



# Team Product Document

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Prepared By/Date E. R. McGinnis		Dept. 641	Mail/Addr T038	Date R. Amar D. L. Koncel	
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*	P. D. Rutherford	T038			
*	J. G. Barnes	T038			
*	B. Bass	T034			
*	D. W. Hickman	T100			
	N. Liu	T038			
*	W. C. Schaeppi	T034			
*	P. H. Waite	T034			
*	M. A. Spenard	T034			
	J. A. Kucinskis	T487			
	R. A. Marshall	T038			
	D. M. Trippeda	T038			
	D. F. Aubuchon	T038			
	B. D. Sujata	T038			
	D. L. Koncel	T038			
*	E. R. McGinnis	T038			
*	File 44	T057			
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# Supporting Document Summary of Change

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Rev.	Summary of Change	Approvals and Date
A	<p>Changed the removable contamination limits in Table 1 to account for smear efficiency</p> <p>See metaphase for sign-off history</p>	<p>R. McGinnis</p> <p>P. Rutherford</p> <p>D. Koncel</p> <p>R. Amar</p> <p><b>Release</b></p> <p><b>03-08-04 cv</b></p>

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## 1.0 Introduction

United States code 49CFR173 has several categories for classifying radioactive waste systems. Two of these are Surface Contaminated Object (SCO) and Low Specific Activity (LSA). This document describes how these two classifications are to be applied to Rocketdyne's radioactive waste packaging and shipping program so that regulatory compliance is met.

## 2.0 Rocketdyne's Application of SCO and LSA

Based on NUREG-1608 (Reference 1) interpretations of 49CFR definitions, items that are candidates for LSA are activated concrete and steel, contaminated soil, absorbed liquids, and any trash that is easily compactable. Easily compactable trash includes coveralls, paper wipes, booties, plastic bags and sheeting, otherwise known in the industry as "soft trash."

Candidates for SCO are contaminated furniture, non-rubblized, contaminated concrete blocks, contaminated tools and equipment, contaminated pallets, and any contaminated item that is not easily compacted. If an item is both activated and contaminated, it is LSA per NUREG-1608 (REFERENCE 1). There is one exception to this. If it is activated at less than 70 Bq/g (1900 pCi/g) then it is non-radioactive by LSA standards. If that same object is contaminated above the SCO limits, it will have to be shipped as Radioactive Class 7, SCO.

If any item to be disposed of seems to be in a gray area by these definitions, the Radiation Safety Department will make the decision as to whether it is SCO or LSA.

## 3.0 Radiation Surveys

All items which are candidates for LSA or SCO must not exhibit a dose rate of greater than 1 rem/hr at 3 meters from the unshielded material.

Assuming that this criterion is met, it is reasonable to proceed with the evaluation of the material as stated below and the subsequent packaging. However, "packaged" dose rates will also affect the feasibility of this material being shipped as either SCO or LSA as defined in 49CFR173.441.

## 4.0 SCO I and SCO II Limits

Table 1 contains the regulatory limits as specified in 49CFR. SCO-I and SCO-II limits are taken directly from the regulations. 49CFR neglects to define what is non-radioactive SCO. Seeing a need for this limit, NUREG-1608 (REFERENCE 1) states that anything below 10% of the SCO-I limit would be acceptable for shipping as non-radioactive. Those numbers are included in Table 1.

Note: Anything above the SCO-II limits is classified as Type A or Type B material, depending on the activity, and the packaging requirements are much more stringent. Also, the total limits apply to both accessible and inaccessible surfaces, such as both the inside and outside of a sealed tank.

**Table 1 SCO Shipping Limits**

Upper Limits						
Contamination Type	DOT Non-radioactive		SCO-I		SCO-II	
	Bq/cm <sup>2</sup>	dpm/100cm <sup>2</sup>	Bq/cm <sup>2</sup>	dpm/100cm <sup>2</sup>	Bq/cm <sup>2</sup>	dpm/100cm <sup>2</sup>
<b>Removable Beta</b>	0.04	220	0.4	2,200	40	240,000
<b>Removable Alpha</b>	0.004	22	0.04	220	4	24,000
<b>Total Beta</b>	4,000	22,000,000	40,000	220,000,000	800,000	4,400,000,000
<b>Total Alpha</b>	400	2,200,000	4,000	22,000,000	80,000	440,000,000

Note: Removable limits are 1/10 of the regulatory value to account for smear efficiency.

### 5.0 SCO Survey and Documentation Requirements

Documentation of the contamination levels of SCO material must be made to justify the categorization prior to shipment. This can be accomplished in two ways.

- Survey of the item before it is placed into the waste container, documented on a 710-S.
- Process knowledge of the area where the item was used and became contaminated.

The surveys required are smears, direct beta readings and direct alpha readings. If the object is too radioactive for direct readings (i.e. off-scale) then other methods may be utilized to determine the total activity such as mCi of alpha and beta emitters being distributed across the surface area and converting it to dpm/100cm<sup>2</sup> or determining a correction factor of dpm per mrad/hour for a portable ion chamber. If there is documentation that alpha emitters are not present in the waste stream or are insignificant, the alpha direct survey may be skipped.

Process knowledge is knowing the history of an item's environment. If it is known that the maximum removable contamination an item was ever exposed to was 1,200 dpm/100cm<sup>2</sup> beta, then it is not possible for it to have become contaminated to levels above the SCO-I limits of 2,200 removable and 22,000,000 total dpm/100cm<sup>2</sup> beta. The item may be shipped as SCO-I without survey. Routine surveys of the area that the item was in are required, however, to back this process knowledge up.

## 6.0 Every Day Trash and Special Cases

In everyday operations, routine smear surveys are taken in all work areas. These surveys may be utilized to determine the SCO status of non-compactable trash generated on a routine basis. These items may be thrown into a waste container without a special survey. If something happens to greatly increase the contamination levels in an area, the facility HP should be consulted before throwing SCO items from the area into a waste container.

In general, most surface contaminated objects will **be less than the SCO-I limits and be defined as SCO-I**. Occasionally, new remediation projects generate new SCO items that must be surveyed individually to determine if SCO Limits are exceeded. Examples of these are:

- The racks in the RMHF vaults
- Tools that have been in the decon room for years
- Fume hoods and tables in 4021
- The RMHF evaporator and other system hardware
- RMHF ventilation ducts and stack
- 4059 concrete blocks less than 70 Bq/g
- 4021 drain-lines
- RMHF waste-water tanks
- Contaminated lead bricks

These are just examples of what the whole team needs to be aware of as far a special surveys go. These items and items like them need individual, documented surveys (smears, direct beta and direct alpha). Technicians should always consult with Radiation Safety before putting items like these in a waste container and also when they are not sure if a survey is needed or not.

## 7.0 New Lot Follower Process

If reasonable, SCO and LSA should be packaged separately. This is not always practical and the regulations do allow mixing of SCO and LSA waste in the same package. SCO item contamination levels must still be documented though, to prove the container meets the shipping requirements of the SCO class. The other restriction is that the weight of the SCO items cannot be used to calculate the specific activity (pCi/g) of the LSA component of the container. This could dilute the specific activity of the LSA possibly making the shipment out of regulatory compliance. The individual weights of the LSA and SCO must be known for this calculation.

The lot followers are being revised to include a new column in the item description area. The column will contain an SCO checkbox. If the item is SCO, the packager should check this box and enter an estimated weight of the item being put into the container. This allows the person doing the shipping calculations to subtract these weights from the total weight and determine the weight of the LSA component.

## **8.0 Conclusion**

All waste packagers need to be aware of these new requirements for SCO. Thinking ahead of time will prevent a container from having to be unpackaged to retrieve an SCO item that required survey. If there is ever in doubt, Radiation Safety should be contacted.

## **9.0 References**

1. NUREG-1608, RAMREG-003, Categorizing and Transporting Low Specific Activity Materials and Surface Contaminated Objects, July 1998