

This document provides updated/revised unrestricted release criteria for containers and/or railcars that ES will use for unrestricted use of and as guidance for contract negotiations with ES customers.

Leased containers and/or railcars to customers that transport radioactive material must be released from license control or other regulatory authority (i.e. unrestricted use) before returning after the lease is over unless otherwise noted contractually. This requires that radioactive-licensed facilities, using their license criteria for unrestricted use release the container depending on the isotopic mix of total and removable contamination that may be present on the container.

Since several of these containers and/or railcars may have been in service for extended periods of time with many different isotopic mixes and physical and chemical forms of the radioactive material within, it may be difficult to determine the actual isotopic mixes on the container, especially the hard-to-detect and alpha-emitters.

Therefore, this policy provides the following recommendations for facility RSOs for the unrestricted release of these containers and/or railcars. Additionally, please note that if the containers and/or railcars are at a non-ES license facility or the ES facility license release limits are lower than what is provided in this policy then the most restrictive limits must be used for unrestricted release of the container and/or railcar.

- Total & Removable **Beta-Gamma** use Group 4 below unless you have documented evidence it's another group or have more restrictive license criteria
- Total & Removable **Alpha** use Group 2 below unless you have documented evidence it's another group or have more restrictive license criteria

Note that for the total contamination limits both the maximum and average criteria should be used. Several RSOs and radiation safety technicians (RSTs) have historically used only the average criterion as the "maximum" when evaluating unrestricted free release criteria. The average column is "allowed" to be weight averaged over a one square meter (1 m<sup>2</sup>) area but cannot exceed the maximum total contamination in a 100 cm<sup>2</sup> area (refer to footnote d and e below). If there are questions on area averaging, please contact me directly for assessment and/or clarification.

Also, it is required that the container and/or railcar free release surveys be reviewed with a certification statement from the facility RSO certifying that the containers and/or railcars have been released for unrestricted use.

**EnergySolutions Contamination Release Limits**

Group	Radionuclides	Total Contamination (dpm/100 cm <sup>2</sup> )		Removable Contamination (dpm/100 cm <sup>2</sup> ) <sup>f</sup>
		Average <sup>d</sup>	Maximum <sup>e</sup>	
1 <sup>a</sup>	Alpha (Natural Uranium, U-233, U-235, U-238, and associated decay products)	5,000	15,000	1,000
2 <sup>a</sup>	Transuranics, I-125, I-129, Ra-226, Ac-227, Ra-228, Th-228, Th-230, and Pa-231	100	300	20
3 <sup>a</sup>	Natural Thorium, Sr-90, I-126, I-131, I-133, Ra-223, Ra-224, U-232, and Th-232	1,000	3,000	200
4 <sup>a</sup>	Beta-gamma emitters (decay modes other than alpha emissions or spontaneous fission) except Sr-90, H-3, and others as listed	5,000	15,000	1,000
5 <sup>b</sup>	Unknown	100	300	20
6 <sup>c</sup>	Tritium (H-3)	N/A	N/A	10,000

<sup>a</sup> The contamination limits are for the release of areas, solid materials, and/or equipment for unrestricted use in accordance with the surface contamination criteria in NRC NUREG-1757, Volume 1, Revision 2, section 15.11.1.1, "Release of Solid Materials with Surface Residual Radioactivity" (Materials Licensees), specifically [Directive FC 83-23](https://www.nrc.gov/docs/ML0037/ML003745523.pdf), Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Byproduct, Source or Special Nuclear Materials Licenses (<https://www.nrc.gov/docs/ML0037/ML003745523.pdf>).

<sup>b</sup> The unknown radionuclides contamination limits are those most restrictive in the table.

<sup>c</sup> The tritium contamination limits are for the release of areas, solid materials, and/or equipment for unrestricted use in accordance with the following references:

- [Appendix D to Part 835, Surface Contamination Limits](https://www.ecf.gov/cgi-bin/text-idx?SID=0ecd26469c5ea995ac2b5eaf75d2f59&mc=true&node=ap10.4.835_11304.d&rgn=div9) ([https://www.ecf.gov/cgi-bin/text-idx?SID=0ecd26469c5ea995ac2b5eaf75d2f59&mc=true&node=ap10.4.835\\_11304.d&rgn=div9](https://www.ecf.gov/cgi-bin/text-idx?SID=0ecd26469c5ea995ac2b5eaf75d2f59&mc=true&node=ap10.4.835_11304.d&rgn=div9))
- [Texas Administrative Code \(TAC\) §289.202\(ggg\)\(6\), page 202-86. Footnote g for acceptable surface contamination levels](https://www.nrc.gov/docs/ML1607/ML16076A372.pdf) (<https://www.nrc.gov/docs/ML1607/ML16076A372.pdf>)

Because tritium typically penetrates material it contacts, the surface guidelines in group 4 are not applicable to tritium. ES has evaluated the analysis conducted by the Department of Energy Tritium Surface Contamination Limits Committee ("Recommended Tritium Surface Contamination Release Guides," February 1991), the NUREG-1757 release criteria, and the potential doses associated with the release of property containing residual tritium and is in agreement with Texas and the NRC regarding the loose surface contamination limit for tritium.

<sup>d</sup> Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

<sup>e</sup> The maximum contamination level applies to an area of not more than 100 cm<sup>2</sup>.

<sup>f</sup> The amount of removable contamination per 100 cm<sup>2</sup> of surface area should be determined by wiping that area with a dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of contamination on the wipe with an appropriate instrument with known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.