TEMPORARY INSTRUCTION 2515/133

IMPLEMENTATION OF REVISED 49 CFR PARTS 100-179 AND 10 CFR PART 71

SALP FUNCTIONAL AREA: PLANT SUPPORT (PLTSUP)

APPLICABILITY: ALL OPERATING POWER REACTORS

2515/133-01 OBJECTIVE

To evaluate reactor licensees' transportation programs for implementing the revised Department of Transportation (DOT) and NRC transportation regulations for shipments of radioactive materials. Regulatory changes generally are effective as of April 1, 1996 (see Appendix A to this temporary instruction for effective dates of specific provisions). The major reason for the regulatory changes is to make U.S. domestic transportation regulations consistent with those of the International Atomic Energy Agency (IAEA) in its Safety Series No. 6, "Regu-lations for the Safe Transport of Radioactive Material," 1985 edition (Ref. 1).

2515/133-02 BACKGROUND

General. This Temporary Instruction pertains to licensees' implementation of the revised 49 CFR Parts 100-179 and 10 CFR Part 71. Therefore, in any case where a licensee has implemented the revised rules and has been inspected in any of the areas covered by this TI, there is no need to repeat such inspection under this TI. Similarly, inspection of an area of a licensee's transportation program under this TI need not be repeated under any other inspection procedure.

02.01 Major Changes in New Rules. Several major changes have been included in these revisions of 49 CFR Parts 100-179 and of 10 CFR Part 71. A brief description of the major changes follows:

a. Requirements for Transportation of Low Specific Activity (LSA) Materials and Surface Contaminated Objects (SCO). The definition of LSA material has been expanded to:

   1. Add specified materials to LSA-I in recognition of their use and that they present small potential hazard.

   2. Tie the acceptable concentrations of LSA-II material directly to radionuclide A_2 values.

3. Define a new LSA-III material as a solid containing radioactive material that would not leach from the solid to the environment.

In addition a new classification, "Surface Contaminated Object" has been defined for non-radioactive objects which have radioactively contaminated surfaces.

b. Mandatory Use of Units from the International System of Units (SI). The contents and radiation levels in radioactive materials packages must now be described in terms of SI units, optionally followed by conventional (English) units. The reasons for this change include similar change from English to SI units adopted in the 1985 edition of the IAEA's transport regulations, and the safety benefits from consistency in hazard communications.

c. Expansion of the Radionuclide List, in 49 CFR 173.435 and 10 CFR Part 71 Table A-1 and Changes in Radionuclide Limits. The table which provides A_1 and A_2 values in both DOT and NRC regulations has been expanded by nearly 100 entries. Because there now should be few instances where unlisted radionuclides would be transported, the rules for calculating values for unlisted radionuclides have been simplified. Any determination of limits for unlisted radionuclides, except in a few cases, is subject to NRC or DOT approval. Most current A_1 and A_2 values have been changed. The IAEA system for calculating A_1 and A_2 values is further described in "The Q System for the Calculation of A_1 and A_2 Values," IAEA Safety Series No. 7 (Ref. 2).

d. Classification of Fissile Material. As the fissile material criteria evolved, the IAEA recognized that the three fissile classes could be combined and simplified into a single system. The effects of the simplification of the IAEA system now being adopted into the NRC and DOT regulations are:

1. The elimination of the three fissile class designations.

2. The establishment of a single set of criteria for all packages of fissile materials.

3. The use of the transport index as the primary control of accumulations of packages.

e. Radiation Protection Program. DOT has added a new Subpart I to 49 CFR Part 172, which contains requirements for a written radiation protection program for both shippers and carriers. This action is in response to the EPA guidance, "Radiation Protection Guidance to Federal Agencies for Occupational Exposure: Recommendations Approved by the President, (January, 1987)" (Ref. 3). However, 49 CFR 172.803(d)(2) provides an exemption from this requirement which would apply to NRC reactor licensees, because of their existing, NRC approved radiation protection program. NRC reactor licensees should review their procedures to confirm that they are not impacted by this new rule.

Note that DOT has indicated that the radiation protection program rules in the new regulation may be reviewed, and possibly clarified, prior to the October 1, 1997, implementation date for Subpart I.

02.02 Minor Changes to New Rules. A number of changes of lesser significance in the DOT and NRC regulations include:

a. Communication Requirements. In 49 CFR Part 172:

1. Changes to the Hazardous Materials Table (section 172.101) corrected section numbers and revised or added some proper shipping names for LSA materials and SCO. Changed section references are given in Appendix B to this TI.

2. Several changes in shipping paper descriptions (section 172.203) are specified.

3. Package marking (§ 172.310) must include the trefoil symbol (for Type B packages).

4. Label (§ 172.403) must reflect proper category, include description, activity, and/or weight.

5. Appendix B (new) to 49 CFR Part 172 specifies size requirements for the trefoil symbol.

6. Placards required for exclusive use, domestic LSA or SCO shipments using strong-tight or bulk containers (§ 172.504).

b. Package Design

1. Four new general design requirements for packages are added to 49 CFR 173.410.

2. Changes to requirements for liquids in Type A packages are specified in 49 CFR 173.412.

3. Requirements are added to 10 CFR 71.88 for the air transport of plutonium.

4. Deep water immersion and dynamic crush tests are added to 10 CFR 71.73.

5. 49 CFR 173.415 deletes reference to outdated DOT Spec 55 packaging, and authorizes the use of NRC Type A fissile packages as Type A.

6. 49 CFR 173.417 specifies changes in authorized fissile materials packages.

7. 49 CFR 173.421, which excepts limited quantities from many of the Hazardous Materials Regulation (HMR) requirements, requires compliance with the general package design requirements of 49 CFR 173.410.

c. Fissile Material

1. The fissile materials exceptions, 49 CFR 173.453, were amended to remove the exception for thermal reactor irradiated natural or depleted uranium. Also, the mass limit for homogeneous solutions or mixtures (49 CFR 173.453(b)(3)) is now applied only to the U-235 component.

2. The fissile classifications, 49 CFR 173.455, were deleted.

3. 49 CFR 173.457 redefines fissile class III shipments in terms of a "fissile material, controlled shipment."

4. 49 CFR 173.459, for mixing of fissile materials packages, was amended to remove reference to fissile class, and to express shipment controls in terms of "fissile material, controlled shipment[s]."

d. LSA Material. 49 CFR 173.468, "Test for LSA-III material," is added to specify a leaching test.

e. Shipment Approval. 49 CFR 173.477, "Approval for export shipments," is amended to delete references to fissile classes. Additionally, a new paragraph (49 CFR 173.477(c)) addresses the contents of an application for shipment approval under special arrangement.

f. Reporting and Notification (Changes to Part 71)

1. Instances where the Certificate of Compliance (CoC) conditions of approval were not observed in making a shipment are now reportable in 30 days (10 CFR 71.95).

2. Requirements for advance notification of shipments of irradiated nuclear fuel and nuclear waste (10 CFR 71.97) were revised for clarity.

2515/133-03 INSPECTION REQUIREMENTS

03.01 Training and Qualifications of Personnel. Review the training, knowledge, and performance of radiation protection technicians (RPTs), radwaste workers and supervisors in the transportation area, to determine the changes and updates implemented in response to the new regulations:

a. Determine whether the licensee's employee training program and continuing retraining programs for RPTs, radwaste workers, and supervisors adequately address the revisions to the transportation regulations. 49 CFR Part 172, Subpart H, requires that each hazmat employer provide initial and periodic training to its hazmat employees. Review the training modules, qualifications of instructors, and the exams taken and grades received. Focus on the following topics, which should have been updated to comply with the new rules:

   1. LSA and SCO hazards, definitions, and requirements.

   2. Placarding, labelling, and marking of vehicles and packages.

   3. SI units, as used in the transportation of radioactive material [comparison of SI and conventional units; where the units are applied in transportation (e.g., shipping papers, labels, emergency response instructions); rules for including conventional units; and training aids].

   4. Elimination of the fissile classes, the fissile transport index system of criticality control of package arrays, conveyance package limits, and the special controls exercised or arranged by the shipper for fissile material packages that have been assigned a criticality transport index of greater than 10 (49 CFR 173.457).

b. Determine whether the training provided to regular and contract RPTs, radwaste workers and supervisors, and occupationally exposed workers, covers their responsibilities with respect to: (1) processing and packaging of LSA material and SCO for transportation, (2) preparation or review of shipping papers, labels, and other functions where SI units are required, and (3) special controls over the shipment of fissile material, as applicable.

c. Determine, by observation, if possible, whether RPTs and other radwaste workers are performing their duties safely and in accordance with licensee training and procedures.

03.02 Transportation of LSA Materials and SCO

a. Review the changes made to the licensee’s procedures for the processing and packaging of LSA material and SCO. Review procedures for determining degree of uniformity of LSA material. Review procedures for new leaching test requirement for LSA-III material (49 CFR 173.468 and 10 CFR 71.77 specify a leach test required to demonstrate that LSA-III material is relatively insoluble as required by its definition).

b. Determine whether management and supervisory oversight are effective with respect to training; procedure generation, maintenance, and implementation; follow-up and correction of deficiencies noted in event reports; engender effective communications between work groups and supervisory and management levels concerning processing and packaging of LSA materials and SCO.

c. Review the licensee's plans for the use of packaging for shipments of LSA material and SCO. Review the licensee's written justification for the planned use of industrial packages, strong tight packages, Type A packages, or Type B packages, based on the characteristics of the waste mix and the limitations that must be applied to the package as prepared for transport.

d. Review several shipping papers associated with shipments of LSA material or SCO already completed. Determine that the licensee's procedures comply with the applicable regulations, and that the shipping records indicate the shipment was made in accordance with the licensee's procedures.

e. If possible, observe a shipment of LSA materials being prepared for shipment and loaded into a shipping container. Can the radioactive component of the materials be reasonably described as "essentially uniformly distributed" or as "distributed throughout," depending on the requirement imposed?

f. If possible, observe a fully loaded LSA material package being checked to verify the calculation that shows compliance with the regulatory limit on the unshielded external radiation level of 10 mSv/h (1 rem/hr) at 3 meters. Evaluate the written procedure and its basis. Verify that computer codes, where utilized, have been updated to include the changes made necessary by the NRC/DOT rulemaking. Review the backup procedures for use in case the computer codes are unavailable or appear to provide incorrect results.

g. If possible, observe the sampling and analysis of at least one waste stream which may be shipped as LSA material (e.g., spent dewatered resin). Follow up by examining shipping papers for that or a similar shipment to see if the requirements of 49 CFR 173.433 are satisfied as to the radionuclides that must be entered on shipping papers and labels.

03.03 Use of International System of Units (SI)

a. Review the changes made to the licensee's procedures for the use of SI units in the preparation of shipping documents and emergency response information which accompanies radioactive material shipments.

b. Review several sets of shipping papers associated with shipments of LSA material or SCO already completed. Focus on the use of SI units.

c. Verify that computer codes have been updated to include the use of SI units, as necessary.

03.04 Expansion of the Radionuclide List and Changes in Radionuclide Limits

a. Determine whether the licensee has procedures for the use of the radionuclide table of A_1/A_2 values to assure that packages do not exceed their allowable radioactivities. Have the new radionuclides and changes in A_1/A_2 values been entered?

b. Audit selected A_1 and A_2 values to verify that the new values have been implemented. Suggested radionuclides include: Cs-137, Co-60, Zn-65, Rb-86, and some transuranics.

c. Verify that computer codes have been updated to include the use of new values, as necessary.

d. Review the licensee procedures for identification of nuclei (e.g., scaling factors and sampling plans) to verify that the new nuclides and changed A_1/A_2 values are incorporated, and that the waste streams have been adequately characterized. Verify that this information has been incorporated into implementation of the "95% rule" for listing radionuclides on shipping papers (§173.433).

03.05 Classification of Fissile Material

a. Review the changes made to the licensee's procedures for the use of the transport index and special controls for the prevention of criticality in transportation of fissile material to assure they are consistent with the new fissile material requirements.

b. Review, if possible, several sets of shipping papers associated with shipments of fissile material already completed. Focus on the identification of fissile material and on the transport index and special controls assigned for its control during transport.

c. Verify that computer codes have been updated to include the current system for calculating the assigned transport index for criticality control during transport.

2515/133-04 INSPECTION GUIDANCE

The central focus of this TI is to ensure that licensees' programmatic controls implement the requirements of 49 CFR Parts 100-179 and 10 CFR Part 71 (60 FR 50248) as they were published in final form on September 28, 1995.

04.01 Training and Qualifications of Personnel. For contract or vendor employees not specifically covered by the licensee's radiation protection program, NRC Generic Letter 95-09, "Monitoring and Training of Shippers and Carriers of Radioactive Materials," provides additional guidance. This Generic Letter states that licensees can accept, as adequate, training received by carriers under requirements imposed by the DOT relative to shipments of radioactive material. A carrier's certification of that training should suffice.

04.02 Transportation of LSA Materials and SCO. Some guidance on changes to the LSA/SCO regulations can be obtained from the preamble to the DOT Notice of Final Rulemaking, dated September 28, 1995, (Ref. 4) under subheading B, "Low Specific Activity Material and Surface Contaminated Objects." Additional general guidance can be obtained from the preamble to the NRC Notice of Final Rulemaking, dated September 28, 1995, (Ref. 5) under the subheading *"Section 71.4: Definitions"* (LSA and SCO in particular).

Note that two misprints appear in the NRC Final Rule in the Federal Register (page 50265), in the definitions of LSA-II solids and LSA-III objects that are not solidified in a binder, regarding the distribution of radionuclides. The use of the term "*essentially uniformly distributed*" in Item (2)(ii) of the LSA-II definition, is inappropriate, and should be replaced with the term "*distributed throughout*." The phrase "*essentially uniformly distributed throughout*" in item (3)(i) of the LSA-III definition is incorrect, and should also be replaced with the term "*distributed throughout*". The use of the term "*essentially uniformly distributed*" in the definition of LSA-I mill tailings, etc., and in the definition for LSA-III materials solidified in a binding agent, is correct as it appears in the regulations. Specific guidance on these terms is provided in in the following section (see item d). The same errors appear in the LSA and SCO definitions in the DOT notice on page 50309. Additional errata to the final Federal Register rules are given in Appendix C.

a. The distinction between the various LSA and SCO classes is anticipated to cause several questions as the new rules are implemented. NRC will provide additional guidance as needed. The following points may help clarify some initial questions:

   1. Surface contaminated objects (SCO) are by definition objects which are not themselves radioactive, but have radioactive materials distributed on their surfaces. The implication of this definition is that objects that are radioactive themselves (e.g., activated objects) and are also contaminated cannot be classified as SCO. Such objects may, however, be regarded as LSA material insofar as the requirements specified in the LSA definition are complied with.

2. For such objects to qualify as LSA material it is necessary to ascertain that the applicable limits on estimated average specific activity are complied with. In assessing the average specific activity, all radioactive material attributed to the object, i.e., both the distributed activity and the activity of the surface contaminations, needs to be included. As appropriate, additional requirements applicable to LSA material need to also be satisfied in order for the objects to qualify as LSA material.

3. Examples of inaccessible surfaces are:

   (a) Inner surfaces of pipes, the ends of which can be securely closed by simple methods.

   (b) Inner surfaces of maintenance equipment for nuclear facilities.
   (c) Glove boxes with access ports blocked-off for disposal.

4. If the SCO contamination limits are exceeded, a Type A or Type B package would be needed, depending on the A_2 fraction in the package.

5. Absorbent materials (e.g., wipes and towels) would generally be treated as LSA material, not SCO

6. When mixing SCO and LSA materials in a single package, both materials should meet their respective definitions before being mixed together, and then the container could be considered to be LSA.

7. Pre-shipment processing of materials may change the category of material. For example, if contaminated pieces of tubing were collected and compacted, reducing the internal void spaces, a material which would be SCO if uncompacted could be better characterized as LSA after compaction. Incineration is another, more obvious example. Some judgement on the part of the licensee and inspectors will be necessary in this area.

b. No Specific guidance.

c. Several authorized packages exist for shipments of LSA/SCO material (49 CFR 173.427).

If the requirement of 49 CFR 173.427(a)(1), for the unshielded dose rate limit, is satisfied, non-accident-resistant packages may be used. According to 49 CFR 173.427(e), LSA or SCO that exceeds the packaging limits in § 173.427 (i.e., unshielded dose rate limit), must be packaged in accordance with 10 CFR Part 71 (i.e., in accident-resistant, Type B packages). However, 10 CFR 71.52 contains an exemption for LSA/SCO material transported as exclusive use. The exemption is from the 10 CFR 71.51 requirements to make Type B packages accident resistant. This exemption is set to expire April 1, 1999, after which, these non-accident-resistant packages may no longer be used for the transport of LSA/SCO material which cannot satisfy the unshielded dose rate criteria.

While the exemption is in effect, NRC packages certified for LSA materials may continue to be used for LSA and SCO shipments. NRC certified packages for LSA materials are listed in the "Directory of Certificates of Compliance for Radioactive Materials Packages," NUREG-0383. The authorized contents specified on these certificates are based on the LSA definitions from the old rules. NRC plans to revise the certificates for these packages to: (1) show an expiration date of April 1, 1999; and (2) to limit the specific activity allowed to correspond to that of the old rules (i.e., basically 0.1 µCi/g for nuclides with an $A_2 \leq 0.05$ Ci; 5 µCi/g if $0.05 < A_2 \leq 1$ Ci; or 0.3 mCi/g for nuclides with an A_2 greater than 1 Ci). Licensees must have a copy of the revised certificates before using an NRC

certified package to ship LSA material or SCO (and must ship in compliance with the *revised* Certificate).

The non-accident resistant packages identified in 49 CFR 173.427 include: the industrial packages (§§ 173.410 and 173.411); and for domestic use only, the Type A packages, including Spec 7A packages (§§ 173.410, 173.412, and 173.415); the strong tight packages (§§ 173.410 and 173.24); and the NRC approved LSA packages (§ 173.427(e) and § 71.52, see the above paragraph). A subtle provision in the new regulations is that the exemption from labelling and marking of LSA packages (§173.427(a)(6)(vi)), applies only to packages designated as strong tight containers in exclusive-use, domestic shipments, where the quantity per package is less than one A_2; or to bulk packaging of LSA-I and SCO-I for which shipment is performed pursuant to § 173.427(c).

d. New communications requirements include, in part:

1. A new requirement, at § 172.203(d)(10) requires that "Exclusive use shipment" be added on the shipping paper, if appropriate.

2. Note that the group notation (LSA-I, LSA-II, LSA-III, SCO-I, or SCO-II) must appear on the shipping paper, but is not part of the proper shipping names from § 172.101.

e. In the definition of LSA, a distinction is made between the terms "essentially uniformly distributed" and "distributed throughout." The term "essentially uniformly distributed" is intended to be more restrictive than "distributed throughout." Both terms are intended to disallow LSA classification for a material with very high radioactivity (such as a leaking sealed source) in one location and a large quantity of non-radioactive material surrounding it, thereby reducing the average concentration to within specified limits. If, in such a case, the packaging were destroyed during transport, and the high activity portion were separated from the non-radioactive portion, it could cause substantial radiation exposure, either from direct radiation or through a pathway (e.g., inhalation). The IAEA models justifying the special rules applied to LSA shipments, assume uniform distribution of any LSA material released from the package.

Because the distribution of the radioactivity in the LSA material is an important factor in meeting the LSA definitions, each licensee must be able to demonstrate that the radioactive component of his LSA material is "essentially uniformly distributed" to a reasonable extent, or that it is "distributed throughout" the LSA material, depending on the requirement imposed. A quantitative standard has not been developed, and NRC and DOT are currently considering guidance development. There is some advisory material in IAEA Safety Series No 37 (Ref. 6), as amended 1990, but NRC and DOT have not determined the general applicability of this advisory material.

f. The appropriate packaging requirements (i.e., NRC certification or not) will be determined by the 1 rem/hr dose rate limit at 3 meters from the unshielded contents. The inspector should review the licensee's procedures for making this determination. It is anticipated that licensees will base the determination on measured dose rates from the package surfaces; and prior knowledge about the package contents through routine sampling (for process wastes), or through specific sampling of the contents (e.g., for objects/components). A back-calculation can then be performed which effectively removes *all* packaging (including liners) from the contents. It is expected that licensees may develop or purchase systematic procedures or programs which relate measured dose rates, frequently used package types, and waste stream information, to the unshielded dose rate at 3 meters. The technical bases for these procedures should be reviewed. Independent verification (through measurement) of the unshielded dose rates by inspectors may not be practical; and qualitative, bounding evaluations may be necessary. As a quick point of reference, for a cylindrical volume of 130 cubic feet, 1 rem/hr at 3 meters could be on the order of $5A_1$ quantities of gamma emitters (Co-60). Inspectors

should also review the licensee procedures in the context of their incorporation of ALARA concepts.

g. No specific guidance.

04.03 Use of International System of Units (SI)

a. Mandatory use of SI for radiation units becomes effective April 1, 1997. These values will be required on shipping papers [§ 172.203(d)(4)] and on labels [§ 172.403(g)(2)]. Note that SI units for quantities other than radiation (e.g., mass and volume) are not required by the new regulation, but may be used. Radiological units being added as primary standards are the unit for radioactivity, the becquerel (Bq), to replace the curie (Ci); and the unit for dose equivalent, the sievert (Sv), to replace the rem. One becquerel is equal to 1 disintegration per second, so is most frequently expressed as a large multiple of the base unit, e.g., the terabecquerel is equal to $1x10^{12}$ Bq or 27 Ci. The sievert is a large unit, equal to 100 rem. A commonly encountered multiple for the sievert is the millisievert (1 mSv equals 100 mrem, or 0.1 rem).

Some conversions:	1 Ci	= $3.7x10^{10}$ Bq	= 0.037 TBq
	1 TBq	= $1x10^{12}$ Bq	= 27 Ci
	1 mSv	= 100 mrem	= 0.1 rem
	1 rem	= 1 cSv	= 10 mSv
	1 Bq	= 60 dpm= 0.027 nCi = $27.0x10^{-12}$ Ci	

b. No specific guidance.

c. No specific guidance.

04.04 Expansion of the Radionuclide List and Changes in Radionuclide Limits

a. In general, the A_1/A_2 values for gamma-emitting isotopes has increased, while the values for beta- and alpha-emitting isotopes have decreased. These changes could affect the authorized contents for NRC certified packages in various ways. For example, since the A_1/A_2 values for alpha-emitters have generally decreased, a quantity of fissile material which would previously have been authorized on the certificate for a Type AF (Type A-fissile) package would now need a Type B package. The changes also may affect the containment and shielding aspects of packages whose authorized contents are expressed in terms of A_1/A_2 values.

b. No specific guidance.

c. No specific guidance.

d. No specific guidance.

04.05 Classification of Fissile Material

a. 1. The *Transport Index* for fissile materials packages is the maximum of (1) the radiation level (to the nearest tenth), in mrem/hr, at 1 meter from any surface, or (2) a number "50/N", rounded up to the nearest tenth. "N" in (2), above, is a calculated number (during package certification) such that: 5N water reflected undamaged packages would be subcritical with nothing between them, and 2N damaged packages (i.e., subjected to hypothetical accident conditions in § 71.73) would be subcritical with optimum interdispersed hydrogenous moderation and reflection.

2. All fissile materials must be assigned a criticality control TI after April 1, 1996 when prepared for shipment. Because the old Fissile Class I and Fissile Class III categories did not previously have a criticality control TI assigned, some questions have arisen as to an appropriate value to assign these packages under the new rules. Table 1. compares the old Fissile Class I, II and III system and the new system. The last column of the table gives a converted value for the TI for the old Fissile Class I and Class III packages. NRC plans to issue revised Certificates of Compliance specifying the new TI values for each fissile package. Licensees must have a copy of the revised certificate before using an NRC certified package to ship fissile material (and must comply with the revised certificate).

Table 1. Comparison of Old and Revised Fissile Materials Classification Systems

Fissile Materials Class	Number of Packages to remain subcritical[1] (both fully water reflected, accident also water moderated)		Conservative TI Value[2]
	- Normal Conditions -	- Accident Conditions -	
Fissile Class I	any quantity	at least 250	0.4
Fissile Class II	5N	2N	Same as old rule (50/N)
Fissile Class III	2X	1X	125/X, or 100 if X=1
New System	5N	2N	50/N

NOTE 1: On this Table, "X" has been used for the old rules' "N" (number of packages), to avoid confusion with the "N" used in the new rule (though the terms have similar meanings).

2: These values are considered to be conservative in all cases.

3. Under the revised rules, for criticality TI not greater than 10, if the sum of all TI on vehicle is 50 (or 100 for exclusive use), then adequate criticality control is provided. Provisions for the use of special arrangements are generally unchanged, but they formerly applied only to Fissile Class III packages. For criticality TI greater than 10 (meaning N is less than 5), a controlled shipment must be used. The controls of 49 CFR 173.457(a) must be incorporated, and the shipper must: (1) use exclusive use; or (2) use the "special arrangements" provisions of 49 CFR 173.457. Adequate criticality control is provided by limiting sum of all TI on vehicle to 100 for exclusive use.

b. No specific guidance.

c. No specific guidance.

2515/133-05 REPORTING REQUIREMENTS

Document inspection findings in a routine inspection report. In addition to routine regional distribution, send a copy to Jim Schneider, Transportation and Storage Safety Section, SFPO, NMSS, by mail, facsimile, or E-mail.

2515/133-06 COMPLETION SCHEDULE

Implemented this TI as part of a routine inspection during either outage or non-outage periods.

2515/133-07 EXPIRATION

This TI will remain in effect until 03/15/98.

2515/133-08 CONTACT

Questions concerning this TI should be addressed to Earl P. Easton (301/415/8520).

2515/133-09 STATISTICAL DATA REPORTING

Direct inspection effort expended in fulfilling the requirements of this instruction is to be charged to 2515/133 for RITS with an Inspection Program Element (IPE) code of "SI" (Safety Issues Program).

2515/133-10 ORIGINIATING ORGANIZATION INFORMATION

10.01 Organizational Responsibility. The Spent Fuel Project Office and the Emergency Preparedness and Radiation Protection Branch initiated this TI.

10.02 Resource Estimate. It is anticipated that 20 to 25 inspector-hours on-site will be needed to complete the requirements of this instruction. Multi-unit sites require the same amount of time.

10.03 Other. There are no parallel inspection procedures that will be satisfied by the performance of this TI.

2515/133-11 REFERENCES

1. Regulations for the Safe Transport of Radioactive Material, 1985 Edition (As Amended 1990), Safety Series #6, International Atomic Energy Agency, Vienna, Austria.

2. Explanatory Material for the IAEA Regulations for the Safe Transport of Radioactive Material, 1985 Edition (As Amended 1990), Safety Series No 7, International Atomic Energy Agency, Vienna, Austria.

3. Radiation Protection Guidance to Federal Agencies for Occupational Exposure: Recommendations Approved by the President, (January, 1987); U.S. Environmental Protection Agency, Washington, DC 20460.

4. Hazardous Materials Transportation Regulations; Compatibility with Regulations of the International Atomic Energy Agency; Notice of Final Rule Making, 60 FR 50292; United States Department of Transportation; Published 9/28/95.

5. Compatibility With the International Atomic Energy Agency (IAEA); Notice of Final Rulemaking, 60 FR 50248; United States Nuclear Regulatory Commission; Published 9/28/95.

6. Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material, 1985 Edition (As Amended 1990), Safety Series No 37, International Atomic Energy Agency, Vienna, Austria.

Appendices:

A. EFFECTIVE DATES OF DOT - NRC TRANSPORTATION AMENDMENTS PUBLISHED ON SEPTEMBER 28, 1995

B. SECTION REFERENCES FOR AMENDMENTS TO 49 CFR PART 173 and 10 CFR PART 71

C. ERRORS IN NRC AND DOT FEDERAL REGISTER FINAL RULES

END

APPENDIX A

EFFECTIVE DATES OF DOT - NRC TRANSPORTATION AMENDMENTS PUBLISHED ON SEPTEMBER 28, 1995 60 FR 50292

A: U.S. Department of Transportation Regulations 49 CFR Parts 170-189

1. November 1, 1995 - Voluntary compliance date of all amendments.

2. April 1, 1996 - General effective date of amendments.

3. April 1, 1997 - Mandatory use of SI (International Systems) units.

4. April 1, 1997 - Final date for authorized use of Specification 7A packagings designed in accordance with § 178.350 which was in effect on June 30, 1983 (§ 173.415).

5. October 1, 1997 - Mandatory compliance with 49 CFR Part 172, Subpart I - Radiation Protection Program.

B: U.S. Nuclear Regulatory Commission Regulations 10 CFR Part 71

1. August 31, 1987 - Final date to complete fabrication of a package the design of which was approved by NRC but without the designation B(U) or B(M) in its assigned identification number. Packages fabricated after that date cannot be used under the NRC general license in 10 CFR 71.12.

2. April 1, 1996 - General effective date of amendments.

3. March 1, 1998 - Date for mandatory compliance with Uniform Low-Level Radioactive Waste Manifest rule (Appendix G, Section I, to 10 CFR Part 20), unless disposal facility implements this rule prior to this date.

4. April 1, 1999 - 10 CFR 71.52 (LSA exception from Type B requirements) expires. After this date, packages for LSA/SCO shipments, where the external radiation level at 3 m from the unshielded material exceeds 10 mSv/h (1 rem/h) (see LSA exemption in § 71.10(b)(2)), can be approved by NRC only if they satisfy all Type B package requirements.

5. April 1, 1999 - Final date to complete fabrication of a package the design of which was approved by NRC but without the designation "-85" in its assigned identification number. Packages fabricated after that date cannot be used under the NRC general license in 10 CFR 71.12.

APPENDIX B

SECTION REFERENCES FOR AMENDMENTS TO 49 CFR PART 173 and 10 CFR PART 71

- only changes to section names are shown -

49 CFR PART 173

OLD SECTION	NEW SECTION	
173.411	173.410	General design requirements.
173.421-1	173.422	Additional requirements for excepted packages containing Class 7 (radioactive) materials.
173.421-2	173.423	Requirements for multiple hazard limited quantity Class 7 (radioactive) material.
173.422	173.424	Excepted packages for radioactive instruments and articles.
173.423	173.425	Table of activity limits - excepted quantities and articles.
173.424	173.426	Excepted packages for articles containing natural uranium or thorium.
173.425	173.427	Transport requirements for LSA/SCO material.
173.427	173.428	Empty Class 7 (radioactive) materials packaging.
173.457	173.457	Transportation of fissile material, controlled shipments-specific requirements.
None	173.468	Test for LSA-III material.

10 CFR PART 71

OLD SECTION	NEW SECTION	
71.7	71.8	Specific exemptions.
71.18	71.18	General license: fissile material, limited quantity per package.
71.20	71.20	General license: fissile material, limited moderator per package.
71.22	71.22	General license: fissile material, limited quantity, controlled shipment.
71.24	71.24	General license: fissile material, limited moderator, controlled shipment
None	71.38	Renewal of QA certificate of compliance.
71.57, 59, 61	71.22	Array of fissile material.

OLD SLECTION		NEW SECTION
None	71.64	Plutonium Air shipments.
None	71.74	Accident conditions: Pu by air.
None	71.77	Qualification of LSA-III material.

APPENDIX C

ERRORS IN NRC AND DOT FEDERAL REGISTER FINAL RULES

PUBLISHED ON SEPTEMBER 28, 1995
60 FR 50248 (NRC) & 60 FR 50292 (DOT)

Several misprints or errors found their way into the Federal Register versions of the final rules. Licensees and NRC inspectors should be aware of these, and a reference list of those discovered to date is provided below.

DOT Section (49 CFR §§)	NRC Section (10 CFR §§)	Description of Error
N/A	71.18	The minimum Transport Index equation in § 71.18(d)(1) should read:

$$\text{Minimum zzznzzzzz znzzz} =)))))z+))))z+z))1-\frac{15}{)z+z+z)})$$

N/A	71.55	§ 71.55(d)(3) should reference § 71.59(**a**)(1)
172.403	N/A	Label category table. The "per-hour" was left off some of the units. All maximum radiation level values in the second column should be mSv/hr, or mrem/hr, as applicable. Also, the second column, "Maximum external radiation level at any point on the external surface", for the Yellow-III label row, should read: "Greater than **0.5 mSv/h** (50 mrem**/h**) ..."
173.403	71.4	Definitions. The following changes to the definition of Low-Specific Activity (LSA) material are needed: • For **LSA-II**, the words **essentially uniformly distributed** should be deleted and replaced with **distributed throughout** in both rules. • For **LSA-III**, the words **essentially uniformly** should be deleted from the first part of the definition which applies to a solid or collection of solid objects, in both rules.
173.417	N/A	Authorized fissile materials packages. Table 3.-Allowable content of uranium hexaflouride "heels" in a spec. 7A cylinder, is missing a column heading which splits the UF_6 maximum "heel" weight per cylinder into kilograms and pounds. As a result, the remaining columns are unaligned in Federal Register final rule publication.
173.425	N/A	Excepted quantities and Articles. In Table 7: • The materials package limit for special form solid should read $\mathbf{10^{-3}A_1}$. • The instrument and article package limit for "other liquids" should read $\mathbf{10^{-1}A_2}$. • The footnote should reference § 173.433**(d)**.

- A second footnote should be added, indicating that the values for "Gases: Tritium," **also apply to tritium in activated luminous paint and tritium absorbed on solid carriers**.

173.427 N/A LSA requirements. In the row beginning "LSA-III**I**" should actually begin as "LSA-**III**"

173.428 N/A Empty Packages. § 173.428(a) should read "... requirements of § 173.421**(a)(2), (3), and (6)** of this subpart;"

173.443 N/A Package contamination limits. The beta-gamma maximum permissible limits should be: **0.4** Bq/cm^2, and **10^{-5}** µCi/cm^2.

173.465 N/A Type A package tests.

- § 173.465(a) should read: "...capable of withstanding the water spray, free drop, **stacking**, and penetration tests ...."
- § 173.465(e)(1) should read: "A bar of 3.2 centimeters (**1.25** inches) ...."

173.435 71 App. A Table of A_1 and A_2 values. The following changes are necessary:

1. Values for A_1:

- For **Br-82**, the A_1 Ci value should be changed to **10.8** in both rules.
- For **C-11**, the A_1 Ci value should be changed to **27** in both rules.
- For **Cm-244**, the A_1 Ci value should be changed to **108** in both rules.

2. Values for A_2:

- For **Es-253**, and for **Fm-257**, the A_2 Tbq/Ci ratios do not equal 27. For each of these nuclei, the A_2 derivation should be checked. These nuclei are not included in IAEA regulations. NRC is in the process of recalculating the proper values.
- For **Pd-107**, the "unlimited" should be shifted right from the "element and atomic number column. Thus, the A_2 Ci value should be **Unlimited**, the TBq/g value should be 1.9E-05, and the Ci/g value should be 5.1E-04. This misprint occurs in the DOT rule only.

3. Values for specific activities:

- For **Ag-110m**, the TBq/g value should be changed to 1.8E+**02** in both rules.
- For **Am-242m**, the Ci/g value should be changed to **1.0E+01** in both rules.
- For **Ar-39**, the TBq/g value should be changed to 1.3E+**00** in both rules.
- For **Cd-113m**, the TBq/g value should be changed to 8.3E+**00** in both rules.
- For **Cm-244**, the Ci/g value should be changed to **5.7E+01** in both rules.
- For **Eu-150**, the Ci/g value should be changed to **1.6**E+06 in both rules.

Also, it should be noted that this is for the 12.8 hr half-life isotope, and IAEA has an additional value for the 26 yr half-life isotope

- For **Eu-155**, the Ci/g value should be changed to 4.9E+**02** in both rules.

- For **F18**, the TBq/g value should be changed to 3.5E+**06** in both rules.

- For **Fe-59**, the Ci/g value should be changed to **5.0**E+04 in both rules.
  This is an error that also exists in the Specific Activity Table in IAEA SS37

- For **Gd-148**, the TBq/g value should be changed to **1.2**E+00 in both rules, and the Ci/g value should be changed to **3.2**E+01 in both rules.

- For **Pd-107**, the "unlimited" should be shifted right from the "element and atomic number column. Thus, the A_2 Ci value should be **Unlimited**, the TBq/g value should be 1.9E-05, and the Ci/g value should be 5.1E-04. This misprint occurs in the DOT rule only.

- For **Pt-197m**, the TBq/g value should be changed to **3.7**E+05 in both rules.

4. Table A-3 - Activity-mass relationships for uranium:

- The footnote should reference **U-234** which is concentrated during the enrichment process, not U-235 (NRC rule only).