
Packaging Requirements Under the New Regulatory Changes and Their Effects on the Shippers Quality Control Program

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INTRODUCTION

The Nuclear Regulatory Commission (NRC) has published proposed changes to their current radioactive material transportation regulations (10 CFR Part 71) for comment in the Federal Register. The Department of Transportation (DOT) has also developed changes to their Hazardous Material Regulations dealing with radioactive material. These proposed regulations should soon be published for comment, also in the Federal Register. These regulatory changes are designed to bring the United States in line with the international regulations published by the International Atomic Energy Agency (IAEA). Assuming that DOT adopts essentially IAEA regulations, a significant impact of these changes falls in the area of packaging used for the shipment of Low Specific Activity (LSA) material and the new proper shipping category of Surface Contaminated Objects. Since the majority of the shipments made by nuclear power facilities fall into this category, these changes will directly effect the operations of these facilities.

CURRENT VS PROPOSED REGULATIONS

Under current DOT regulations LSA, shipped via exclusive use, requires only a strong tight container. Like all containers used to ship hazardous material, strong tight containers must comply with the general performance objectives and design and construction criteria contained in 49 CFR 173.24. Shipper are responsible to assure that these packages meet these limited design and construction criteria and that the effectiveness of the shielding and containment are within limits specified in the regulation. Once the activity per package rises above a Type A quantity of LSA material per, the NRC establishes additional criteria. Shipments of greater than Type A LSA

requires the use of an NRC licensed container and the application of an NRC approved Quality Assurance Program.

Under the proposed changes the DOT will no longer authorize the use of strong tight containers for LSA material, although these containers will still be authorized for Limited Quantity and Excepted Articles and Instruments. The old proper shipping name for LSA has been divided into two separate proper shipping names which are LSA and Surface Contaminated Objects (SCO). These two proper shipping names have been further subdivided into separate classes (LSA-I, LSA-II, LSA-III, SCO-I and SCO-II). In the shipment of this material the DOT has established three types of Industrial Packaging (See Table 1). Each of these Industrial Packages has its own separate performance objectives and design and construction criteria which are specified in Subpart I of 49 CFR 173. Because of this increased packaging requirement, the NRC has raised its threshold of control to 2XA₁ per package for material meeting LSA class II and III or SCO class II. LSA I or SCO I will not be controlled by the NRC regardless of the total activity contained in the package. Once this new threshold is reached, the NRC will require the shipper to use essentially a TYPE B package.

Contents	TABLE-1	
	Exclusive Use	None Exclusive Use
LSA-I		
Solid	IP-1	IP-1
Liquid	IP-1	IP-2
LSA-II		
Solid	IP-2	IP-2
Liquid & Gas	IP-2	IP-3
LSA-III	IP-2	IP-3
SCO-I	IP-1	IP-1
SCO-II	IP-2	IP-2

The effects of the new changes are graphically shown in Figure 1. Using the average isotopic distribution for a Pressurized Water Reactor (PWR) for Bead Resin dewatered in a 195 cubic foot container, the effect of the current and proposed regulation can be seen. Under current regulation below 12 curies of total activity, only a strong tight container is needed. Above 12 curies, the shipment must be made in an NRC certified container. At 1,200 curiers, the

shipment is no longer LSA and must be shipped in a TYPE B package.

Under the proposed regulations the same package would require an IP-2 container up to 40 curies and be subject to DOT requirements only. Above 40 curies, the shipment would be under NRC requirements which include the use of a TYPE B package and an NRC approved QA Plan. At 91 curies, the package would no longer meet the LSA criteria of the IAEA because it would exceed 1 R/Hr at 3 Meters without shielding.

A major effect of these regulatory changes will be to place more responsibility on the shipper of LSA material with regards to package assessment, certification, documentation, and quality control. Using our example, under current regulation the shipper is responsible for design and certification to only minimum standards below 12 curies. At above 12 curies the design and certification are taken over by the NRC through the licensing process. Under the new regulations the shipper is now responsible for design and certification to more stringent requirements up to approximately 40 curies, at which point the NRC provides certification.

Under the proposed regulations, specific performance tests and design and construction objectives will be specified for Industrial Packages 2 and 3. Like current TYPE A packaging there will be no requirement for prior approval from the DOT. Each shipper will be required to maintain a complete certification file which must include supporting safety analysis demonstrating that the construction methods, package design and materials of construction are in compliance with regulatory requirements. This file must also relate the contents of the package being shipped to the contents which were used for testing or evaluation purposes. As is now the case with DOT Spec. 7A containers, the shipper's regulatory responsibilities will not be reduced simply by using containers manufactured or leased from an outside vendor. The shipper will bare full responsibility of certification and documentation of any Industrial Package he uses. This file must be maintained by the shipper for at least one year after the last use of the package and be made available to DOT upon request.

PERFORMANCE OBJECTIVES AND DEMONSTRATION OF COMPLIANCE

With the introduction of the new Industrial Packages, specific performance objectives have been established. For the most part, these performance objectives are modifications of current performance objectives used by the DOT. The performance objective for an IP-1 package are no more than the current performance objectives for a strong tight

container. The performance objective for both IP-2 and IP-3 packages are stated in the ability to pass specific performance tests. These tests are modifications of current DOT TYPE A package testing.

For IP-2 packages, the shipper must demonstrate that the package is designed, constructed, and its contents so limited that it will be capable of passing both a drop test to a flat, horizontal, unyielding surface and a compression test equivalent to 5 times the maximum gross weight applied uniformly to two opposite sides. The acceptance criteria for both of these tests require that there be no loss or dispersion of the radioactive contents and no loss of shielding integrity which would result in more than a 20% increase in radiation level.

In addition to the two performance tests required for an IP-2 package, a IP-3 package must also pass two additional tests. These include the penetration test and the water spray test. As with the IP-2 package, the acceptance criteria for these two additional tests require no loss or dispersion of the radioactive contents and no loss of shielding integrity which would result in more than a 20% increase in radiation level.

As with current DOT performance tests, the demonstration of compliance will be a shippers responsibility. The shipper may demonstrate compliance with these test requirements in four authorized methods.

- By performance of the test with prototypes or samples of the package as normally presented for transport.
- By reference to a previous, satisfactory demonstration of compliance of a sufficiently similar nature.
- By performance of tests with models of appropriate scale incorporating those features that are significant.
- By engineering evaluation or comparative data.

The shipper may use any one or a combination of these methods to demonstrate that the package, as normally presented for shipment, will meet the performance test. No prior certification of the testing is required by the DOT but detailed records which prove compliance must be maintained.

This demonstrated compliance must be documented by the shipper regardless of the source of the containers. The requirement is the same whether he manufactures his own containers, buys containers from a vendor, or leases reusable containers from someone else. The shipper is still solely

responsible.

EFFECTS ON THE NUCLEAR POWER INDUSTRY

From a packaging standpoint, these new regulations will result in an increase in paper work on the part of nuclear power facilities. Detailed compliance packages will have to be maintained on all packages that are used to ship LSA or SCO material which are not certified by the NRC. At most facilities, procedures are already in place to cover the certification of DOT Spec 7A packages. These procedures will only need to be expanded to cover the additional certification of Industrial Packages. It will not, however, require the development of new package designs.

Currently, most power facilities are using packages which are fully capable of meeting these new requirements. Most single trip shipping packages currently used for LSA material have already been tested and have successfully passed the current DOT Specification 7A tests. This testing was accomplished by the DOE for use by its contractors. Although nuclear facilities can use these results to document compliance, care must be taken.

Nuclear facilities must first evaluate the actual containers which they are using to assure that they are similar enough to the container test by the DOE so as not to invalidate the results. The second area that must be examined is the type, form, and quantity of the radioactive material which will be shipped. This may require a detailed engineering evaluation. Since these test document performance of only a TYPE A quantity of radioactive material facilities must document that the increase in the total quantity of radioactive material would not have any negative effects on the test results. Another possibility is to limit the authorized quantity to less than a TYPE A quantity. Such a limitation would not pose any adverse impact, since most of these containers are currently used for only less than a TYPE A quantity.

There is one group of containers which are currently in use that may cause the industry problems. With full implementation of these new regulations, the NRC will no longer license the current reusable greater than TYPE A LSA cask. These casks are used for the shipment of higher activity LSA material either to comply with the maximum package radiation levels or when the total quantity exceeds TYPE A. For the most part, these casks are owned by vendors who not only lease the containers but also provide transportation as part of the total service. Demonstrating compliance with the new DOT requirements Industrial Packages could be based on the Safety Analysis Report submitted as

part of the NRC licensing process. The problem is that these containers are reusable with multiple users.

Nuclear facilities would have no problem certifying that these containers were originally designed and manufactured to meet the required regulatory standards. Because of the reusability and the multiple users, Nuclear facilities would have difficulty in assuring that there is no material defects, as a result of extended use, that may invalidate compliance.

Under current NRC regulations the users of these containers are held responsible for ensuring that these containers are in compliance. In addition a detailed history of the container is required as part of the NRC approved quality assurance program. Although the NRC holds the user responsible for quality assurance of these containers, the users are authorized to fulfill this requirement by obtaining a written certification from the cask owner. This certification is provided by the owner and assures the user that the required records to demonstrate compliance are on file and available for inspection by the NRC. Under current DOT, radioactive material regulations, there is no such certification process. The shipper is held fully and solely responsible.

Although not recognized under the radioactive material regulation, DOT has solved a similar problem in other areas of the Hazardous Material Regulation. Shippers of other hazardous material can rely on the application of the DOT Specification number by the manufacture of the container as evidence that the package complies with the regulatory requirements. DOT regulations (49 CFR 178.0-2) hold the manufacturer of the package responsible for compliance. Shippers are able to rely on the manufactures marking of the container as proof of compliance. DOT should examine the possibility of applying this same standard to the owners of leased radioactive material packages.

The owner of these packages should be required to test and certify his package. In applying the DOT Industrial Package marking, the owner would be certifying to the users of the package and to the DOT that the package is in compliance. The shipper could then rely on this marking in fulfilling his responsibilities. In this way the responsibility for package compliance would be placed on the owner and not each individual user of these multi-user packages.

CONCLUSION

Based on a review of these proposed changes to the radioactive material transportation regulations, it is felt

that they will have only minimum impact on the nuclear power industry as it relates to the certification of DOT Industrial Packages, at the lower activity level. To assist the users of reusable, multi-user containers, at the higher activity level, the DOT should examine the extension of 49 CFR 178.0-2 requirement to these types of packages.

REFERENCES

Transportation Regulation; Compatibility With the International Atomic Energy Agency, FR5321551, Nuclear Regulatory Commission(1988).

Regulations For the Safe Transport of Radioactive Material, Safety Series No.6, International Atomic Energy Agency(1985).

A Review of the Department of Transportation Regulations for Transportation of Radioactive Materials, Department of Transportation(1983).

FIG. 1
**CURRENT REGULATIONS vs
 NRC'S PROPOSED REGULATIONS**

