1.0 E-7 μCi / gm |
| Ra-226 (DOE only) | ≤ 10 nCi / gm |
| RA-226 (Commercial) | Prior Approval Required |
| Transuranics | ≤ 1.0 nCi / gm |
| Other Special Nuclear Material (SNM)* | Prior Approval Required |

*Includes U-233, U-235, or uranium enriched in the isotopes U-233 or U-235

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# Guidance Document for Multi-Facility Recycle / Reuse / Free Release of Metals from Radiological Control Areas

**Attachment 6**
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FREE RELEASE FACILITY ACCEPTANCE CRITERIA

# ACCEPTANCE CRITERIA FOR THE TA-54 FREE RELEASE FACILITY

The Waste Minimization / Free Release Facility (WM/FR) is accepting scrap metal items removed from Radiological Control Areas (RCA) that need to be surveyed for free release and recycled. The Waste Generator releasing scrap metal to the WM /FR facility is required to use Acceptable Knowledge (AK) and radiological surveys to whether items released surface contamination levels below Department of Energy Order 5400.5, Table 2 values. Acceptable knowledge is a method used to characterize waste that includes documented sampling and analysis, process knowledge, supplemental waste analysis data, and facility records or analysis as applied to waste characterization. Process knowledge is defined as the use of operational understanding to evaluate whether property has been located or utilized in a way that could have caused activation or radiological contamination.

## ACCEPTANCE CRITERIA

Acceptance of scrap metal to the WM / FR facility is dependent upon the physical, chemical, and radiological characteristics of the metal. This criteria is briefly outlined below. If you have any specific questions regarding the TA-54 Acceptance Criteria please call Sandra Gogol or Bryan Carlson at (505) 672-0833.

Metal Types

- Iron / Steel
- Aluminum
- Copper (including copper with lead solder)
- Other metals including hazardous metals contact- Sandra Gogol or Bryan Carlson at 672-0833 for approval prior to shipment

Physical Criteria

- Only items with a surface area greater than 1 square foot.
- Must be 20 ft or less in length
- Weight of shipping container must be less than 20,000 lbs.
- The weight of any individual pieces of candidate metal, as well as the weight of the B-25 containers must be less than 4500 lbs.

Radiological Criteria

- Field survey consisting of direct and large area swipes in conjunction with process knowledge to yield reasonable assurance that the scrap metal will meet the surface contamination release limits.
- For items with > 5% inaccessible areas, an Acceptable Knowledge (AK) Form must be returned with the shipment.
- No volume contaminated material

Chemical

- No hazardous materials (with exception of lead solder)

Shipping

Contact facility personnel prior to shipping materials to the WM/FR facility. All shipments sent should meet DOT exempt classification, as outlined in 49CFR 173.421.
No specific labeling is required for exempt shipments.

Accompanying documentation should include the Acceptable Knowledge and Waste Profile Forms. (The category of "Green is Clean" should be checked off in the Waste Type" Category of the Waste Profile Form.) The Acceptable Knowledge form is only required for items with greater than 5% of the surface area as inaccessible.