A Comparison of Part 71 and TS-R-1
Prepared for the Nuclear Regulatory Commission

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Introduction

The Nuclear Regulatory Commission (NRC) is undertaking rulemaking actions to keep its transport safety regulations (Part 71) harmonized with those of the International Atomic Energy Agency (IAEA). The IAEA's "Regulations for the Safe Transport of Radioactive Material", also known as TS-R-1, are periodically revised to keep them current with developing transportation technologies and the latest radiation protection principles. The latest revision of the IAEA regulations was published in 1996. Member States and international organizations are now working to implement regulations which are harmonized with TS-R-1.

As part of the analysis of possible issues related to harmonizing with TS-R-1, NMSS/IMNS requested that ICF, Inc., in collaboration with Oak Ridge National Laboratory, develop a comparison of the TS-R-1 and Part 71 regulations. This comparison was prepared under the technical direction of SFPO. Rather than preparing a simple text-by-text comparison, it was decided that an explanation of the comparability between the two sets of regulations would be most helpful. These explanations are provided on a paragraph and subparagraph basis since many of the requirements in the regulations are quite detailed. The comparison table presents a summary of each paragraph and subparagraph in TS-R-1, lists any corresponding Part 71 citations and provides an explanation their comparability.

Radioactive materials transportation safety regulatory responsibilities in the United States are shared by the NRC and the Department of Transportation (DOT). These responsibilities have been coordinated and are delineated in a Memorandum of Understanding between the two agencies. Accordingly, the regulations promulgated by each agency reflect these areas of responsibility. Since the TS-R-1 regulations cover all aspects of radioactive materials transportation safety, they span the areas of responsibility of both NRC and DOT. In order to present an accurate and complete description of the regulatory requirements in the US, the comparison table indicates this by noting where TS-R-1 requirements are reflected in the DOT requirements. Since a majority of the TS-R-1 regulations address topics that are the responsibility of DOT, there are a large number of TS-R-1 paragraphs that are not reflected in Part 71 (these are noted in the table). This does not reflect a shortcoming in Part 71, just the division of responsibilities between NRC and DOT.

Organization of the Comparison Table

The table contains the following columns:

- Column 1 - identifies the relevant TS-R-1 paragraph or subparagraph
- Column 2 - identifies the relevant Part 71 paragraph or subparagraph
- Column 3 - contains the regulatory text from TS-R-1, or, where the regulatory text is very long, the TS-R-1 requirements are summarized

- Column 4 - provides a comparison of the TS-R-1 and Part 71 requirements

When Part 71 does not have a requirement corresponding to a TS-R-1 requirement, this is generally noted by a blank in column 2 and an explanation in column 4. When Part 71 contains a requirement which is not reflected in TS-R-1 this is generally noted by a blank in column 1 and an explanation in column 4. The table is sorted by TS-R-1 paragraph numbers (column 1). This results in the Part 71 requirements which do not have corresponding TS-R-1 requirements appearing "en block" at the end of the table.

The radioactive materials transport safety regulations are very detailed and there are many degrees to which multiple sets of regulations may be consistent. This degree of consistency ranges from being identical to being very different. In order to provide a measure of understanding of how close the regulations are to each other, the following terms are used in the table with their associated meanings:

- Identical — exactly the same
- Essentially the same — minor wording differences
- Similar requirement — wording and content difference for a **mandatory statement**
- No similar requirement — no corresponding mandatory statement
- Similar provision — wording and content difference for a **permissive statement**
- No similar provision — no corresponding permissive statement

The table identifies all of the significant differences between the US and IAEA regulations, both those which are historical in nature and those introduced by TS-R-1. In this latter case, it is noted in column 4 (the comparison), including noting where there is:

- No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking
- No similar requirement, however, this topic is within DOT's area of responsibility
- No similar provision; this is a new provision in TS-R-1 and is being considered in the Part 71 rulemaking
- No similar provision, however, this topic is within DOT's area of responsibility

Since Part 71 was revised earlier to be harmonized with the previous edition of the IAEA regulations (Safety Series No. 6, 1985 (as amended 1990)), most of the current differences between Part 71 and TS-R-1 stem from changes introduced by TS-R-1. However, some historical differences between Part 71 and the IAEA regulations continue to exist for various reasons, such as: the NRC's license- and certificate-based regulatory approach; requirements implemented in response to unique US situations (such as the plutonium by air requirements); and variations in the level of detail specified in some topics (such as quality assurance). It should be noted that it is not unusual for IAEA Member States to have national variations in their domestic regulations.

The major differences between Part 71 and TS-R-1, both historical and those resulting from changes in the IAEA regulations, have been addressed as "Issues" in the Part 71 rulemaking. The comparison did not identify other major issues which are not presently covered in the rulemaking. Additional differences (which are not major) are identified in column 4 of the table.

TS-R-1	10 CFR Part 71	Safety Series TS-R-1 Summary	TS-R-1 to 10 CFR Part 71 Comparison
101		**SECTION I –– INTRODUCTION** BACKGROUND (101-103) Defines the purpose of the regulations as establishing standards of safety and levels of control for radiological hazards for people, property, and the environment.	Similar to 71.0, Purpose and scope, but Part 71 does not build on the IAEA Basic Safety Standards, SS No. 115 and the "'Radiation Protection and Safety of Radiation Sources", SS No. 120.
102		Indicates that this Safety Standard is supplemented by a hierarchy of Safety Guidelines and Safety Practices, including ST-2 and Safety Series Nos. 87, 112, and 113.	No comparable paragraph, it describes the IAEA guidance documents.
103	71.0 (c)	It is each government's prerogative to assign responsibility to specific persons for carrying out particular regulatory actions.	71.0 (c) makes part 71 applicable to licensees "if the license delivers that material to a carrier for transport..."
104		OBJECTIVE (104-105) States that the objective of these regulations is to protect persons, property and environment from the effects of radiation during the transport of radioactive material. Prescribes the general requirements necessary to achieve this protection. (a) containment of the radioactive contents' (b) control of external radiation levels; (c) prevention of criticality; and (d) preventionof damage caused by hear	This is explanatory text . No similar general statement in Part 71.
105		States that in the transport of radioactive material that the safety of persons, who are either members of the public or workers, is assured when these Regulations are complied with. Confidence is achieved through quality assurance and compliance assurance programs.	This is explanatory text . No similar general statement in Part 71.
106	71.0 (c), (e), and (f)	SCOPE (106-109) Specifies that these Regulations apply to the transport of radioactive material by all modes on land, water, or in the air, including transport which is incidental to the use of the radioactive material. Transport comprises all operations and conditions associated with and involved in the movement of radioactive material; these include the design, manufacture, maintenance, and repair of packaging, and the preparation, consigning, loading, carriage including in-transit storage, unloading and receipt at the final destination of loads of ration material and packages. A graded approach is applied to the performance standards in these Regulations that is characterized by three general severity levels:	Similar to 71.0 (c), (e) and (f).

106 (a)		routine conditions of transport (incident free);	No similar provision.
1 0 6 (b)		normal condition of transport (minor mishaps);	No similar provision.
106 (c)		accident conditions of transport.	No similar provision.
107 (a)		Specifies that regulations do not apply to radioactive material that is an integral part of the means of transport.	No similar provision in Part 71.
1 0 7 (b)	71.0 (c)	Specifies that regulations do no apply to radioactive material moved within an establishment which is subject to appropriate safety regulations in force in the establishment and where the movement does not involve public roads or railways.	71.0 (c) is similar.
107 (c)		Specifies that regulations do not apply to radioactive material implanted or incorporated into a person or live animal for diagnosis or treatment.	No similar provision, but the 71.5(a) reference to Title 49 includes 173.401 (b) which is similar.
1 0 7 (d)		Specifies that the transport regulations do not apply to radioactive material in consumer products which have received regulatory approval, following their sale to the end user.	No similar provision, however, this topic is within DOT's area of responsibility.
107 (e)		States that the regulations do not apply to natural occurring radionuclides which are not intended to be processed for use of these radionuclides provided the activity concentration of the material does not exceed 10 times the values specified in paras. 401-406.	No similar provision, however, this topic is within DOT's area of responsibility.
108		States that these regulations do not specify controls such as routing or physical protection which may be instituted for reasons other than radiological safety.	Routing is covered by Title 49 and physical protection is covered in other Parts of Title 10.
109		States that for radioactive material having subsidiary risks, the relevant regulations for each country in which transportation takes place applies in addition to these Regulations.	No similar provision, however, this topic is within DOT's area of responsibility.
110		STRUCTURE (110) Discusses the organizational structure of TS-R-1.	Not applicable.
201	71.4	**SECTION II - DEFINITIONS** A1 & A2 shall mean the activity value of radioactive material which is listed in Table 1 or derived in Section IV and is used to determine the activity limits for the requirements of these regulations.	Essentially the same, but Part 71 contains reference to "...permitted in a Type A package..." which is not in TS-R-1.
202		Cargo aircraft shall mean any aircraft, other than a passenger aircraft, which is carrying goods or property.	No similar defined term in Part 71. See 49 CFR 171.8.
203		Passenger aircraft, shall mean an aircraft that carries any person other than a crew member, a carrier's employee in an official capacity, an	No similar defined term in Part 71. See 49 CFR 171.8.

		authorized representative of an appropriate national authority, or a person accompanying a consignment.	
204		Multilateral approval shall mean approval by the relevant competent authority both of the country of origin of the design or shipment and of each country through or into which the consignment is to be transported. The term "through or into" specifically excludes "over", i.e., the approval and notification requirements shall not apply to a country over which radioactive material is carried in an aircraft, provided that there is no scheduled stop in that country.	No similar defined term in Part 71. See 49 CFR 171.403 (similar to TS-R-1).
205		Unilateral approval shall mean an approval of a design which is required to be given by the competent authority of the country of origin of the design only.	No similar defined term in Part 71. See 49 CFR 171.403.
206	71.4	Carrier shall mean any person, organization or government undertaking the carriage of radioactive material by any means of transport. The term includes both carriers for hire or reward (known as common or contract carriers in some countries) and carriers on own account (known as private carriers in some countries).	Similar wording in Part 71.
207		Competent authority shall mean any national or international regulatory body or authority designed or otherwise recognized as such for any purpose in connection with these Regulations.	No similar defined term in Part 71. See 49 CFR 171.8.
208		Compliance assurance shall mean a systematic programme of measures applied by a competent authority which is aimed at ensuring that the provisions of these Regulation are met in practice.	No similar defined term in Part 71.
209		Confinement system shall mean the assembly of fissile material and packaging components specified by the designer and agreed to by the competent authority as intended to preserve criticality safety.	No similar defined term in Part 71.
210		Consignee shall mean any person, organization or government which receives a consignment.	No similar defined term in Part 71.
211		Consignment shall mean any package or packages, or load of radioactive material, presented by a consignor for transport.	No similar defined term in Part 71.
212		Consignor shall mean any person, organization or government which prepares a consignment for transport, and is named as consignor in the transport documents.	No similar defined term in Part 71.

213	71.4	Containment system shall mean the assembly of components of the packaging specified by the designer as intended to retain the radioactive material during transport.	Similar wording in Part 71.
214		Contamination shall mean the presence of a radioactive substance on a surface in quantities in excess of 0.4 Bq/cm^{22} for beta and gamma emitters and low toxicity alpha emitters, or 0.04 Bq/cm^{222} for all other alpha emitters.	No similar defined term in Part 71.
215		Non-fixed contamination shall contamination that can be removed from a surface during routine conditions of transport.	No similar defined term in Part 71.
216		Fixed contamination shall mean contamination other than non-fixed contamination.	No similar defined term in Part 71.
217	71.4	Conveyance shall mean for transport by road or rail: any vehicle; for transport by water: any vessel, or any hold, compartment, or defined deck area of a vessel; and for transport by air: any aircraft.	71.4 definition also includes "large freight container" for road and rail transport.
218		Criticality safety index (CSI) assigned to a package, overpack or freight container containing fissile material shall mean a number which is used to provide control over the accumulation of packages, overpacks or freight containers containing fissile material.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
219		Defined deck area shall mean the area, of the weather deck of a vessel, or of a vehicle deck of a roll-on/roll-off ship or a ferry, which is allocated for the stowage of radioactive material.	No similar defined term in Part 71.
220		Design shall mean the description of special form radioactive material, low dispersible radioactive material, package or packaging which enable such an item to be fully identified. The description may include specifications, engineering drawings, reports demonstrating compliance with regulatory requirements, and other relevant documentation.	No similar defined term in Part 71. See 49 CFR 173.401.
221	71.4	Exclusive use shall mean the sole use, by a single consignor, of a conveyance or of a large freight container....	Part 71 is more prescriptive in its definition, adding radiation protection provisions and requiring specific written instructions. See 49 CFR 173.403 also.
222	71.4	Fissile material shall mean U-233, U-235, Pu-239, and Pu-241.	Essentially the same but Part 71 includes Pu-238.
223		Defines large freight container and small freight container.	No similar defined term in Part 71. See 49 CFR 173.403.
224		Defines intermediate bulk container as a portable packaging that has a capacity of not more than 3 m^{33}, is designed for mechanical	No similar defined term in Part 71. See 49 CFR 171.8 for a similar definition applicable to all hazardous materials IBCs.

		handling, is resistant to the stresses produced in handling and transport, is designed to conform to the standards in the chapter on Recommendations on Intermediate Bulk Containers (IBC's) of the United Nations Recommendations on the Transport of Dangerous Goods.	
225		Low dispersible radioactive material shall mean either a solid radioactive material or a solid radioactive material in a sealed capsule, that has limited dispensability and is not in powder form.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
226	71.4	Low specific activity material shall mean radioactive material which by its nature has a limited specific activity, or radioactive material for which limits of estimated average specific activity apply. External shielding materials surrounding the LSA material shall not be considered in determining the estimated average specific activity.	Both Part 71 and 49 CFR 173.403 have a similar definition, but there are differences with TS-R-1. The US regulations define LSA-I to include mill tailings, debris, etc. not exceeding 10E-6 A2/g (TS-R-1 does not include this). Part 71 and Title 49 exclude fissile material from LSA-I for unlimited A2 materials. Part 71 and Title 49 do not contain the LSA-I provision for materials up to 30 times the exempt activity concentrations. LSA-II is essentially the same. TS-R-1 excludes powders from LSA-III.
227	71.4	Low toxicity alpha emitters are: natural uranium; depleted uranium; natural thorium; uranium-235 or uranium-238; thorium-232; thorium-228 and thorium-230 when contained in ores or physical and chemical concentrates; or alpha emitters with a half-life of less than 10 days.	Essentially the same. Part 71 adds "tailings".
228	71.4	Maximum normal operating pressure shall mean the maximum pressure above atmospheric pressure at mean sea-level that would develop in the containment system in a period of one year under the conditions of temperature and solar radiation corresponding to environmental conditions in the absence of venting, external cooling by an ancillary system, or operational controls during transport.	Essentially the same.
229		Overpack shall mean an enclosure such as a box or bag which is used by a single consignor to facilitate as a handling unit a consignment of one or more packages for convenience of handling, stowage and carriage.	No similar defined term in Part 71. See 49 CFR 171.8.
230	71.4	Lists each package type and states that packages containing fissile material or UF6 are subject to additional requirements.	The basic definition is the same. Part 71 definition does not include excepted packages, industrial packages, Type A or Type C packages. Part 71 includes additional information on the difference between Type B(U) and Type B(M) and does not mention the additional requirements for packages containing fissile material or UF6.
231	71.4	Packaging shall mean the assembly of components necessary to enclose the	Basically the same. Part 71 and 49 CFR 173.403 include the provision that the vehicle, tie-down

		radioactive contents completely. It may consist of one or more receptacles, absorbent materials, spacing structure, radiation shielding and service equipment for filling, emptying, venting and pressure relief; devices for cooling; absorbing mechanical shocks, handling and tie-down, and thermal insulation; and service devices integral to the package. The packaging may be a box, drum or similar receptacle, or may also be a freight container, tank or intermediate bulk container.	system and auxiliary equipment may be designated as part of the packaging.
232	71.101	Quality assurance shall mean a systematic program of controls and inspections applied by any organization or body involved in the transport of radioactive material which is aimed at providing adequate confidence that the standard of safety prescribed in this Regulation is achieved in practice.	Similar definition is found in 71.101(a).
233		Radiation level shall mean the corresponding dose rate expressed in millisieverts per hour.	No similar defined term in Part 71. See 49 CFR 173.403.
234		Radiation Protection Programme shall mean systematic arrangements which are aimed at providing adequate consideration of radiation protection measures.	No similar defined term.
235		Radioactive contents shall mean the radioactive material together with any contaminated or activated solids, liquids and gases within the packaging.	No similar defined term in Part 71. See 49 CFR 173.403.
236	71.10 (a)	Radioactive material shall mean any material containing radionuclides where both the activity concentration and the total activity in the consignment exceed the values specified in para 401-406.	No similiar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking. However, 71.10 (a) identifies material which is exempt from Part 71, and 49 CFR 173.403 defines radioactive material in an identical way (0.002 microcurie per gram). This definition of radioactive material and the 0.002 microcurie per gram value is SUBSTANTIALLY different from TS-R-1, which is radionuclide-specific.
237		Shipment shall mean the specific movement of a consignment from origin to destination.	No similar defined term.
238		Special arrangement shall mean those provisions, approved by the competent authority, under which consignments which do not satisfy all the applicable requirements of these Regulations may be transported.	No similar defined term. However, a specific exemption (71.8) is similar to a special arrangement.
239	71.4	Special form radioactive material shall mean either an indispersible solid radioactive material or a sealed capsule containing radioactive material.	Definitions are similar, no technical differences. Part 71 includes requirements in the definition while TS-R-1 separates the requirements into another section. Part 71 provides grandfathering for designs in the definition while TS-R-1

			separates these into another section.
240	71.4	Specific activity of a radionuclide shall mean the activity per unit mass of that nuclide. The specific activity of a material shall mean the activity per unit mass or volume of the material in which the radionuclides are essentially uniformly distributed.	Definitions are similar. TS-R-1 also includes "activity per unit volume" for materials.
241	71.4	Surface contaminated object shall mean a solid object which is not itself radioactive but which has radioactive material distributed on its surfaces. SCO shall be in one of two group: SCO-I or SCO-II	Essentially the same.
242		Tank shall mean a tank container, a portable tank, a road tank vehicle, a rail tank wagon or a receptacle with a capacity of not less than 450 litres to contain liquids, powders, granules, slurries or solids which are loaded as gas or liquid and subsequently solidified, and of not less than 1000 litres to contain gases. A tank container shall be capable of being carried on land or on sea and of being loaded and discharged without the need of removal of its structural equipment, shall possess stabilizing members and tie-down attachments external to the shell, and shall be capable of being lifted when full.	No similar defined term.
243	71.4	The transport index assigned to a package, overpack or freight container, or to unpackaged LSA-I or SCO-I, shall mean a number which is used to provide control over radiation exposure.	This is a revised definitiont in TS-R-1 and is being considered in the Part 71 rulemaking. Definitions are technically substantially different. Part 71 (and 49 CFR 173.403) include criticality safety controls in the transport index. TS-R-1 uses a separate criticality safety index.
244		Unirradiated thorium shall mean thorium containing not more than 10E-7 g of U-233 per gram of thorium-232.	No similar defined term in Part 71. See 49 CFR 173.403.
245		Unirradiated uranium is defined as uranium containing not more than 2 x 10E+3 Bq of plutonium per gram of U-235, not more than 9 X 10E+6 Bq of fission products per gram of U-235 and not more than 5 x 10E-3 g of U-236 per gram of U-235.	No similar defined term in Part 71. See 49 CFR 173.403 which is consistent with SS No. 6 but differs from TS-R-1.
246	71.4	Natural uranium shall mean chemically separated uranium containing the naturally occurring distribution of uranium isotopes (approximately 99.28% U-238, and 0.72% U-235 by mass). Depleted uranium shall mean uranium containing a lesser mass percentage of U-235 than in natural uranium. Enriched uranium shall mean uranium containing a greater mass percentage of U-235 than 0.72%. In all cases, a very small mass percentage of U-234 is present.	Essentially the same.

247		Defines vehicle as a road vehicle (including an articulated vehicle, I.e. a tractor and semi-trailer combination) or railroad car or railway wagon. Each trailer shall be considered as a separate vehicle.	No similar defined term.
248		Defined vessel as any seagoing vessel or inland waterway craft used for carrying cargo.	No similar defined term in Part 71. See 49 CFR 171.8 which differs significantly from TS-R-1.
301		**SECTION III - GENERAL PROVISIONS** RADIATION PROTECTION (301-307) Requires a Radiation Protection Program for the transport of radioactive material. The nature and extent of the measures to be employed in the program shall be related to the magnitude and likelihood of radiation exposures. Incorporates the requirements of paras. 302-303 and 305-309. Requires documentation to be available for inspection.	No similar requirement in Part 71.
302		Specifies that doses must be below relevant dose limits. Requires consideration of ""interface between transport and other activities"".	No similar requirement in Part 71.
303		Need for continuous training concerning radiation hazards involved and worker's responsibility. Need for workers to consider affect of their actions on other persons.	No similar requirement in Part 71. See 49 CFR 172.700.
304		Specifies that the competent authority shall arrange for periodic assessments of the radiation doses to persons due to the transport of radioactive material, to ensure that the system of protection and safety complies with the Basic Safety Standards [2].	No similar requirement.
305		States for occupation exposures arising from transport activities, where it is assessed that the effective dose: (a) is most unlikely to exceed 1 mSv in a year, neither special work patterns nor detailed monitoring nor dose assessment programs nor individual record keeping shall be required: (b) is likely to be between 1 and 6 mSv in a year, a dose assessment program via work place monitoring or individual monitoring shall be conducted; (c) is likely to exceed 6 mSv in a year, individual monitoring shall be conducted. When individual monitoring or work place monitoring is conducted, appropriate records shall be kept.	No similar requirement.
306	71.131	Requires sufficient segregation between	No similar requirement in Part 71. Title 49 Parts

		radioactive materials and workers/members of the public. The values for dose shall be used for the purpose of calculating segregation distances or radiation levels: (a) for workers in regularly, occupied working areas, a dose of 5 mSv in a year; (b) for members of the public, in areas where the public has regular access, a dose of 1 mSv in a year to the critical group.	174, 175, 176, and 177 do, however, require segregation during transit.
307		Segregation between radioactive materials and undeveloped photographic film. The basis for determining segregation distances for this purpose shall be that the radiation exposure of undeveloped photographic film due to the transport of radioactive material be limited to 0.1 mSv per consignment of such film.	No similar requirement in Part 71. Title 49 Parts 175, 176, 177, and 178 do, however, require segregation during transit.
308		EMERGENCY RESPONSE (308-309) Specifies that in the event of accidents or incidents during the transport of radioactive material, emergency provisions, as established by relevant national and/or international organizations, shall be observed to protect persons, property, and the environment.	No similar requirement in Part 71. Title 49 addresses emergency actions and responsibilities in several Parts.
309		Emergency procedures shall take into account the formation of other dangerous substances, that may result from the reaction between the contents of a consignment and the environment in the event of an accident.	No similar requirement.
310	71.37 7 1 Subpart H	QUALITY ASSURANCE (310) Para. 310 - Quality Assurance QA Programmes shall be established and implemented for the design, manufacture, testing, documentation, use, maintenance, and inspection of all special form radioactive material, low dispersible radioactive material and packages and for transport and in-transit storage operations to ensure compliance with the relevant provisions of these Regulations. The manufacturer, consignor, or user shall be prepared to provide facilities for competent authority inspection during manufacture and use and to demonstrate to any cognizant competent authority that:	Part 71 is much more detailed and specific than TS-R-1, but does not cover areas such as in-transit storage and low dispersible material. Basic approaches are similar.
310 (a)	71.37 7 1 Subpart H	the manufacturing methods and materials used are in accordance with the approved design specifications; and	

3 1 0 (b)	71.37 7 1 Subpart H	all packages are periodically inspected and, as necessary, repaired and maintained in good condition so that they continue to comply with all relevant requirements and specifications, event after repeated use. Where competent authority approval is required, such approval shall take into account and be contingent upon the adequacy of the quality assurance program.	
311	71.0 (f) 71.93	COMPLIANCE ASSURANCE Competent authority is responsible for assuring compliance with these Regulations. Means to discharge this responsibility include the establishment and execution of a program for monitoring the design, manufacture, testing, inspection, and maintenance of packaging, special form radioactive material and low dispersible radioactive material, and the preparation, documentation, handling, and stowage of packages by consignors and carriers, to provide evident that the provisions of these Regulations are being met in practice.	Part 71 provisions address the NCR's right to inspect, record retention, etc. TS-R-1 addresses the Competent Authority's responsibility to have a program which ensures that the regulations are being met in practice.
312	71.8	SPECIAL ARRANGEMENT States that consignments for which conformity with the other provisions of these Regulations is impracticable shall not be transported except under special arrangement. The competent authority may approve special arrangement transport operations for single or a planned series of multiple consignments. The overall level of safety in transport shall be at least equivalent to that which would be provided if all the applicable requirements had been met. For international consignments of this type, multilateral approval shall be required.	A Special Arrangement is similar to a specific exemption (71.8) in that it may be granted by the cognizant authority. TS-R-1 requires "equivalent safety" while Part 71 requires the NRC to determine that it is "authorized by law and will not endanger life or property nor the common defense and security".
401	7 1 , Appendix A	**SECTION IV - ACTIVITY LIMITS AND MATERIAL RESTRICTIONS** BASIC RADIONUCLIDE VALUES (401) References Table I (Basic Radionuclide Values) with A1 and A2 values for radionuclides. Table I provides A1 and A2 values, activity concentration for exempt materials, and activity limits for exempt consignments for radionuclides.	Part 71, Appendix A, does not contain values for exempt activity concentrations nor activity limits for exempt consignments of radionuclides. This is being considered in the Part 71 rulemaking.
401 (a)	7 1 , Appendix A	A(sub1) and A(sub2) in TBq	The A-values which were changed between SS No. 6 and its revision to TS-R-1 are not reflected in Part 71. Part 71 and 49 CFR 173.435 are consistent with SS No. 6.

4 0 1 (b)	7 1 , Appendix A	activity concentration for exempt material in Bq/g	No similar requirement. This is being considered in the Part 71 rulemaking.
401 (c)	7 1 , Appendix A	activity limits for exempt consignment in Bq	No similar requirement. This is being considered in the Part 71 rulemaking.
402	7 1 , Appendix A II	DETERMINATION OF BASIC RADIONUCLIDE VALUES (402-406) A1 and A2 determination requires competent authority approval if not in table, but no approval if in table. The determination of basic radionuclides values which are not listed in Table 1 shall require competent authority approval or, for international transport, multilateral approval. Where the chemical form of each radionuclide is known, it is permissible to use the A2 value related to its solubility class as recommended by the International Commission on Radiological Protection, if the chemical forms under both normal and accident conditions of transport are taken into consideration. Alternatively, the radionuclide values in Table II may be used without obtaining competent authority approval.	Similar in that both require approval of unlisted radionuclides. TS-R-1 contains more specifics such as allowing chemical form to be considered.
403	7 1 , Appendix A III	In the calculations of A(sub1) and A(sub2) for a radionuclide not in Table I, a single radioactive decay chain in which the radionuclides are present in their naturally occurring proportions, and in which no daughter nuclide has a half-life either longer than 10 days or longer than that of the parent nuclide, shall be considered as a single radionuclide; and the activity to be taken into account and the A(sub1) or A(sub2) value to be applied shall be those corresponding to the parent nuclide of that chain. In the case of radioactive decay chains in which any daughter nuclide has a half-life either longer than 10 days or greater than that of the parent nuclide, the parent and such daughter nuclides shall be considered as mixtures of different nuclides.	Essentially the same
404	7 1 , Appendix A IV	Provides equations that gives conditions that must be met for mixtures of radionuclides.	Essentially the same.
405	7 1 , Appendix A V	States that when the identity of each radionuclide is know but the individual activities of some of the radionuclides are not know, then the radionuclides may be grouped and the lowest radionuclide value for the radionuclides in each group may be used in applying the formulas in paras. 404 and 414.	Essentially the same.

		Groups may be based on the total alpha activity and the total beta/gamma activity when these are known, using the lowest radionuclide values for the alpha emitters or beta/gamma emitters, respectively.	
406	7 1 , Appendix A II	Specifies that the values in Table II should be used for individual radionuclides or for mixtures of radionuclides for which relevant data are not available.	The Tables contain different values (Part 71 is consistent with SS No. 6 while the Table in TS-R-1 has revised values). This is being considered in the Part 71 rulemaking.
407		CONTENTS LIMITS FOR PACKAGES (407-419) Specifies that the quantity of radioactive material in a package should not exceed the relevant limits specified in para 408-419.	No similar general requirement.
408		**Excepted packages** (408-410) An excepted package for radioactive material other than articles manufactured of natural uranium, depleted uranium or natural thorium should not contain activities greater than the listed provisions.	Part 71 does not apply to excepted packages of non-fissile materials (71.10 (b)). See 49 CFR 173.421 - .426.
408 (a)		where radioactive material is enclosed in or is included as a component part of an instrument or other manufactured article, such as a clock or electronic apparatus, the limits specified in columns 2 and 3 of Table III for each individual item and each package, and	Included by reference in 71.5(a) to Title 49.
4 0 8 (b)		where the radioactive material is not so enclosed in or is not included as a component of an instrument or other manufactured article, the package limits specified in column 4 of Table III.	Included by reference in 71.5(a) to Title 49.
409		Specifies that for articles manufactured of natural uranium, depleted uranium or natural thorium, an excepted package may contain any quantity of such material provided than the outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or some other substantial material.	Part 71 does not apply to excepted packages of non-fissile materials (71.10 (b)). See 49 CFR 173.426.
410	71.0 (b)	For transport by post, the total activity in each excepted package should not exceed one tenth of the relevant limit specified in Table III.	Part 71 does not apply to excepted packages of non-fissile materials (71.10 (b)). See U.S. Postal Service regulation (39 CFR 111 and Publication No. 6). The values of TS-R-1 Table III are consistent with 49 CFR 173.425.
411	71.10 (b) (2)	**Industrial packages Type 1, Type 2 and Type 3** (411-412) The radioactive contents in a single package of LSA material or in a single package of SCO shall be so restricted that the radiation level specified in para. 521 shall not be exceeded,	Consistent with 71.10 (b)(2), however, the conveyance limits are not in Part 71, they are in 49 CFR 173.427.

		and the activity in a single package shall also be so restricted that the activity limits for a conveyance specified in para. 525 shall not be exceeded.	
412		Provides activity limit for air transport of packages containing non-combustible solid LSA-II or LSA-III material.	No similar requirement.
413	71.10 (b) (1)	**Type A packages** (413-414) Provides requirements for Type A packages. Type A packages shall not contain activities greater than A1 or A2.	Similar in effect (71.10 exempts packages containing less than Type A quantities of non-fissile or fissile excepted material). See also 49 CFR 173.413.
413 (a)	71.10 (b) (1)	for special form radioactive material - A(sub1)	Similar in effect (71.10 exempts packages containing less than Type A quantities of non-fissile or fissile excepted material). See also 49 CFR 173.413.
4 1 3 (b)	71.10 (b) (1)	for all other radioactive material - A (sub2)	Similar in effect (71.10 exempts packages containing less than Type A quantities of non-fissile or fissile excepted material). See also 49 CFR 173.413.
414	7 1 , Appendix A	Provides an equation for determining the maximum radioactive contents for a Type A package that contains a mixture of radionuclides.	See Part 71 Appendix A, IV and 49 CFR 173.431(d) which are similar. TS-R-1 also states that the total amount of both normal and special form material together in a single package must have an A-value ratio of less than 1.
415	7 1 . 1 2 , 71.14, a n d 71.16	**Type B(U) and Type B(M) packages** (415-416) Provides contents limits and restrictions for Type B(U) and Type B(M) packages.	Similar to 71.12 (c)(2), 71.14 (c)(2) and 71.16 (d)(2).
415 (a)	7 1 . 1 2 , 71.14, a n d 71.16	activities greater than those authorized for the package design	Similar to 71.12 (c)(2), 71.14 (c)(2) and 71.16 (d)(2).
4 1 5 (b)	7 1 . 1 2 , 71.14, a n d 71.16	radionuclides different from those authorized for the package design, or	Similar to 71.12 (c)(2), 71.14 (c)(2) and 71.16 (d)(2).
415 (c)	7 1 . 1 2 , 71.14, a n d 71.16	contents in a form, or a physical or chemical state different from those authorized for the package design, as specified in their certificates of approval.	Similar to 71.12 (c)(2), 71.14 (c)(2) and 71.16 (d)(2).
416		Provides requirements for Type B(U) and Type B(M) packages transported by air.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking. These restrictions limit Type B package use for air shipments, effectively imposing Type C package requirements which are not in the US regulations.
416 (a)		for low dispersible radioactive material - as authorized for the package design as specified in the certificate of approval	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.

4 1 6 (b)		for special form radioactive material - 3000 A(sub1) or 100,000 A(sub2), whichever is the lower, or	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
416 (c)		for all other radioactive material - 3000 A(sub2)	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
417		**Type C packages** (417) Provides requirements for contents of Type C packages.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
417 (a)		activities greater than those authorized for the package design,	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
4 1 7 (b)		radionuclides different from those authorized for the package design, or	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
417 (c)		contents in a form, or physical or chemical state different from those authorized for the package design,	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
418	7 1 . 1 2 , 71.14 to 71.24	**Packages containing fissile material** (418) Provides requirements for the contents of packages containing fissile material.	Similar to 71.12 (c)(2), 71.14 (c)(2), 71.16 (d)(2) which are worded more generally than TS-R-1, and 71.18 - 71.24.
418 (a)		a mass of fissile material different from that authorized for the package design,	Similar to 71.12 (c)(2), 71.14 (c)(2), 71.16 (d)(2) which are worded more generally than TS-R-1, and 71.18 - 71.24.
4 1 8 (b)		any radionuclide or fissile material different from those authorized for the package design, or	Similar to 71.12 (c)(2), 71.14 (c)(2), 71.16 (d)(2) which are worded more generally than TS-R-1, and 71.18 - 71.24.
418 (c)		contents in a form or physical or chemical state, or in a spatial arrangement, different from those authorized for the package design.	Similar to 71.12 (c)(2), 71.14 (c)(2), 71.16 (d)(2) which are worded more generally than TS-R-1, and 71.18 - 71.24.
419		**Packages containing uranium hexafluoride** (419) Provides requirements for the contents of packages containing UF6.	No similar requirements. See 49 CFR 173.420.
501	71.85	**SECTION V - REQUIREMENTS AND CONTROLS FOR TRANSPORT** (501) REQUIREMENTS BEFORE THE FIRST SHIPMENT Sets requirements that must be fulfilled before the first shipment of any package.	Similar to 71.85(a) and (b) and 49 CFR 173.474.
501 (a)	71.85 (b)	If the design pressure of the containment system exceeds 35 kPa (gauge), it shall be ensured that the containment system of each package conforms to the approved design requirements relating to the capability of that system to maintain its integrity under that pressure.	Similar to TS-R-1, but with a specific test criteria.

5 0 1 (b)	71.85 (a)	For each Type B(U), Type B(M) and Type C package and for each package containing fissile material, it shall be ensured that the effectiveness of its shielding and containment and, where necessary, the heat transfer characteristics and the effectiveness of the confinement system, are within the limits applicable to or specified for the approved design.	Similar in intent to TS-R-1, does not cover Type C packages.
501 (c)	71.85 (a)	For packages containing fissile material, where, in order to comply with the requirements of para. 671, neutron poisons are specifically included as components of the package, checks shall be performed to confirm the presence and distribution of those neutron poisons.	Similar in intent to TS-R-1, does not cover Type C packages.
502	71.87	REQUIREMENTS BEFORE EACH SHIPMENT (502) Sets requirements that must be fulfilled prior to each shipment of any package.	Similar to 71.87 and 49 CFR 173.475.
502 (a)	71.87	For any package it shall be ensured that all the requirements specified in the relevant provisions of these Regulations have been satisfied.	Similar to TS-R-1 and 49 CFR 173.475.
5 0 2 (b)	71.87 (h)	It shall be ensured that lifting attachments which do not meet the requirements of para. 607 have been removed or otherwise rendered incapable of being used for lifting the package, in accordance with para. 608.	Similar to TS-R-1.
502 (c)	71.87	For each Type B(U), Type B(M) and Type C package and for each package containing fissile material, it shall be ensured that all the requirements specified in the approval certificates have been satisfied.	71.87, 71.12 (c)(2), 71.14 (c)(2) and 71.16 (d)(2) address compliance with the certificate, but does not include Type C packages.
5 0 2 (d)		Each Type B(U), Type B(M) and Type C package shall be held until equilibrium conditions have been approached closely enough to demonstrate compliance with the requirements for temperature and pressure unless an exemption from these requirements has received unilateral approval.	No similar provision. 49 CFR 173.420(a)(5) addresses equilibrium pressure in UF6 packages.
502 (e)	71.87 (c)	For each Type B and Type C package, inspections or tests are required to ensure that all closures, valves and other openings of the containment system are properly closed and sealed.	71.87(c) is similar, but does not include Type C packages.
502 (f)		For special form material, all requirements in the special form approval certificate and the relevant provisions of the regulations must be met.	No similar specific requirement applicable to special form material.
5 0 2 (g)	71.55 (c)	For packages containing fissile material, measurements of isotopic composition (if	71.55(c) addresses special design features to prevent water in-leakage. No similar requirement

		burnup credit is allowed) and tests of the closure of the package (if special features are used to avoid in-leakage of water) shall be performed.	to measure isotopic composition, but 71.83 deals with this indirectly.
5 0 2 (h)		For low dispersible material, the requirements in the approval certificate and the relevant provisions of the regulations must be met.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
503		TRANSPORT OF OTHER GOOD (503-506) Requires that a package shall not contain any other items except such articles and documents that are necessary for the use of radioactive material. The requirements shall not preclude the transport of low specific activity material or surface contaminated objects with other items. The transport of such articles and documents in a package, or of low specific activity material or surface contaminated objects with other items may be permitted provided that there is no interaction between them and the packaging or its radioactive contents that would reduce the safety of the package.	No similar provision. 71.12 (c) requires packages to be used in compliance with their certificates (which specify allowable contents).
504		Requires that tanks and intermediate bulk containers used for the transport of radioactive material shall not be used for the storage or transport of other goods unless decontaminated below the level of 0.4 Bq/cm(super2) for beta and gamma emitters and low toxicity alpha emitters and 0.04 Bq/cm(super2) for all other alpha emitters.	No similar requirement, however, this topic is within DOT's area of responsibility.
505		Specifies that the transport of other goods with consignments being transported under exclusive use shall be permitted provided the arrangements are controlled only by the consignor and it is not prohibited by other regulations.	No similar requirement, however, this topic is within DOT's area of responsibility.
506		States that consignments shall be segregated from other dangerous goods during transport in compliance with the relevant transport regulations for dangerous goods of each of the countries through or into which the materials will be transported, and, where applicable, with the regulations of the cognizant transport organizations, as well as these Regulations.	No similar requirement, however, this topic is within DOT's area of responsibility.
507		OTHER DANGEROUS PROPERTIES OF CONTENTS (507) Sets the requirements of other dangerous properties of the package contents, such as explosiveness, flammability, pyrophoricity, chemical toxicity and corrosiveness that should be taken into account in the packing, labeling, marking, placarding, storage and transport in	No similar requirement, however, this topic is within DOT's area of responsibility.

		order to be in compliance with the transport regulations for dangerous goods of each of the countries through or into which the materials will be transported, and, where applicable, with the regulations of the cognizant transport organizations, as well as these Regulations.	
508	71.87 (i)	REQUIREMENTS AND CONTROLS FOR CONTAMINATION AND FOR LEAKING PACKAGES (508-514) The non-fixed contamination on the external surfaces of any package shall be kept as low as practicable and, under routine conditions of transport, shall not exceed set limits:	Invokes 49 CFR 173.433. The DOT limits and TS-R-1 are the same, but are stated differently.
508 (a)	71.87 (i)	4 Bq/cm2 for beta and gamma emitters and low toxicity alpha emitters, and	Invokes 49 CFR 173.433. The DOT limits and TS-R-1 are the same, but are stated differently.
5 0 8 (b)	71.87 (i)	0.4 Bq/cm2 for all other alpha emitters. These limits are applicable when averaged over any area of 300 cm2 of any part of the surface.	Invokes 49 CFR 173.433. The DOT limits and TS-R-1 are the same, but are stated differently.
509		States that the level of non-fixed contamination on the external and internal surfaces of overpacks, freight containers, tanks and intermediate bulk containers should not exceed the limits specified in para 508, except as provided in para. 514.	Title 49 addresses packages and conveyances.
510		If a package is suspected or is damaged or leaking, access to the package shall be restricted and a qualified person shall assess the extent of contamination and the resultant radiation level of the package. The scope of the assessment shall include the package, the conveyance, the adjacent loading and unloading areas, and, if necessary, all other material which has been carried in the conveyance. When necessary, additional steps for the protection of persons, property and the environment, in accordance with provisions established by the competent authority, shall be taken to overcome and minimize the consequences of such leakage or damage.	No similar requirement. Title 49 addresses this in the modal Parts 174-177.
511		Packages which are damaged or leaking radioactive contents in excess of allowable limits for normal conditions of transport may be removed to an acceptable interim location under supervision, but shall not be forwarded until repaired or reconditioned and decontaminated.	No similar provision. Title 49 addresses this with regard to radioactive material, e.g., 176.710 and hazardous materials in general.
512		A conveyance and equipment used regularly for the transport of radioactive material shall be periodically check to determine the level of contamination. The frequency of such checks shall be related to the likelihood of	No similar requirement. 71.87 (i) invokes 49 CFR173.443 which applies to exclusive use vehicles which transport packages that are allowed to have higher contamination levels.

		contamination and the extent to which radioactive material is transported.	
513		Any contaminated conveyance, equipment or part thereof must be decontaminated if it is contaminated above the limit set in para. 508 or which shows a radiation level in excess of 5 μµSv/h. Radiation level must be in excess of 5 μµSv/h at the surface.	No similar provision. 49 CFR Parts 174, 175, 196 and 177 address conveyance contamination provisions.
514		An overpack, freight container, tank, intermediate bulk container or conveyance dedicated to the transport of radioactive material under exclusive use shall be excepted from the requirements of para 509 and 513 solely with regard to its internal surfaces and only for as long as it remains under that specific exclusive use.	No similar provision in Part 71. 49 CFR 173.443 contains a similar provision.
515		REQUIREMENTS AND CONTROLS FOR TRANSPORT OF EXCEPTED PACKAGES (515-519) Sets requirements and controls for transport of excepted packages.	Part 71exempts excepted packages containing non-fissile or fissile-excepted contents (71.10 (b)(1)).
515 (a)		Requirements specified in paras. 507, 508, 511, 516, 534-536, 549 (c), 554 and, as applicable 517-520.	Part 71exempts excepted packages containing non-fissile or fissile-excepted contents (71.10 (b)(1)). 49 CFR 173.421 is similar.
5 1 5 (b)		The requirements for excepted packages specified in para. 620.	No similar provision in Part 71. 49 CFR 173.421 is similar.
515 (c)	71.10 (b) (1)	If the excepted package contains fissile material, one of the fissile exceptions provided by para. 672 shall apply and the requirement of para. 634 shall be met.	Part 71exempts excepted packages containing non-fissile or fissile-excepted contents (71.10 (b)(1)). 49 CFR 173.421 limits excepted packages to less than 15 g U-235.
5 1 5 (d)		The requirements in paras. 579 and 580 if transported by post	Part 71exempts excepted packages containing non-fissile or fissile-excepted contents (71.10 (b)(1)). See 39 CFR 124 for postal requirements.
516		States that the radiation level at any point on the external surface of an excepted package shall not exceed 5 μµSv/h.	Part 71exempts excepted packages containing non-fissile or fissile-excepted contents (71.10 (b)(1)). 49 CFR 173.421 (a) and 173.424 contain a similar provision.
517		Sets requirements for radioactive material transport in an excepted package. States that radioactive material which is enclosed in or is included as a component part of an instrument or other manufactured article, with activity not exceeding the item and package limits specified in columns 2 and 3 of Table III (Activity Limits for Excepted Packages), may be transported in an excepted package provided that certain conditions are met.	Part 71exempts excepted packages containing non-fissile or fissile-excepted contents (71.10 (b)(1)). 49 CFR 173.424 contains similar provisions.
517 (a)		The radiation level at 10 cm from any point on the external surface of any unpackaged instrument or article is not greater than 0.1	Part 71exempts excepted packages containing non-fissile or fissile-excepted contents (71.10 (b)(1)). 49 CFR 173.424 contains a similar

		mSv/h.	provision.
5 1 7 (b)		Each instrument or article (except radioluminescent timepieces or devices) bears the marking "RADIOACTIVE".	No similar requirement, however, this topic is within DOT's area of responsibility.
517 (c)		The active material is completely enclosed by non-active components (a device performing the sole function of containing radioactive material shall not be considered to be an instrument or manufactured article).	No similar requirement, however, this topic is within DOT's area of responsibility.
518		Radioactive material in forms other than as specified in para. 517, with an activity not exceeding the limit specified in column 4 of Table III, may be transported in an excepted package, provided that certain conditions are met.	Part 71exempts excepted packages containing non-fissile or fissile-excepted contents (71.10 (b)(1)). 49 CFR 173.421 contains similar provisions.
518 (a)		The package retains its radioactive contents under routine conditions of transport.	Part 71exempts excepted packages containing non-fissile or fissile-excepted contents (71.10 (b)(1)). 49 CFR 173.421 contains a similar provision.
5 1 8 (b)		The package bears the marking "RADIOACTIVE" on an internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package.	Part 71exempts excepted packages containing non-fissile or fissile-excepted contents (71.10 (b)(1)). 49 CFR 173.421 contains a similar provision.
519		A manufactured article in which the sole radioactive material is unirradiated natural uranium, unirradiated depleted uranium or unirradiated natural thorium may be transported as an excepted package provided that the outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or some other substantial material.	No similar provision in Part 71. 49 CFR 173.426 contains a similar provision.
520		**Additional requirements and controls for transport of empty packagings** (520) Additional requirements and controls for transport of empty packagings. Empty packages which had previously contained radioactive material may be transported as an excepted package provided that they meet certain conditions.	Part 71exempts excepted packages containing non-fissile or fissile-excepted contents (71.10 (b)(1)). 49 CFR 173.428 contains similar provisions. Exmpty certified packagings are also addressed in the appropriate package safety analysis report in the chapter on operating procedures.
520 (a)		It is in a well maintained condition and securely closed.	Part 71exempts excepted packages containing non-fissile or fissile-excepted contents (71.10 (b)(1)). 49 CFR 173.428 contains a similar requirement.
5 2 0 (b)		The outer surface of any uranium or thorium in its structure is covered with an inactive sheath made of metal or some other substantial material.	Part 71exempts excepted packages containing non-fissile or fissile-excepted contents (71.10 (b)(1)). No similar requirement in Title 49.
520 (c)		The level of internal non-fixed contamination does not exceed one hundred times the levels	Part 71exempts excepted packages containing non-fissile or fissile-excepted contents (71.10

		specified in para. 508.	(b)(1)). 49 CFR 173.428 contains this requirement.
5 2 0 (d)		Any labels which may have been displayed on it in conformity with para. 541 are no longer visible.	Part 71exempts excepted packages containing non-fissile or fissile-excepted contents (71.10 (b)(1)). 49 CFR 173.428 contains a similar requirement.
521	71.10 (b) (2)	REQUIREMENTS AND CONTROLS FOR TRANSPORT OF LSA MATERIAL AND SCO IN INDUSTRIAL PACKAGES OR UNPACKAGED (521-525) States that the quantity of LSA material of SCO in a single Industrial package Type 1, Industrial package Type 2, Industrial package Type 3, or object or collection of objects shall be so restricted that the external radiation level at 3 m from the unshielded material or object or collection of objects does not exceed 10 mSv/h.	71.10(b)(2) and 49 CFR 173.427(a)(1) are essentially the same as this requirement.
522		LSA material and SCO which is or contains fissile material shall meet the applicable requirements of para 568, 569 and 671.	Part 71 limits LSA and SCO, per se, to non-fissile and fissile excepted materials.
523		LSA material and SCO in groups LSA-I and SCO-I may be transported unpackaged under specified conditions.	71.10(b)(2) exempts LSA and 49 CFR 173.427(c) addresses LSA-I and SCO-I transported in bulk packagings, but the provisions are very different than TS-R-1.
523 (a)		All unpackaged material other than ores containing only naturally occurring radionuclides shall be transported in such a manner that under routine conditions of transport there will be no escape of radioactive contents from the conveyance nor will there be any loss of shielding.	71.10(b)(2) exempts LSA and 49 CFR 173.427(c) addresses LSA-I and SCO-I transported in bulk packagings, but the provisions are very different than TS-R-1.
5 2 3 (b)		Each conveyance shall be under exclusive use, except when only transporting SCO-I on which the contamination on the accessible and the inaccessible surfaces is not greater than ten times the applicable level specified in para. 214.	71.10(b)(2) exempts LSA and 49 CFR 173.427(c) addresses LSA-I and SCO-I transported in bulk packagings, but the provisions are very different than TS-R-1.
523 (c)		For SCO-I where it is suspected that non-fixed contamination exists on inaccessible surfaces in excess of the values specified in para. 241(a)(I), measures shall be taken to ensure that the radioactive material is not released into the conveyance.	71.10(b)(2) exempts LSA and 49 CFR 173.427(c) addresses LSA-I and SCO-I transported in bulk packagings, but the provisions are very different than TS-R-1.
524		LSA material and SCO, except as otherwise specified in para. 523, shall be packaged in accordance with Table IV (Industrial Package Requirements for LSA Material and SCO)	71.10(b)(2) exempts LSA. 49 CFR 173.427(f), Table 8, is identical this TS-R-1 provision.
525		The total activity in a single hold or compartment of an inland water craft, or in another conveyance, for carriage of LSA material or SCO in Type IP-I, Type IP-2, Type	71.10(b)(2) exempts LSA. 49 CFR 173.427(f), Table 9, is identical this TS-R-1 provision, except that the limits for inland water craft are not included.

		IP-3 or unpackaged, shall not exceed the limits shown in Table V.	
526	71.4	Specifies that the TI for a package, overpack, or freight container, or for unpackaged LSA-I or SCO-I, shall be the number derived in accordance with the procedure in paras. 526 - 527.	The definition of the TI is different between Part 71/Title 49 and TS-R-1 (see TS-R-1 para. 243 above). The application of the TI is different as well. TS-R-1 applies the TI concept to unpackaged LSA and SCO and freight containers.
526 (a)	71.4	Determine the maximum radiation level in units of mSv/h at a distance of 1 m from the external surfaces of the package, overpack, freight container, or unpackaged LSA-I and SCO-I. The value determined is multiplied by 100 and the resulting number is the transport index. For uranium and thorium ores and their concentrates, the maximum radiation level at any point 1 m from the external surface of the load may be takes as: .4 mSv/h for ores and physical concentrates of uranium and thorium; 0.3 mSv/h for chemical concentrates of thorium; 0.02 mSv/h for chemical concentrates of uranium, other than uranium hexafluoride.	For non-fissile and fissile excepted packages Part 71 and 49 CFR 173.403 are the same as TS-R-1. The TS-R-1 provisions for ores, concentrates, etc. are not reflected in Part 71 and Title 49.
5 2 6 (b)		DETERMINATION OF TRANSPORT INDEX (TI) (526-527) For tanks, freight containers and unpackaged LSA-I and SCO-I, the value determined in step (a) shall be multiplied by the appropriate factor from Table VI (Multiplication Factors for Large Dimension Loads).	No similar requirement, however, this topic is within DOT's area of responsibility.
526 (c)	71.4	The value obtained in (a) and (b) shall be rounded up to the first decimal place (e.g. 1.13 becomes l.2) except that a value of 0.05 or less may be considered as zero.	71.4 and 49 CFR 173.403 are similar to the TS-R-1 requirement to round up the TI and 49 CFR 172.403 (footnote 2) is essentially the same as the TS-R-1 provision to consider a value of 0.05 or less to be zero.
527		The transport index for each overpack, freight container or conveyance shall be determined as either the sum of the TIs of all the packages contained, or by direct measurement of radiation level, except in the case of non-rigid overpacks for which the transport index shall be determined only as the sum of the TIs of all the packages.	Part 71 does not address this. 49 CFR 173.448(g) has similar requirements.
528		DETERMINATION OF CRITICALITY SAFETY INDEX (CSI) (528-529) The CSI for packages containing fissile material shall be obtained by dividing the number 50 by the smaller of the two values of N derived in para 681 and 682. The value of the CSI may be zero, provided that an unlimited number of	Part 71 and Title 49 do not have the Criticality Safety Index (CSI) provisions. However, the way in which the Transport Index is used for criticality control purposes is similar to the TS-R-1 CSI provisions.

		packages is subcritical.	
529		The CSI for each consignment shall be determined as the sum of the CSIs of all the packages contained in that consignment.	Part 71 and Title 49 do not have the Criticality Safety Index (CSI) provisions. However, the limits which placed on accumulation of TI's are similar to TS-R-1.
530	71.47 (a) 71.59	LIMITS ON TRANSPORT INDEX, CRITICALITY SAFETY INDEX AND RADIATION LEVELS FOR PACKAGES AND OVERPACKS (530-532) The transport index of any package or overpack shall not exceed 10, nor shall the CSI of any package or overpack exceed 50 except for consignments under exclusive use.	71.47 (a) and (b) and 49 CFR 173.441 (a) and (b) are consistent with the TI limit. Part 71 and Title 49 do not have the Criticality Safety Index (CSI) provisions, but the limits on the accumulation of TI's for fissile packages are similar to TS-R-1.
531	71.47 (a)	Sets the maximum radiation level on external surfaces of packages or overpacks except for those: transported under exclusive use by rail and road under the conditions specified in subpara. 572(a); or, under exclusive use and special arrangement by vessel or by air under the conditions specified in paras. 574 or 578. The maximum radiation level at any point on any external surface of a package or overpack shall not exceed 2 mSv/h.	71.47 and 49 CFR (173.441 and Parts 174-177) are essentially the same as TS-R-1.
532	71.47 (b) (1)	The maximum radiation level at any point on any external surface of a package under exclusive use shall not exceed 10 mSv/h.	71.47 and 49 CFR 173.441 are essentially the same as TS-R-1.
533	71.5 (a)	CATEGORIES (533) Sets requirements for assigning packages and overpacks to either category I-WHITE, II-YELLOW, or III-YELLOW in accordance with the conditions in Table VII (Categories of Packages and Overpacks).	Part 71 does not address labeling, except by reference to Title 49 in 71.5(a). 49 CFR 172.403 is essentially the same as TS-R-1.
533 (a)	71.5 (a)	Both the transport index and the surface radiation level conditions shall be taken into account in determining which is the appropriate category. Where the TI satisfies the condition for one category, but the surface radiation level satisfies the condition for a different category, the package or overpack shall be assigned to the higher category. For this purpose, category I-WHITE shall be regarded as the lowest category.	Part 71 does not address labeling, except by reference to Title 49 in 71.5(a). 49 CFR 172.403 is essentially the same as TS-R-1.
5 3 3 (b)	71.5 (a)	The TI shall be determined following the procedures specified in paras. 526 and 527.	See paras. 526 and 527 above.

533 (c)	71.47	If the surface radiation level is greater than 2 mSv/h, the package or overpack shall be transported under exclusive use and under the provisions of paras. 572(a), 547 or 578.	71.47 and 49 CFR (173.441 and Parts 174-177) are essentially the same as TS-R-1.
5 3 3 (d)		A package transported under a special arrangement shall be assigned to category III-YELLOW.	Part 71 and title 49 do not use the concept of "special arrangement". The provisions for exemptions are the closest analogy.
533 (e)		An overpack which contains packages transported under special arrangement shall be assigned to category II-YELLOW.	Part 71 and title 49 do not use the concept of "special arrangement". The provisions for exemptions are the closest analogy.
534	71.5 (a)	MARKING, LABELLING AND PLACARDING (534-547) **Marking** (534-540) Each package shall be legibly and durably marked on the outside of the packaging with an identification of either the consignor or consignee, or both.	Part 71 does not address this marking, except by reference to Title 49 in 71.5 (a). 49 CFR 172.302 (d) is essentially the same as TS-R-1 (with some domestic exceptions).
535	71.5 (a)	Provides that the United Nations number preceded by the letters "UN", and the proper shipping name shall be legibly and durably marked on the outside of the packages that are not excepted packages. In the case of excepted packages, other than those accepted for international movement by post, only the UN number, preceded by the letters "UN", shall be required. For packages accepted for international movement by post, the requirement of para. 580 shall apply. Table VIII - Excerpts from List of United Nations Numbers, Proper Shipping Names and Descriptions, Subsidiary Risks and Their Relationship to the Schedules.	Part 71 does not address marking, except by reference to Title 49 in 71.5 (a). 49 CFR 172.302 addresses marking: UN number and proper shipping name - see 49 CFR 302 (a) [173.421 (a) provides the exception for excepted packages]; UN number on excepted packages - Part 71 and Title 49 do not contain this requirement; packages by post - see US Postal Publication No. 6 which is consistent with the IAEA requirement; Table VIII - Title 49 is not consistent with TS-R-1 which has extensively revised the proper shipping names and UN numbers.
536	71.85 (c)	Each package of gross mass exceeding 50 kg shall have its permissible gross mass legibly and durably marked on the outside of the packaging.	71.85 addresses all packages subject to Part 71, regardless of mass.. 49 CFR 172.310(a) is essentially the same as TS-R-1.
537 (a)		Each package which conforms to an Industrial package Type 1, and Industrial package Type 2, or an Industrial package Type 3 design shall be legibly and durably marked on the outside of the packaging with ""TYPE IP-1"", ""TYPE IP-2"", or ""TYPE IP	No similar requirement, however, this topic is within DOT's area of responsibility.
5 3 7 (b)	71.85	Each package which conforms to a Type A package design shall be legibly and durably marked on the outside the packaging with "TYPE A".	71.85(c) would apply to Type AF (fissile) packages. 49 CFR 172.310(b) is essentially the same as TS-R-1.
537 (c)	71.5 (a)	Each package which conforms to an Industrial package Type 2, an Industrial package Type 3	Part 71 does not address this marking, except by reference to Title 49 in 71.5(a) and indirectly by

		or a Type A package design shall be legibly and durably marked on the outside of the packaging with the international vehicle registration code of the country of origin of design and the name of the manufacturers, or other identification of the packaging specified by the competent authority.	71.85(c) for fissile package designs (since the vehicle registration code is included in the package identification number). 49 CFR 172.310(d) is consistent with TS-R-1 (except for IP-type packages). There is no requirement for marking the name of the manufacturer.
538	71.5 (a), 71.85(c)	Sets marking requirements for packages which conform to an approved design under paras, 805-814 or 816-817.	Part 71 addresses marking with a combination of reference to Title 49 in 71.5(a) and requirements in 71.85(c). 49 CFR 172.310 is partially consistent with TS-R-1: UF6 packages and Type C package - not consistent; B(U), B(M) and fissile packages - consistent;
538 (a)	71.5 (a), 71.85(c)	Each package shall be legibly and durably marked on the outside of the packaging with the identification mark allocated to that design by the competent authority.	71.85 requires marking the identification number assigned by NRC and 71.5(c) references Title 49. 49 CFR 172.310(d), 173.471 (b), 173.472(c) and 174.473(b) are consistent with TS-R-1.
5 3 8 (b)	71.13 (a)(b) ; 71.85	Each package shall be legibly and durably marked on the outside of the packaging with a serial number to uniquely identify each packaging which conforms to that design.	Part 71 is essentially the same as TS-R-1.
538 (c)	71.5 (a)	Each package shall be legibly and durably marked on the outside of the packaging with "TYPE B(U)" or "TYPE B(M) in the case of a Type B(U) or Type B(M) package design.	Part 71 does not address this requirement for marking the package type, except by reference to Title 49 in 71.5(a). 49 CFR 172.302(b) requires "TYPE B", but not "B(U)" or "B(M)".
5 3 8 (d)		Each package shall be legibly and durably marked on the outside of the packaging with "TYPE C" in the case of a Type C package design.	Part 71 and 49 CFR do not contain requirements for Type C packages.
539	71.5 (a)	Each package which conforms to a Type B(U), Type B(M) or Type C package design shall have the outside of the outermost receptacle which is resistant to the effects of fire and water plainly marked by embossing, stamping or other means resistant to the effects of fire and water with the trefoil symbol shown in Fig. I.	Part 71 does not address this marking, except by reference to Title 49 in 71.5(a). 49 CFR 172.310(c) is consistent with TS-R-1 (except for Type C packages) but resistance to the effects of fire and water are not stated.
540	71.5 (a)	LSA-1 or SCO-1 material is contained in receptacles or wrapping materials and is transported under exclusive use as permitted by para. 523, the outer surface of these receptacles or wrapping materials may bear the marking 'RADIOACTIVE LSA-' or 'RADIOACTIVE SCO-I' as appropriate.	Part 71 does not address this marking, except by reference to Title 49 in 71.5(a). 49 CFR 173.427(a)(6) is similar to TS-R-1 but is limited to domestic transport.
541	71.5 (a)	**Labelling** (541-542) Sets labeling requirements for packages, overpacks, and freight containers. Each package, overpack and freight container shall bear the labels which conform to the models in Fig. 2, Fig. 3, or Fig. 4, except as allowed under the alternative provisions of para. 546 for large freight containers and tanks. Each package,	Part 71 does not address labeling except by reference to Title 49 in 71.5(a). Title 49 is similar to TS-R-1: packages and overpacks - consistent except for "fissile" label requirements which are not in Title 49; freight containers - not consistent with TS-R-1; removal of irrelevant labels - 49 CFR 172.401 is similar;

		overpack, and freight container containing fissile material, other than fissile material excepted under the provisions of para. 672 shall bear labels which conform to the model in Fig. 5. Any labels which do not relate to the contents shall be removed or covered. For radioactive material having other dangerous properties see para. 507.	
542	71.5 (a)	Indicates requirements for fixing labels. The labels conforming to the models in Fig. 2, Fig. 3 and Fig 4 shall be affixed to two opposite sides of the outside of a package or overpack or on the outside of all four sides of a freight container or tank. The labels conforming the model in Fig. 5 shall be affixed adjacent to the labels conforming to the models in Fig 2, Fig. 3, and Fig. 4. The labels should not cover the markings specified in paras. 534-539.	Part 71 does not address labeling except by reference to Title 49 in 71.5(a). Title 49 is similar to TS-R-1: labeling of packages and overpacks are identical; Title 49 does not require labeling freight containers nor does it provide for the "fissile" label.
543	71.5 (a)	**Labelling for radioactive contents** (543) Indicates requirements for labeling radioactive contents. Each label conforming to the models in Fig. 2, Fig. 3, and Fig. 4 should be completed with the following information.	Part 71 does not address labeling except by reference to Title 49 in 71.5(a). 49 CFR 172.403(g) is similar to TS-R-1.
543 (a)	71.5 (a)	Contents - except for LSA-I material, the names(s) of the radionuclide(s) as taken from Table I, using the symbols prescribed therein. For mixtures of radionuclides, the most restrictive nuclides must be listed to the extent the space on the line permits. The group of LSA or SCO shall be shown following the name(s) of the radionuclide(s). The terms "LSA-II", "LSA-III", "SCO-I", and "SCO-II" shall be used for this purpose. For LSA-I material, the term "LSA-I" is all that is necessary; the name of the radionuclide is not necessary.	Part 71 does not address labeling except by reference to Title 49 in 71.5(a). 49 CFR 172.403(g) is similar but does not permit using "LSA" and "SCO" entries generically for the contents.
5 4 3 (b)	71.5 (a)	Activity: The maximum activity of the radioactive contents during transport expressed in units of Bq with the appropriate SI prefix (see Annex II). For fissile material, the mass of fissile material in units of grams (g), or multiples thereof, may be used in place of activity.	Part 71 does not address labeling except by reference to Title 49 in 71.5(a). 49 CFR 172.403(g) is similar but allows use of customary units (Curies) and has other requirements for Pu-238, -239, and -241.
543 (c)	71.5 (a)	For overpacks and freight containers the "contents" and "activity" entries on the label shall bear the information required in subparas. 543(a) and 543(b), respectively, totaled together for the entire contents of the overpack or freight container except that on labels for overpacks or freight containers containing different radionuclides, such entries may read "See Transport Documents".	Part 71 does not address labeling except by reference to Title 49 in 71.5(a). 49 CFR 173.448(g) is similar for overpacks.

544		**Labelling for criticality safety** (544-545) Sets requirements for criticality safety labels. Each label conforming to the model in Fig. 5 shall be completed with the CSI as stated in the certificate of approval for special arrangement of the certificate of approval for the package design issued by the competent authority.	No similar requirement, however, this topic is within DOT's area of responsibility.
545		The CSI on the label shall bear the information required in para. 544 totaled together for the fissile contents of the overpack or freight container.	No similar requirement, however, this topic is within DOT's area of responsibility.
546	71.5 (a)	**Placarding** (546-547) Sets requirements for placarding. Large freight containers carrying packages other than excepted packages, and tanks shall bear four placards, which conform with the model in Fig. 6. The placards shall be affixed in a vertical orientation to each side wall and each end wall of the large freight container or tank. Any placards which do not relate to the contents shall be removed. Instead of using both labels and placards, it is permitted as an alternative to use enlarged labels only, as shown in Fig. 2, Fig. 3, Fig. 4 and Fig. 5 with dimensions of the minimum size shown in Fig. 6.	Part 71 does not address placarding except by reference to Title 49 in 71.5(a). 49 CFR 172.504 addresses placarding but only requires placarding freight containers when a YELLOW-III package or an exclusive use LSA/SCO shipment under the provisions of 173.427(a) is being transported. Placement of placards is similar. Title 49 does not permit use of enlarged labels.
547	71.5 (a)	States that where the consignment in the freight container or tank is unpackaged LSA-I or SCO-I or where an exclusive use consignment in a freight container is packaged radioactive material with a single United Nations number, the appropriate United Nations number for the consignment (see Table VIII) shall also be displaced in black digits not less than 65 mm high, either: in the lower half of the placard shown in Fig. 6, preceded by the letters "UN" and against the white background, or on the placard shown in Fig. 7.	Part 71 does not address placarding except by reference to Title 49 in 71.5(a). 49 CFR 172.504 addresses placarding and 172.332 addresses display of the UN identification number. Title 49 does not require display of the UN identification number for LSA/SCO shipments nor for packaged material in most cases.
548	71.5 (a)	CONSIGNOR'S RESPONSIBILITIES (548-561) Compliance with the requirements of paras. 520 (d) and 534-547 for marking, labelling and placarding shall be the responsibility of the consignor.	71.5(a) and 49 CFR 173.1(b) are similar to TS-R-1.
549	71.5 (a)	**Particulars of consignment** (549) Must include in the transport documents with each consignment, the following:	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5(a). 49 CFR 172.200 (a) is similar to TS-R-1.
549 (a)	71.5 (a)	The proper shipping name, as specified in Table	Part 71 does not address shipment documentation

		VIII.	except by reference to Title 49 in 71.5(a). 49 CFR 172.202(a) is identical, but it refers to the hazardous materials table in Title 49 which contains different proper shipping names than TS-R-1.
5 4 9 (b)	71.5 (a)	The United Nation Class number "7".	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5(a). 49 CFR 172.202(a) is identical, but it refers to the hazardous materials table in Title 49 which contains different proper shipping names than TS-R-1.
549 (c)	71.5 (a)	The United Nations number assigned to the material as specified in Table VIII, preceded by the letters "UN"	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5(a). 49 CFR 172.202(a) is identical, but it refers to the hazardous materials table in Title 49 which contains different proper shipping names than TS-R-1.
5 4 9 (d)	71.5 (a)	The name or symbol of each radionuclide or, for mixtures of radionuclides, an appropriate general description or a list of the most restrictive nuclides.	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5 (a). 49 CFR 172.203 (d) is similar to TS-R-1.
549 (e)	71.5 (a)	A description of the physical and chemical form of the material, or a notation that the material is special form radioactive material or low dispersible radioactive material. A generic chemical description is acceptable for chemical form	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5(a). 49 CFR 172.203(d) is similar but does not contain provisions for low dispersible material.
549 (f)	71.5 (a)	The maximum activity of the radioactive contents during transport expressed in units of Bq with an appropriate SI prefix (see Annex II). For fissile material, the mass of fissile material in units of grams, or appropriate multiples may be used in place of activity.	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5(a). 49 CFR 172.203(d) is similar but contains special requirements for Pu-238, -239, and -241 and customary units.
5 4 9 (g)	71.5 (a)	The category of the package, I.e. I-WHITE, II-YELLOW, III-YELLOW	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5(a). 49 CFR 172.203(d) is similar to TS-R-1.
5 4 9 (h)	71.5 (a)	The transport index (categories II-YELLOW and III-YELLOW only)	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5(a). 49 CFR 172.203(d) is similar to TS-R-1.
549 (i)	71.5 (a)	For consignments including fissile material other than consignments excepted under para. 672, the criticality safety index	No similar requirement, however, this topic is within DOT's area of responsibility.
549 (j)	71.5 (a)	The identification mark for each competent authority approval certificate	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5 (a). 49 CFR 172.203 (d), 173.471, 173.472, and 173.473 are similar to TS-R-1.
5 4 9 (k)	71.5 (a)	For consignments of packages in an overpack or freight container, a detailed statement of the contents of each package within the overpack or freight container and, where appropriate, of each overpack or freight container in the	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5 (a). 49 CFR 172.203 (d) is similar in that it requires information on each package.

		consignment. If packages are to be removed from the overpack or freight container at a point of intermediate unloading, appropriate transport documents shall be made available	
549 (l)	71.5 (a)	Where a consignment is required to be shipped under exclusive use, the statement "EXCLUSIVE USE SHIPMENT"	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5 (a). 49 CFR 172.203 (d) is similar to TS-R-1.
5 4 9 (m)		For LSA-II, LSA-III, SCO-I, and SCO-II, the total activity of the consignment as a multiple of A2	No similar requirement, however, this topic is within DOT's area of responsibility.
550	71.5 (a)	**Consignor's declaration** (550-553) The consignor shall include in the transport documents a declaration in the following terms or in terms having an equivalent meaning: "I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by (insert mode(s) of transport involved) according to the applicable international and national governmental regulations."	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5 (a). 49 CFR 172.204 is similar to TS-R-1.
551		If the intent of the declaration is already a condition of transport within a particular international convention, the consignor need not provide such a declaration for that part of the transport covered by the convention.	No similar provision, however, this topic is within DOT's area of responsibility.
552		The declaration shall be signed and dated by the consignor. Facsimile signatures are acceptable where applicable laws and regulations recognize the legal validity of facsimile signatures.	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5(a). 49 CFR 172.204 is similar to TS-R-1.
553	71.5 (a)	The declaration shall be made on the same transport document which contains the particulars of consignment listed in para 549.	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5(a). 49 CFR 172.204 is similar to TS-R-1.
554	71.5 (a)	**Removal or covering of labels** (554) Removal or covering of labels - When an empty packaging is transported as an excepted package under the provisions of para. 520, the previously displayed labels shall not be visible	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5 (a). 49 CFR 172.204 is similar to TS-R-1.
555		**Information for Carriers** (555-556) The consignor shall provide in the transport documents a statement regarding actions that are required to be taken by the carrier. The statement shall be in the languages deemed necessary by the carrier or the authorities	No similar requirement, however, this topic is within DOT's area of responsibility.

		concerned, and shall include at the following points:	
555 (a)		Supplementary requirements for loading, stowage, carriage, handling and unloading of the package, overpack or freight container including any special stowage provisions for the safe dissipation of heat (see para. 565), or a statement that no such requirements are necessary.	No similar requirement, however, this topic is within DOT's area of responsibility.
5 5 5 (b)	71.5 (a)	Restrictions on the mode of transport or conveyance and any necessary routing instructions.	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5 (a). 49 CFR 172.203 (d) requires entering the words "Highway Route Controlled Quantity" when appropriate.
555 (c)	71.5 (a)	Emergency arrangement appropriate to the consignment.	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5 (a). 49 CFR 172.604 addresses the information which must appear on the shipping documentation such as an emergency contact number.
556		The applicable competent authority certificates need not necessarily accompany the consignment. The consignor shall make them available to the carrier(s) before loading and unloading.	No similar provision in Part 71.49 CFR 173.473 (a) has a similar requirement for foreign made packages.
557	71.5 (a)	**Notification of competent authorities** (557-560) States that before the first shipment of any package requiring competent authority approval, the consignor shall ensure that copies of each applicable competent authority certificate applying to the package design have been submitted to the competent authority of each country through or into which the consignment is to be transported. The consignor is not required to await an acknowledgement for the competent authority, nor is the competent authority required to make such acknowledgement of receipt of the certificate.	Part 71 does not address shipment documentation except by reference to Title 49 in 71.5 (a). 49 CFR 173.471 (d) and 173.472 (e) are similar to TS-R-1.
558		Sets requirements that for each of the given shipments, notification must be made to the proper authorities of each country through or into which the consignment is to be transported. The notification shall be in the hands of each competent authority prior to the commencement of the shipment, and preferably at least 7 days in advance.	No similar requirement, however, this topic is within DOT's area of responsibility.
558 (a)		Type C packages containing radioactive material with an activity greater than 3000 A(sub1) or 3000 A(sub2), as appropriate, or 1000 TBq, whichever is the lower	No similar requirement, however, this topic is within DOT's area of responsibility.

5 5 8 (b)		Type B(U) packages containing radioactive material with an activity greater than 3000 A(sub1) or 3000 A(sub2), as appropriate, or 1000 TBq, whichever is the lower	No similar requirement, however, this topic is within DOT's area of responsibility.
558 (c)		Type B(M) packages	No similar requirement, however, this topic is within DOT's area of responsibility.
5 5 8 (d)		Shipment under special arrangement	No similar requirement, however, this topic is within DOT's area of responsibility.
559		The consignment notification shall include:	No similar requirement, however, this topic is within DOT's area of responsibility.
559 (a)		Sufficient information to enable the identification of the package or packages including all applicable certificate numbers and identification marks.	No similar requirement, however, this topic is within DOT's area of responsibility.
5 5 9 (b)		Information on the date of shipment, the expected date of arrival and proposed routing.	No similar requirement, however, this topic is within DOT's area of responsibility.
559 (c)		The names of the radioactive materials or nuclides.	No similar requirement, however, this topic is within DOT's area of responsibility.
5 5 9 (d)		Descriptions of the physical and chemical forms of the radioactive material, or whether it is special form radioactive material or low dispersible radioactive material.	No similar requirement, however, this topic is within DOT's area of responsibility.
559 (e)		The maximum activity of the radioactive contents during transport expressed in units of becquerels (Bq) with an appropriate SI prefer (See Annex II). For fissile material, the mass of fissile material in units of grams (g), or multiples thereof, may be used in place of activity.	No similar requirement, however, this topic is within DOT's area of responsibility.
560		The consignor is not required to sent a separate notification if the required information has been included in the application for shipment approval; see para. 822.	No similar provision, however, this topic is within DOT's area of responsibility.
561	71.12 (c)	**Possession of Certificates and Instructions** (561) The consignor shall have in his or her possession a copy of each certificate required under Section VIII of these Regulations and a copy of the instructions with regard to the proper closing of the package and other preparations for shipment before making any shipment under the terms of the certificates.	71.12 (c) is similar to TS-R-1; TS-R-1 refers to "……proper closing …….and other preparations for shipment……" while 71.12 (c) refers to "……use and maintenance ……and to the actions to be taken before shipment."
562		TRANSPORT AND STORAGE IN TRANSIT (562-580) **Segregation During Transport and Storage in Transit** (562-563) Packages, overpacks and freight containers	Part 71 does not have a similar requirement. 49 CFR 173.447 addresses this.

		containing radioactive material shall be segregated during transport and during storage in transit:	
562 (a)		from places occupied by persons and from undeveloped photographic film, for radiation exposure control purposes, in accordance with paras. 306 and 307, and	Part 71 does not have a similar requirement. 49 CFR Parts 173, 174, 175, 176, and 177 address segregation requirements.
5 6 2 (b)		from other dangerous goods in accordance with para. 506.	Part 71 does not have a similar requirement. 49 CFR Parts 173, 174, 175, 176, and 177 address segregation requirements.
563		Category II-YELLOW or III-YELLOW packages or overpacks shall not be carried in compartments occupied by passengers, except those exclusively reserved for couriers specially authorized to accompany such packages or overpacks.	Part 71 does not have a similar requirement. 49 CFR 173.448(c),174.700, 175.701, 176.708 and 177.843 address this, and 173.448 and 176.708 include provisions for couriers.
564	71.47 (b) (1) (ii)	**Stowage during transport and storage in transit** (564-567) Consignments shall be securely stowed during transport and storage in transit.	71.47(b)(1)(ii) and 49 CFR 173.441addresse securing high radiation level packages. 49 CFR Parts 174 - 177 address carrier requirements, including securing loads.
565		Provided that its average surface heat flux does not exceed 15 W/m2 and that the immediately surrounding cargo is not in sacks or bags, a package or overpack may be carried or stored among packaged general cargo without any special stowage provisions except as may be specifically required by the competent authority in an applicable approval certificate.	Part 71 does not have a similar requirement. 49 CFR 173.448(b) has a similar requirement.
566		States that loading of freight containers and accumulation of packages, overpacks, and freight containers shall be controlled as follows:	Included by reference in 71.5(a) to Title 49.
566 (a)		The total number of packages, overpacks and freight containers aboard a single conveyance shall be so limited that the total sum of the transport indexes aboard the conveyance does not exceed the values shown in Table IX (Limits for Freight Containers and Conveyances Not Under Exclusive Use), except under the condition of exclusive use. For consignments of LSA-I material there shall be no limit on the sum of the TIs.	Part 71 does not have a similar requirement. 49 CFR Parts 174, 175, 176 and 177 address limits on accumulation of transport indexes per conveyance.
5 6 6 (b)		Where a consignment is transported under exclusive use, there shall be no limit on the sum of the TIs aboard a single conveyance.	Part 71 does not have a similar requirement. 49 CFR Parts 174, 175, 176 and 177 address limits on accumulation of transport indexes per conveyance.
566 (c)	71.47 (b) (2) and (3)	The radiation level under routine conditions of transport shall not exceed 2 mSv/h at any point on, and 0.1 mSv/h at 2 m from, the external surface of the conveyance.	71.47(b)(2) and (3) and 49 CFR 173.441(b)(2) and (3) are essentially the same as TS-R-1.
5 6 6		The total sum of the criticality safety indexes in	No similar requirement since Part 71 and 49 CFR

(d)		a freight container and aboard a conveyance shall not exceed the values shown in Table X (CSI Limits for Freight Containers and Conveyance Containing Fissile Material).	do not include the criticality index requirements. This is being considered in the DOT rulemaking.
567	71.47 (b)	States that any package or overpack having either a transport index greater than 10, or any consignment having a criticality safety index greater than 50, shall be transported only under exclusive use.	71.47(b) and 49 CFR 173.441(b) are essentially the same as this requirement with regard to the transport index requirement. There is no similar requirement regarding the limit on the criticality safety index since Part 71 and 49 CFR do not include any criticality safety index requirements.
568		**Segregation of packages containing fissile material during transport and storage in transi**t (568-569) The number of packages, overpacks, and freight containers containing fissile material stored in transit in any one storage area shall be so limited that the total sum of the criticality safety indexes in any group of such packages, overpacks or freight containers does not exceed 50. Groups of such packages, overpacks and freight containers shall be stored so as to maintain a spacing of at least 6 m from other groups of such packages, overpacks, or freight containers.	No similar requirement since Part 71 and Title 49 do not include the criticality safety index. However, see 173.447 and 173.459 which address limiting accumulations of transport indexes. 49 CFR Parts 174, 175, 176 and 177 address limits on accumulation of transport indexes.
569		Where the total sum of the criticality safety indexes on board a conveyance or in a freight containers exceeds 50, as permitted in Table X (CSI Limits for Freight Containers and Conveyances Containing Fissile Material), storage shall be such as to maintain a spacing of at least 6 m from other groups of packages, overpacks, or freight containers containing fissile material or other conveyances carrying radioactive material.	No similar requirement since Part 71 and Title 49 do not include the criticality safety index. However, see 173.447 and 173.459 which address limiting accumulations of transport indexes. 49 CFR Parts 174, 175, 176 and 177 address limits on accumulation of transport indexes.
570	71.5 (a)	**Additional requirements relating to transport by rail and by road** (570-573) Rail and road vehicles carrying packages, overpacks or freight containers labeled with any of the labels shown in Fig. 2, Fig. 3, Fig. 4 or Fig. 5, or carrying consignments under exclusive use, shall display the placard shown in Fig. 6 on each of the two external lateral walls in the case of rail vehicle; the two external lateral walls and the external real wall in the case of a road vehicle. In the case of vehicles which have insufficient area to allow the fixing of larger placards, the dimensions of the placard as described in Fig. 6 may be reduced to 100 mm.	Reference to 49 CFR invokes the DOT placarding requirements in 172.504. However, these requirements are SUBSTANTIALLY different than TS-R-1. Title 49 only requires placarding when transporting a Yellow-III labeled package or when transporting an exclusive use shipment of LSA/SCO in accordance with 49 CFR 173.427(a). TS-R-1 requires placarding when transporting any package which is required to bear a "Radioactive" label.
571		Requires that in certain instances, a placard	No similar requirement, however, this topic is

		displaying the appropriate UN number must be displayed. Where the consignment in or on the vehicle in unpackaged LSA-I material or SCO-I or where an exclusive use consignment is packaged radioactive material with a single UN number, the appropriate UN number shall also be displayed, in black digits not less than 65 mm high, either:	within DOT's area of responsibility.
571 (a)		In the lower half of the placard shown in Fig. 6, against the white background, or	No similar requirement, however, this topic is within DOT's area of responsibility.
5 7 1 (b)		On the placard shown in Fig. 7.	No similar requirement, however, this topic is within DOT's area of responsibility.
572	71.47	For consignments under exclusive use, the radiation level shall not exceed:	71.47 and 49 CFR 173.441 requirements are essentially the same as TS-R-1.
572 (a)	71.47	10 mSv/h at any point on the external surface of any package or overpack, and may only exceed 2 mSv/h provided that the vehicle is equipped with an enclosure which prevents the access of unauthorized persons to the interior of the enclosure, and provisions are made to secure the package or overpack so that its position within the vehicle remains fixed during routine conditions of transport, and there is no loading or unloading during the shipment.	71.47 and 49 CFR 173.441 requirements are essentially the same as TS-R-1.
5 7 2 (b)	71.47	2 mSv/h at any point on the outer surfaces of the vehicle	71.47 and 49 CFR 173.441 requirements are essentially the same as TS-R-1.
572 (c)	71.47	0.1 mSv/h at any point 2 m from the vertical planes represented by the outer lateral surfaces of the vehicle, or, if the load is transported in an open vehicle, at any point 2 m from the vertical planes projected from the outer edges of the vehicle.	71.47 and 49 CFR 173.441 requirements are essentially the same as TS-R-1.
573	71.5 (a)	Set requirements for road vehicles. States that in case of road vehicles, no persons other than the driver and assistants shall be permitted in vehicles carrying packages, overpacks or freight containers bearing category II-YELLOW or III-YELLOW labels.	Part 71 addresses this by reference to Title 49. 49 CFR 173.448(c) is similar and Parts 174, 175, 176 and 177 also address some aspects of this requirement.
574	71.5 (a)	**Additional requirements relating to transport by vessels** (547-575) Details additional requirements relating to transport by vessels. Packages or overpacks having a surface radiation level greater than 2 mSv/h, unless being carried in or on a vehicle under exclusive use in accordance with Table IX, footnote (a), shall not be transported by vessel except under special arrangement.	Part 71 addresses this by reference to Title 49. 49 CFR 176.704(f), Table III, footnote (e) includes a requirement that high radiation level packages must not be removed from their exclusive use vehicle. By implication, if the high radiation package does not remain in the exclusive use vehicle, an exemption (special arrangement equivalent) would be required.

575		States that the transport of consignments by means of a special use vessel which is dedicated to the purpose of carrying radioactive materials, shall be excepted from the requirements specified in para. 566 provided that the following conditions are met:	No similar requirement in Part 71. 49 CFR 176.708(d) includes requirements which are consistent, but not as comprehensive as the TS-R-1 requirements.
575 (a)		A radiation protection programme for the shipment shall be approved by the competent authority of the flag state of the vessel and, when requested, by the competent authority at each port of call;	No similar requirement, however, this topic is within DOT's area of responsibility.
5 7 5 (b)	71.5 (a)	Stowage arrangements shall be predetermined for the whole voyage including any consignments to be loaded at ports of call en route; and	Part 71 addresses this by reference to Title 49. 49 CFR 176.708(d) includes requirements which are consistent, but not as comprehensive as the TS-R-1 requirements.
575 (c)		The loading, carriage and unloading of the consignments shall be supervised by persons qualified in the transport of radioactive material.	No similar requirement, however, this topic is within DOT's area of responsibility.
576	71.5 (a)	**Additional requirements relating to transport by air** (576-578) Type B(M) packages and consignments under exclusive use shall not be transported on passenger aircraft.	Part 71 partially addresses this by reference to Title 49. 49 CFR 175.700(d) prohibits Type B(M) packages on passenger aircraft. No similar prohibition on exclusive use consignments.
577	71.43 (h)	Vented Type B(M) packages, packages which require external cooling by an ancillary cooling system, packages subject to operational controls during transport, and packages containing liquid pyrophoric materials shall not be transported by air.	Part 71 addresses this by reference to Title 49 and 49 CFR 175.703(d) is essentially the same as TS-R-1. Part 71 prohibits packages designed to allow continuous venting during transport (71.43(h)) regardless of mode of transport.
578	71.5 (a)	Packages or overpacks having a surface radiation level greater than 2 mSv/h shall not be transported by air except by special arrangement.	Part 71 addresses this by reference to Title 49 and 49 CFR 175.703(d) is similar to TS-R-1 but requires "approval" in lieu of special arrangement.
579	71.0 (b), footnote 1	**Additional requirements relating to transport by post** (579-580) Indicates that requirements for transport by post is subject to the requirements of the national postal authorities.	Reference is made to the USPS requirements which are similar to TS-R-1.
580	71.0 (b), footnote 1	States that a consignment that conforms with the requirements of para. 515, and in which the activity of the radioactive contents does not exceed one tenth of the limits prescribed in Table III, may be accepted for international movement by post, subject in particular to the following additional requirements as prescribed by the Acts of the Universal Postal Union:	Reference is made to the USPS requirements which are similar to TS-R-1.
580 (a)	71.0 (b) footnote 1	it shall be deposed with the postal service only by consignors authorized by the national authority;	Reference is made to the USPS requirements which are similar to TS-R-1.

5 8 0 (b)	71.0 (b) footnote 1	it shall be dispatched by the quickest route, normally by air;	Reference is made to the USPS requirements which are similar to TS-R-1.
580 (c)	71.0 (b) footnote 1	it shall be plainly and durably marked on the outside with the words "RADIOACTIVE MATERIAL - QUANTITIES PERMITTED FOR MOVEMENT BY POST"; these words shall be crossed out if the packaging is returned empty;	Reference is made to the USPS requirements which are similar to TS-R-1.
5 8 0 (d)	71.0 (b) footnote 1	it shall carry on the outside the name and address of the consignor with the request that the consignment be returned in the case of non-delivery; and	Reference is made to the USPS requirements which are similar to TS-R-1.
580 (e)	71.0 (b) footnote 1	the name and address of the consignor and the contents of the consignment shall be indicated on the internal packaging.	Reference is made to the USPS requirements which are similar to TS-R-1.
581		CUSTOM OPERATIONS (581) Para. 581 - Customs Operations States that customs operations involving the inspection of the radioactive contents of a package shall be carried out only in a place where adequate means of controlling radiation exposure are provided and in the presence of qualified persons. Any package opened on customs instructions shall, before being forwarded to the consignee, be restored to its original condition.	No similar requirement.
582		UNDELIVERABLE CONSIGNMENTS (582) Para 582 - Undeliverable Consignments Specifies that when a consignment is undeliverable, the consignment shall be placed in a safe location and the appropriate competent authority shall be informed as soon as possible and a request made for instruction on further action.	No similar requirement, however, this topic is within DOT's area of responsibility.
601	71.77 (b) (4)	**SECTION VI - REQUIREMENTS FOR RADIOACTIVE MATERIALS AND FOR PACKAGINGS AND PACKAGES** REQUIREMENTS FOR RADIOACTIVE MATERIALS (601-605) **Requirements for LSA-III material** (601) LSA-III material shall be a solid of such a nature that if the entire contents of a package were subject to the test specified in para. 703 the activity in the water would not exceed 0.1 A2.	71.77 (b) (4) and 49 CFR 173.468 are essential the same as TS-R-1.

602	71.4	**Requirements for special form radioactive material** (602-604) Special form radioactive material shall have at least one dimension not less than 5 mm.	71.4 and 49 CFR 173.403 contain this requirement in their definition of "special form radioactive material".
603	71.75	Sets requirements for special form radioactive material when subjected to the tests specified in paras. 704-711. Should meet the following requirements below:	71.75 and 49 CFR 173.469 are similar to TS-R-1.
603 (a)	71.75 (a) (2)	It would not break or shatter under the impact, percussion and bending tests in paras. 705, 706, 707, and 709(a) as applicable;	See also 49 CFR 173.469 (a) (2).
6 0 3 (b)	71.75 (a) (3)	It would not melt or disperse in the heat test in para. 708 or para 709(b) as applicable; and	See also 49 CFR 173.469 (a) (3).
603 (c)	71.75 (a) (4) and (5)	The activity in the water from the leaching tests specified in paras. 710 and 711 would not exceed 2 kBq; or alternatively for sealed sources, the leakage rate for the volumetric leakage assessment test specified in the International Organizations for Standardization document ISO 9978: Radiation Protection - Sealed Radioactive Sources - Leakage Test Methods" [8], would not exceed the applicable acceptance threshold acceptable to the competent authority.	See also 49 CFR 173.469 (a) (4).
604	71.4	States that when a sealed capsule constitutes part of the special form radioactive material, the capsule shall be so manufactured that it can be opened only by destroying it.	71.4 and 49 CFR 173.403 contain this requirement in their definition of "special form radioactive material".
605		**Requirements for low dispersible radioactive material** (605) States that low dispersible radioactive material shall be such that the total amount of this radioactive material in a package shall meet the following requirements:	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
605 (a)		The radiation level at 3 m from the unshielded radioactive material does not exceed 10 mSv/h;	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
6 0 5 (b)		If subjected to the tests specified in paras. 736 and 737, the airborne release in gaseous and particulate forms of up to 100 um aerodynamic equivalent diameter would not exceed 100 A (sub2). A separate specimen may be used for each test; and	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
605 (c)		If subject to the test specified in para. 703 the activity in the water would not exceed 100 A (sub2). In the application of this test, the damaging effects of the tests specified in (b) above shall be taken into accounts.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.

606		GENERAL REQUIREMENTS FOR ALL PACKAGINGS AND PACKAGES (606-616) Specifies that the package shall be so designed in relation to its mass, volume and shape that it can be easily and safely transported. In addition, the package shall be so designed that it can be properly secured in or on the conveyance during transport.	No similar requirement in Part 71. 49 CFR 173.410 (a) contains this requirement.
607	71.45 (a)	Specifies that the design shall be such that any lifting attachment on the package willl not fall when used in the intended manner and that, if failure of the attachments should occur, the ability of the package to meet other requirements of these Regulations would not be impaired. The design shall take account of appropriate safety factors to cover snatch lifting.	71.45 (a) and 49 CFR 173.410 (b) are similar to TS-R-1. Part 71 and Title 49 impose a safety factor of 3. 71.45 (b) has similar requirements for tie-down devices and structural parts of a package.
608	71.45	Specifies that the package shall be so designed in relation to its mass, volume and shape that it can be easily and safely transported. In addition, the package shall be so designed that it can be properly secured in or on the conveyance during transport.	71.45 and 49 CFR 173.410 (b) are similar to TS-R-1.
609		As far as practicable, the packaging shall be so designed and finished that the external surfaces are free from protruding features and can be easily decontaminated.	No similar requirement in Part 71. 49 CFR 173.410 (c) is essentially the same as TS-R-1.
610		As far as practicable, the outer layer of the package shall be so designed as to prevent the collection and the retention of water.	No similar requirement in Part 71. 49 CFR 173.410 (d) is similar to TS-R-1.
611		States that any features added to the package at the time of transport which are not part of the package shall not reduce its safety.	No similar requirement in Part 71. 49 CFR 173.410 (e) is similar to TS-R-1.
612	71.71 (c) (5)	States that the package shall be capable of withstanding the effect of any acceleration, vibration or vibration resonance which may arise under routine conditions of transport without any deterioration in the effectiveness of the closing devices on the various receptacles or in the integrity of the package as a whole. In particular, nuts, bolts, and other securing devices shall be so designed as to prevent them from becoming lose or being released unintentionally, even after repeated use.	71.71 (c) (5) and 49 CFR 173.410 (f) contain similar requirements to TS-R-1.
613	71.43 (d)	States that the materials of the packaging and any components or structures shall be physically and chemically compatible with each other and with the radioactive contents. Account shall be taken of their behavior under irradiation.	71.43(d) and 49 CFR 173.410(g) are both similar to TS-R-1.

614	71.43 (e)	All valves through which the radioactive contents could otherwise escape shall be protected against unauthorized operation.	71.43(e) also includes a requirement for an enclosure. 49 CFR 173.410(h) is similar to TS-R-1.
615		States that the design of the package shall take into account ambient temperatures and pressures that are likely to be encountered in routine conditions of transport.	49 CFR 173.24 is similar, but neither Part 71 nor Title 49 contain the "routine conditions of transport" since this is a new term in TS-R-1.
616		For radioactive material having other dangerous properties the package design shall take into account those properties; see paras. 109 and 507.	No similar requirement in Part 71. 49 CFR 173.2a and 173.423 address limited quantity radioactive materials which meet the definition of another hazard class. These requirements are more limited in scope than TS-R-1.
617	71.43 (g)	ADDITIONAL REQUIREMENTS FOR PACKAGES TRANSPORTED BY AIR (617-619) Sets requirements for packages transported by air. For packages to be transported by air, the temperature of the accessible surfaces shall not exceed 50°°C at an ambient temperature of 38°°C with no account taken for insulation.	71.43(g), while not specific to air transport, is consistent with 49 CFR 173.410(i) and TS-R-1.
618		Packages to be transported by air shall be so designed that, if they were exposed to ambient temperatures ranging from -40°°C to + 55°°C, the integrity of containment would not be impaired.	Part 71 does not have a similar provision except for plutonium transport by air (71.64 (b) ((1) (ii)). 49 CFR 174.410 (i) is essentially the same as TS-R-1.
619		Packages containing radioactive material transported by air shall have a containment system able to withstand without leakage a reduction in ambient pressure to 5 kPa.	49 CFR 173.410(i) addresses liquid contents and uses an internal pressure test which is roughly equivalent for a rigid package (95 kPa).
620	71.5 (a)	REQUIREMENTS FOR EXCEPTED PACKAGES (620) States that an excepted package shall be designed to meet the requirements specified in paras. 606-616 and in addition, the requirements of paras. 617-619 if carried by air.	Part 71 does not address excepted packages. 49 CFR has their requirements in various sections which are roughly equivalent with TS-R-1.
621	71.5 (a)	REQUIREMENTS FOR INDUSTRIAL PACKAGES (621-628) **Requirements for industrial package Type 1 (Type IP-1)** (621) Industrial package Type I (Type IP-1) shall be designed to meet the requirements specified in paras. 606-616 and 634, and, in addition, the requirements of paras. 617-619 if carried by air.	Part 71 does not address industrial packages. 49 CFR 173.411 has requirements which are similar to TS-R-1.
622	71.5 (a)	**Requirements for Industrial package Type 2 (Type IP-2)** (622) Sets requirements for industrial package Type 2	Part 71 does not address industrial packages. 49 CFR 173.411 has requirements which are similar to TS-R-1.

		(Type IP-2) as specified in para. 621 and, in addition, if it were subject to the tests specified in paras. 722 and 723, it would prevent:	
622 (a)	71.5 (a)	loss of dispersal of the radioactive contents	Part 71 does not address industrial packages. 49 CFR 173.411 has requirements which are similar to TS-R-1.
6 2 2 (b)	71.5 (a)	loss of shielding integrity which would result in more than a 20% increase in the radiation level at any external surface of the package.	Part 71 does not address industrial packages. 49 CFR 173.411 has requirements which are similar to TS-R-1 (20% increase in TS-R-1, "no significant increase in Title 49).
623	71.5 (a)	**Requirements for industrial packages Type 3 (Type IP-3)** (623) Sets requirements for industrial package Type 3 (Type IP-3) as specified in para. 621 and, in addition, the requirements specified in paras. 634-647.	Part 71 does not address industrial packages. 47 CFR 173.411 has requirements which are similar to TS-R-1.
624		**Alternative Requirements for Industrial Packages Types 2 and 3 (Type IP-2) and Type IP-3)** (624-628) States that packages may be used as Industrial package Type 2 (Type IP-2) provided that:	No similar provision, however, this topic is within DOT's area of responsibility.
624 (a)		They satisfy the requirements for Type IP-I specified in para. 621;	No similar requirement, however, this topic is within DOT's area of responsibility.
6 2 4 (b)		They are designed to conform to the standards prescribed in the chapter on General Recommendations on Packing of the United Nations Recommendations on the Transport of Dangerous Goods [7], or other requirements at least equivalent to those standards; and	No similar requirement, however, this topic is within DOT's area of responsibility.
624 (c)		When subject to the tests required for UN Packing Group I or II, they would prevent: loss or dispersal of the radioactive contents; and loss of shielding integrity which would result in more than a 20% increase in the radiation level at any external surface of the package.	No similar requirement, however, this topic is within DOT's area of responsibility.
625	71.5 (a)	States that tank containers may also be used as Industrial package Types 2 or 3 (Type IP-2) or (Type IP-3), as long as certain provisions are met.	Part 71 does not address industrial packages. 49 CFR 173.411 has requirements which are more restrictive than TS-R-1.
625 (a)	71.5 (a)	They satisfy the requirements for Type IP-I specified in para. 621;	Part 71 does not address industrial packages. 49 CFR 173.411 has requirements which are more restrictive than TS-R-1, specifying that only IMO101 or 102 portable tanks can be used which meet the requirements of IP-2 or IP-3.
6 2 5 (b)	71.5 (a)	They are designed to conform to the standards prescribed in the chapter on Recommendations on Multimodal Tank Transport of the UN Recommendations on the Transport of Dangerous Goods [7], or other requirements at	Part 71 does not address industrial packages. 49 CFR 173.411 is similar, but limited to IMO 101 or 102 portable tanks.

		least equivalent to those standards, and are capable of withstanding a test pressure of 265 kPa; and	
625 (c)	71.5 (a)	They are designed so that any additional shielding which is provided shall be capable of withstanding the static and dynamic stresses resulting from handling and routine conditions of transport and of preventing a loss of shielding integrity which would result in more than a 20% increase in the radiation level at any external surface of the tank containers.	Part 71 does not address industrial packages. 49 CFR 173.411 is similar, but limited to IMO 101 or 102 portable tanks.
626		Tanks, other than tank containers, may also be used as Industrial package Types 2 or 3 (Type IP-2) or (Type IP-3) for transporting LSA-I and LSA-II liquids and gases as prescribed in Table IV, provided that they conform to standards at least equivalent to those prescribed in para. 625.	No similar provision, however, this topic is within DOT's area of responsibility.
627	71.5 (a)	Sets provision by which freight containers may also be used as industrial package Types 2 or 3. Provisions are:	Part 71 does not address industrial packages. 49 CFR 173.411 has requirements which are more restrictive than TS-R-1.
627 (a)		that the radioactive contents are restricted to solid materials;	No similar requirement, however, this topic is within DOT's area of responsibility.
6 2 7 (b)	71.5 (a)	that they satisfy the requirements for Type IP-I specified in para. 621; and	Part 71 does not address industrial packages. 49 CFR 173.411 has requirements which are more restrictive than TS-R-1, requiring that the freight container meet the requirements for IP-2 or IP-3.
627 (c)	71.5 (a)	that they are designed to conform to the standards prescribed in the International Organization for Standardization document ISO 1496/1: "Series 1 Freight Containers - Specifications and Testing - Part 1: General Cargo Containers" [9] excluding dimensions and ratings. They shall be designed such that if subjected to the tests prescribed in that document and the accelerations occurring during routing conditions of transport they would prevent: loss or dispersal of the radioactive contents and loss of shielding integrity which would result in more than a 20% increase in the radiation level at any external surface of the freight containers	Part 71 does not address industrial packages. 49 CFR 173.411 has requirements that are similar.
628		Provisions by which metal intermediate bulk containers may be used as Industrial package Type 2 or 3 (Type IP-2) or (Type IP-3). Provisions are:	No similar provision, however, this topic is within DOT's area of responsibility.
628 (a)		that they satisfy the requirements for Type IP-I specified in para. 621; and	No similar requirement, however, this topic is within DOT's area of responsibility.
6 2 8 (b)		that they are designed to conform to the standards, prescribed in the chapter on Recommendation on Intermediate Bulk	No similar requirement, however, this topic is within DOT's area of responsibility.

		Containers (IBC's) of the United Nations Recommendations on the transport of Dangerous Goods [7], for Packing Group I or II, and if they were subjected to the tests prescribed in that document, but with the drop test conducted in the most damaging orientation, they would prevent: loss or dispersal of the radioactive contents and loss of shielding integrity which would result in more than a 20% increase in the radiation level at any external surface of the intermediate bulk container.	
629	71.5 (a)	REQUIREMENTS FOR PACKAGES CONTAINING URANIUM HEXAFLUORIDE (629-632) Sets requirements for packages containing uranium hexafluoride (UF6). Uranium hexafluoride shall be packaged and transported in accordance with the provision ISO 7195 [10], and the requirements of paras. 630-631. The package shall also meet the requirements prescribed elsewhere in these Regulation which pertain to the radioactive and fissile properties of the material.	Part 71 does not address UF6 directly, although it addresses fissile package design standards which are applicable to fissile UF6. 49 CFR 173.420 contains specific requirements for UF6.
630		States that each package designed to contain 0.1 kg or more of UF6 shall be designed so that it would meet the following requirements.	Part 71 does not address UF6 directly, although it addresses fissile package design standards which are applicable to fissile UF6. 49 CFR 173.420 contains specific requirements for UF6. Part 71 does not address UF6 directly.
630 (a)	71.5 (a)	Withstand without leakage and without unacceptable stress, as specified in ISO 7195 [10], the structural test as specified in para. 718 [an internal pressure test];	Part 71 does not address UF6 directly. 49 CFR 173.420 requires compliance with ANSI N14.1 which is similar.
6 3 0 (b)		Withstand without loss or dispersal of the uranium hexafluoride the test specified in para. 722 [the Type A drop test]; and	No similar requirement, however, this topic is within DOT's area of responsibility.
630 (c)		Withstand without rupture of the containment system the test specified in para. 728 [the Type B fire test].	No similar requirement, however, this topic is within DOT's area of responsibility.
631		Packages designed to contain 0.1 kg or more of UF6 shall not be provided with pressure relief devices.	No similar requirement, however, this topic is within DOT's area of responsibility.
632		Subject to the approval of the competent authority, packages designed to contain 0.1 kg or move of UF6 may be transported if:	No similar requirement.
632 (a)		the packages are designed to requirements other than those given in ISO 7195 [10] and paras. 630-631 but, notwithstanding, the requirements of paras. 630-631 are met as far as practicable;	No similar requirement.
6 3 2 (b)		the packages are designed to withstand without leakage and without unacceptable stress a test	No similar requirement.

		pressure less and 2.8 MPa as specified in para. 718; or	
632 (c)		for packages designed to contain 9000 kg or more of uranium hexafluoride, the packages do not meet the requirement of para. 630(c).	No similar requirement.
633	71.5 (a)	REQUIREMENTS FOR TYPE A PACKAGES (633-649) Type A packages shall be designed to meet the requirements specified in paras. 606-616 and, in addition, the requirements of paras. 617-619 if carried by air, and of paras. 634-649.	Part 71 does not address non-fissile and fissile excepted Type A packages directly but does address fissile package designs which may be Type A. 49 CFR 173.412 is similar to TS-R-1.
634	71.43 (a)	The smallest overall external dimension of the package shall not be less than 10 cm.	71.43(a) and 49 CFR 173.412 (b) are essentially the same as TS-R-1.
635	71.43 (b)	The outside of the package shall incorporate a feature such as a seal, which is not readily breakable and which, while intact, will be evident that it has not been opened.	71.43(b) and 49 CFR 173.412 (a) are essentially the same as TS-R-1, however, 49 CFR 173.412 (a) allows sealing of the cargo compartment of a closed transport vehicle in lieu of individual package seals.
636	71.45 (b) (3)	Any tie-down attachments on the package shall be so designed that, under normal and accident conditions of transport, the forces in those attachments shall not impair the ability of the package to meet the requirements of these Regulations.	71.45 (b) (3) and 49 CFR 173.412 (i) are essentially the same as TS-R-1.
637	71.5 (a), 71.71 (b)	The design of the package shall take into account temperatures ranging from -40°°C to +70°°C for the components of the packaging. Attention shall be given to freezing temperatures for liquids and to the potential degradation of packaging materials within the given temperature range.	71.71 (b) contains requirements for "initial conditions" as part of the normal conditions of transport, and these are similar, but differ numerically from TS-R-1. 49 CFR 173.412 (c) is similar to TS-R-1.
638	71.31 (c)	The design and manufacturing techniques shall be in accordance with national or international standards, or other requirements, acceptable to the competent authority.	National or international standards may be used but are not required by 71.31 (c). Compliance with the requirements in Part 71 and Title 49 have been deemed acceptable to the competent authority (by implication).
639	71.43 (c)	The design shall include a containment system securely closed by a positive fastening device which cannot be opened unintentionally or by a pressure which may arise within the package.	71.43 (c) and 49 CFR 173.412 (d) are essentially the same as TS-R-1.
640		Special form radioactive material may be considered as a component of the containment system.	No similar provision in Part 71. 49 CFR 173.412(d) is essentially the same as TS-R-1.
641	71.43 (c)	If the containment system forms a separate unit of the package, it shall be capable of being securely closed by a positive fastening device which is independent of any other part of the packaging.	71.43 (c) is similar to TS-R-1. 49 CFR 173.412(d) is essentially the same as TS-R-1.
642	71.43 (d)	The design of any component of the containment system shall take into account,	71.43 (d) and 49 CFR 173.412 (e) are similar to TS-R-1.

		where applicable, the radiolytic decomposition of liquids and other vulnerable materials and the generation of gas by chemical reaction and radiolysis.	
643	71.71 (c) (3)	The containment system shall retain its radioactive contents under a reduction of ambient pressure to 60 kPa.	71.71 (c) (3) and 49 CFR 173.412(f) are more restrictive (reduced pressure to 25 kPa).
644	71.43 (e)	All valves, other than pressure relief valves, shall be provided with an enclosure to retain any leakage from the valve.	71.43 (e) and 49 CFR 173.412 (g) are essentially the same as TS-R-1.
645	71.5 (a)	A radiation shield which encloses a component of the package specified as a part of the containment system shall be so designed as to prevent the unintentional release of that component from the shield. Where the radiation shield and such component within it form a separate unit, the radiation shield shall be capable or being securely closed by a positive fastening device which is independent of any other packaging structure.	49 CFR 173.412 (h) is similar to TS-R-1.
646	71.43 (f)	A package shall be so designed that if it were subjected to the tests specified in paras. 719-724 [Type A package tests], it would prevent:	71.43 (f) and 49 CFR 173.412 (j) are essentially the same as TS-R-1.
646 (a)	71.43 (f)	Loss or dispersal of the radioactive content; and	71.43(f) and 49 CFR 173.412(j) are identical to TS-R-1.
6 4 6 (b)	71.43 (f)	Loss of shielding integrity which would result in more than a 20% increase in the radiation level at any external surface of the package.	Both 71.43(f) and 49 CFR 173.412(j) limit radiation level increases to "no significant increase".
647	71.5 (a)	The design of a package intended for liquid radioactive material shall make provision for ullage to accommodate variations in the temperature of the contents, dynamic effects and filling dynamics.	49 CFR 173.412 (k) is essentially the same as TS-R-1.
648	71.5 (a)	Sets additional requirements for Type A packages designed to contain liquids.	49 CFR 173.412 (k) is essentially the same as TS-R-1.
648 (a)	71.5 (a)	Be adequate to meet the conditions specified in para. 646 if the package is subjected to the tests specified in para. 725; and	49 CFR 173.412 (k) is essentially the same as TS-R-1.
6 4 8 (b)	71.5 (a)	Either be provided with sufficient absorbent material to absorb twice the volume of the liquid contents. Such absorbent material must be suitably positioned so as to contact the liquid in the event of leakage; or be provided with a containment system composed of primary inner and secondary outer containment components designed to ensure retention of the liquid contents, within the secondary outer containment components, even if the primary inner components leak.	49 CFR 173.412 (k) is essentially the same as TS-R-1.
649	71.5 (a)	A package designed for gases shall prevent loss or dispersal of the radioactive contents if the	49 CFR 173.412 (k) is essentially the same as TS-R-1.

		package were subjected to the tests specified in para. 725. A Type A package designed for tritium gas or for noble gases shall be excepted from this requirement.	
650	71.51	REQUIREMENTS FOR TYPE B (U) PACKAGES (650-664) Type B(U) packages shall be designed to meet the requirements specified in paras. 606-616, the requirements of paras. 617-619 if carried by air, and of paras. 634-647, except as specified in para. 646(a), and in addition, the requirements specified in paras. 651-664.	49 CFR 173.413 refers to 10 CFR Part 71 for these requirements (which is similar to TS-R-1).
651	71.71 (c)	A package shall be so designed that, under the ambient conditions specified in paras. 653 and 654, heat generated within the package by the radioactive contents shall not, under normal conditions of transport, as demonstrated by the tests in paras. 719-724, adversely affect the package in such a way that it would fail to meet the applicable requirements for containment and shielding if left unattended for period of one week. Particular attention shall be paid to the effects of heat, which may:	71.71 (c) requires identical ambient heat conditions as TS-R-1 for the normal conditions of transport.
651 (a)	71.43 (d)	Alter the arrangement, the geometrical form or the physical state of the radioactive contents or, if the radioactive material is enclosed in a can or receptacle (for example, clad fuel elements), cause the can, receptacle or radioactive material to deform or melt; or	71.43 (d) establishes a broad requirement which is similar in application to the TS-R-1 requirement.
6 5 1 (b)	71.43 (d)	Lessen the efficiency of the packaging through differential thermal expansion or cracking or melting of the radiation shielding material; or	71.43 (d) establishes a broad requirement which is similar in application to the TS-R-1 requirement.
651 (c)	71.43 (d)	In combination with moisture, accelerate corrosion.	71.43 (d) establishes a broad requirement which is similar in application to the TS-R-1 requirement.
652	71.43 (g)	A package shall be so designed that the temperature of the accessible surfaces of a package shall not exceed 50°°C, unless the package is transported under exclusive use.	Similar to TS-R-1 with 85 degree limit on exclusive use shipments, but Part 71 does not tie 71.71(c) to a maximum allowable surface temperature.
653	71.71 (c)	The ambient temperature shall be assumed to be 38°°C.	71.71 (c) uses the same ambient temperature as TS-R-1.
654	71.71 (c)	The solar insulation conditions shall be assumed to be as specified in Table XI.	Essentially the same as TS-R-1.
655	71.73 (a) 71.73 (c) (4)	Requires that for a package which includes thermal protection in order to satisfy the 30 minute thermal test, the protection on the exterior of the package shall not be rendered ineffective by ripping, cutting, skidding, abrasion, or rough handling.	Part 71 requires essentially the same test sequencing prior to thermal testing, but does not include consideration of "ripping, cutting," etc.

656	71.51	Sets requirements indicating that a package shall be so designed that if it were subjected to certain tests (a and b below) it could meet given requirements.	Similar to TS-R-1.
656 (a)	71.51	The tests specified in paras. 719-724, it would restrict the loss of radioactive contents to not more than 10(super)−−6 A(sub)2 per hour; and	Similar to TS-R-1, same release limit.
6 5 6 (b)	71.51	The tests specified in paras. 726, 727 (b), 728 and 729 and the tests in paras: (i) 727(c), when the package has a mass not greater than 500 kg, an overall density not greater than 1000 kg/m^{33} based on the external dimensions, and the radioactive contents greater than 1000 A(sub)2 for not as special form radioactive material, or (ii) 727(a) for all other packages, it would: (i) retain sufficient shielding to ensure that the radiation level at 1 m from the surface of the package would not exceed 10 mSv/h with the maximum radioactive contents and (ii) restrict the accumulated loss of radioactive contents in a period of one week to not more than 20 A(sub)2 for krypton-85 and not more than A(sub)2 for all other radionuclides.	Similar to TS-R-1, same acceptance criteria. However, TS-R-1 specifies that only the crush test need be performed on those packages subject to it. Part 71 requires that the free drop test and crush tests be performed on such packages.
657	71.61	A package for radioactive contents with activity greater than 10(super)5 A(sub)2 shall be so designed that if it were subject to the enhanced water immersion test specified in para. 730, there would be no rupture of the containment system.	71.61 applies to only irradiated nuclear fuel exceeding 10(super)6 curies, TS-R-1 applies to all radionuclides exceeding10(super)5 A(sub)2. 71.61 requires "without collapse, buckling, or inleakage of water" while TS-R-1 requires "no rupture of the containment system".
658	71.51 (c)	Compliance with the permitted activity release limits shall depend neither upon filters nor upon a mechanical cooling system.	Equivalent with TS-R-1.
659	71.4	A package shall not include a pressure relief system from the containment system which would allow the release of radioactive material to the environment under the conditions of the tests specified in paras. 719-724 and 726-729.	Essentially the same as TS-R-1.
660	71.51	A package shall be so designed that if were at the maximum normal operating pressure and it were subjected to the tests specified in para 719-724 and 726-729 the level of strain in the containment system would not adversely affect the package.	71.51 (a) (1) requires "no substantial reduction in the effectiveness of the packaging following the normal conditions of transport and 71.51 (a) (2) is similarly applied (in practice) following the hypothetical accident conditons.
661	71.4	A package shall not have a maximum normal operating pressure in excess of a gauge pressure of 700 kPa.	Essentially the same as TS-R-1.
662	71.43 (g)	The maximum temperature of any surface readily accessible during transport of a package shall not exceed 85^{oo}C in the absence of insolation under the ambient conditions	Similar to TS-R-1.

		specified in para. 653 (except as required in para. 617 for a package transported by air). The package shall be carried under exclusive use if this maximum temperature exceeds 50ººC. Account may be taken of barriers or screens intended to give protection to persons without the need for the barriers or screens being subject to any test.	
663		A package containing low dispersible radioactive material shall be so designed that any features added to the low dispersible radioactive material that are not part of it, or any internal components of the packaging shall not adversely affect the performance of the low dispersible radioactive material.	No similar requirement (LDM is introduced by TS-R-1).
664	7 1 . 7 1 (c)	A package shall be designed for an ambient temperature range from −−40ººC to +38ººC.	Essentially the same as TS-R-1.
665	7 1 . 4 , 71.41.(c)	REQUIREMENTS FOR TYPE B(M) PACKAGES (665-666) Type B(M) packages shall meet the requirements for Type B(U) packages specified in para. 650, except that for packages to be transported solely within a specified country or solely between specified countries, conditions other than those given in paras. 637, 653, 654 and 657-664 above may be assumed with the approval of the competent authorities of these countries. Notwithstanding, the requirements for Type B(U) packages specified in paras. 657-664 shall be met as far as practicable.	Type B(M) is defined in 71.4 in a more limited way than in TS-R-1. The provisions of 71.41(c) are similar to para. 665 in that it allows other conditions to be used in the design and analysis of a package, provided that approval is obtained.
666		Intermittent venting of Type B(M) packages may be permitted during transport, provided that the operational controls for venting are acceptable to the relevant competent authorities.	No similar provision.
667		REQUIREMENTS FOR TYPE C PACKAGES (667-670) Type C packages shall be designed to meet the requirements specified in para 606-619 and others paras.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
668		A package shall be capable of meeting the assessment criteria prescribed for tests in paras. 656(b) and 660 after burial in an environment defined by a thermal conductivity of 0.33 W/(m··K) and a temperature of 38ººC in the steady state. Initial conditions for the assessment shall assume that any thermal insulation of the package remains intact, the package is at the maximum normal operating pressure and the ambient temperature is 38ººC.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.

669		A package shall be so designed that, if it were at the maximum normal operating pressure and subjected to: If subjected to (a) and (b) below where mixtures of different radionuclides are present the provisions of paras. 404-406 shall apply except that for krypton-85 an effective A(sub2)(i) value equal to 10 A(sub)2 may be used. For case (a), the assessment shall take into account the external contamination limits of para. 508.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
669 (a)		the tests specified in paras. 719-724, it would restrict the loss of radioactive contents to not more than 10 (sup−−6) A(sub2) per hours; and	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
6 6 9 (b)		the test sequences in para. 734, it would meet the following requirements: retain sufficient shielding to ensure that the radiation level at 1 m from the surface of the package would not exceed 10 mSv/h with the maximum radioactive contents which the package is designed to contain; and restrict the accumulated loss of radioactive contents in a period of 1 week to not more than 10 A(sub2) for krypton-85 and not more than A(sub2) for all other radionuclides.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
670		A package shall be so designed that there will be no rupture of the containment system following performance of the enhanced water immersion test specified in para. 730.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
671	71.55	REQUIREMENTS FOR PACKAGES CONTAINING FISSILE MATERIAL (671-682) Fissile material shall be transported so as to:	Similar to TS-R-1.
671 (a)	71.55	maintain subcriticality during normal and accident conditions of transport; in particular, the following contingencies shall be considered: water leaking into or out of packages; the loss of efficiency of built-in neutron absorbers or moderators; rearrangement of the contents either within the package or as a result of loss from the package; reduction of spaces within or between packages; packages becoming immersed in water or buried in snow; and temperature changes; and	Similar to TS-R-1.
6 7 1 (b)	71.55	meet the requirements: of para. 634 for fissile material contained in packages; prescribed elsewhere in these Regulations which pertain to the radioactive properties of the material; and specified in paras. 673-682, unless excepted by para. 672.	Similar to TS-R-1.
672	71.53	**Exceptions from the requirements for**	The provisions of 71.53 are similar to TS-R-1.

		packages containing fissile material (672) Fissile material meeting of the of the provision of this para is excepted from the requirement to be transported in packages that comply with paras. 673-682 as well as the other requirements of these Regulations that apply to fissile material. Only one type of exception is allowed per consignment.	The fissile exceptions in 49 CFR 173.453 are different than both of those.
672 (a)	71.53 (a)	A mass limit per consignment such that: Refer to equation and Table XII - Consignment Mass Limits for Exception from the Requirements for Packages Containing Fissile Material.	Essentially the same as TS-R-1.
6 7 2 (b)	71.53 (b)	Uranium enriched in uranium-235 to a maximum of 1% by mass, and with a total plutonium and uranium-233 content not exceeding 1% of the mass of uranium-235, provided that the fissile material is distributed essentially homogeneously through the material. In addition, if uranium-235 is present in metallic, oxide, or carbide forms, it shall form a lattice arrangement.	Similar to TS-R-1.
672 (c)	71.53 (c)	Liquid solutions of uranyl nitrate enriched in uranium-235 to a maximum of 2% by mass, with a total plutonium and uranium-233 content not exceeding 0.002% of the mass of uranium, and with a minimum nitrogen to uranium atomic ration (N/U) of 2.	Similar to TS-R-1.
6 7 2 (d)	71.53 (d)	Packages containing, individually, a total plutonium mass not more than 1 kg, of which not more than 20% by mass may consist of plutonium-239, plutonium-241 or any combination of those radionuclides.	Similar to TS-R-1.
673	71.83	**Content specification for assessments of packages containing fissile material** (673-674) Contains requirements for fissile material for which the chemical or physical form, isotopic composition, mass or concentration, moderation ratio or density, or geographic configuration is not known.	Similar to TS-R-1.
674	71.83	For irradiated nuclear fuel the assessment of paras. 677-682 shall be based on an isotopic composition demonstrated to provide (a) the maximum neutron multiplication during the irradiation history, or (b) a conservative estimate of the neutron multiplication for the package assessments. After irradiation but prior to shipment, a measurement shall be performed	71.83 requires that for unknown properties of fissile material, credible values shall be used that cause maximum neutron mutliplication. There are no provisions similar to 674 (b) nor a requirement for measurement prior to shipment.

		to confirm the conservatism of the isotopic composition.	
675	71.55 (d) (4)	**Geometry and temperature requirements** (675-676) The packaging, after being subject to the tests specified in paras. 719-724, must prevent the entry of a 10 cm cube.	Essentially the same as TS-R-1.
676	71.71 (c)	A package for fissile material shall be designed for an ambient temp. range of -40 degrees C to +38 degrees.	Part 71 applies this requirement to all packages.
677	71.55 (b) and (c)	**Assessment of an individual package in isolation** (677-680) For a package in isolation, it shall be assumed that water can leak into or out of all void spaces of the package, including those within the containment system. However, if the design incorporates, special features to prevent such leakage of water into or out of certain void spaces, even as a result of error, absence of leakage may be assumed in respect of those void spaces. Special features shall include the following:.	Similar to TS-R-1.
677 (a)	71.55 (c)	Multiple high standard water barriers, each of which would remain watertight if the package were subject to the tests prescribed in para. 682(b), a high degree of quality control in the manufacture, maintenance and repair of packagings and tests to demonstrate the closure of each package before each shipment; of	Similar to TS-R-1.
6 7 7 (b)	71.55 (c)	For packages containing UF6 only: packages where there is no physical contact between the valve and any other component of the packaging other that at its original point of attachment and where, in addition the valves remain leaktight; and a high degree of quality control in the manufacture, maintenance, and repair of packagings coupled with tests to demonstrate closure of each package before each shipment.	Part 71 does not contain specific requirements for UF6, but 71.55(c) has been applied with respect to moderator exclusion.
678	71.55 (e)	It shall be assumed that the confinement system shall be closely reflected by at least 20 cm of water or such greater reflection as may additionally be provided by the surrounding material of the packaging. However, when it can be demonstrated that the confinement system remains within the packaging following the tests prescribed in para. 682(b), close reflection of the package by at least 20 cm of water may be assumed in para 679(c).	71.55(e) has a similar requirement requiring full reflection on all sides, but applies it under the hypothetical accident condition tests (damaged condition). TS-R-1 applies this to both normal and accident conditions.
679	71.55	The package shall be subcritical under the conditions of paras. 677 and 678 with the	Part 71 has requirements for both the normal and hypothetical accident conditions of transport

		package conditions that result in the maximum neutron multiplication consistent with: (a) routine conditions of transport (incident free); (b) the tests specified in para. 681(b); (c), the test specified in para. 682(b)	which are similar to TS-R-1.
680		For packages to be transported by air: (1) the package shall be subcritical under conditions consistent with the tests prescribed in para. 734 assuming reflection by at least 20 cm of water but no water inleakage; and (b) allowance shall not be made for special features of para. 677 unless, following the tests specified in para. 734 and, subsequently, para. 733, leakage of water into or out of the void spaces is prevented.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
681	71.59 (a)	**Assessment of package arrays under normal conditions of transport** (681) A number ""N"" shall be derived, such that five time ""N"" shall be subcritical for the arrangement and package conditions that provide the maximum neutron multiplication consistent with the following:	Similar to TS-R-1.
681 (a)	71.59	There shall not be anything between the packages, and the package arrangement shall be reflected on all sides by at least 20 cm of water, and	71.59 is similar to TS-R-1 except for the words requiring "full reflection" on all sides.
6 8 1 (b)	71.59	The state of the packages shall be their assessed or demonstrated condition if they had been subjected to the test specified in paras. 719-724.	Similar by inference. Since the normal condition tests must not result in a reduction of the performance of the package.
682	71.59 (a)	**Assessment of package arrays under accident conditions of transport** A number "N" shall be derived, such that two times "N" shall be subcritical for the arrangement and package conditions that provide the maximum neutron multiplication consistent with the following:	Similar to TS-R-1.
682 (a)	7 1 . 5 5 (e), 71.59 (a)	Hydrogenous moderation between packages, and the package arrangement reflected on all sides by at least 20 cm of water; and	Similar to TS-R-1.
6 8 2 (b)	7 1 . 5 5 (e), 7 1 . 5 9 (a) , 71.73	The tests specified in paras. 719-724 followed by whichever of the following if the more limiting: the tests specified in para. 727(b) and, either para. 727(c) for packages having a mass not greater than 500 kg and an overall density not greater than 1000 kg/m^{33} based on the external dimensions, or para. 727(a) for all other packages; followed by the test specified in para. 728 and completed by the tests specified in paras. 731-733; or the test specified in para. 729; and	Similar to TS-R-1.

682 (c)	71.59 (a) (2)	Where any part of the fissile material escapes from the containment system following the tests specified in para. 682(b), it shall be assumed that fissile material escapes from each package in the array and all of the fissile material shall be arranged in the configuration and moderation that results in the maximum neutron multiplication with close reflection by at least 20 cm of water.	71.59(a)(2) is similar in that damaged packages must be assessed with optimum interspersed hydrogenous moderation.
701	71.41 (a)	**SECTION VII - TEST PROCEDURES** DEMONSTRATION OF COMPLIANCE (701-702) Demonstration of compliance with the performance standards required in Section VI shall be accomplished by any of the methods listed below of a combination thereof.	71.41(a) and 49 CFR 173.461 both address this topic.
701 (a)	71.41 (a)	Performance of tests with specimens representing LSA-III material, or special form radioactive material, or low dispersible radioactive material, or with prototypes or samples of the packagings, where the contents of the specimen or the packaging for the tests shall stimulate as closely as practicable the expected range of radioactive contents and the specimen or packaging to be tested shall be prepared as presented for transport	71.41(a) is a similar requirement to TS-R-1, but more limited in scope (does not cover LSA III or low dispersible material). 49 CFR 173.461(a)(1) is a similar requirements to TS-R-1.
7 0 1 (b)	71.41 (a)	Reference to previous satisfactory demonstrations of a sufficiently similar nature.	71.41(a) allows "another method of demonstration acceptable to the Commission", which is a similar requirement to TS-R-1. 49 CFR 173.461(a)(2) is essentially the same as TS-R-1.
701 (c)	71.41 (a)	Performance of tests with models of appropriate scale incorporate those features which are significant with respect to the item under investigation when engineering experience has shown results of such tests to be suitable for design purposes. When a scale model is used, the need for adjusting certain test parameters, such as penetrator diameter or compressive load, shall be taken into account.	71.41(a) is a similar requirement to TS-R-1 and 49 CFR 173.461(a)(3) is essentially the same as TS-R-1.
7 0 1 (d)	71.41 (a)	Calculation, or reasoned argument, when the calculation procedures and parameters are generally agreed to be reliable or conservative.	71.41(a) is similar to TS-R-1 (since calculations are routinely used to demonstrate compliance) and 49 CFR 173.461(a)(4) is essentially the same as TS-R-1.
702	71.41 (a)	Appropriate methods of assessment shall be used to ensure that the requirements of this sections have been fulfilled in compliance with the performance and acceptance standards prescribed in Section VI.	71.41(a) and 49 CFR 173.461(a) are consistent with TS-R-1 in that an assessment must be performed to demonstrate compliance.
703	71.77	TEST FOR LSA-III MATERIAL (703)	71.77 and 49 CFR 173.468 are essentially the same as TS-R-1.

		A solid material sample representing the entire contents of the package shall be immersed for 7 days in water at ambient temperature. The volume of water to be used in the test shall be sufficient to ensure that at the end of the 7 day test period the free volume of he unabsorbed and unreacted water remaining shall be at least 10% of the volume of the solid test sample itself. The water shall have an initial pH of 6-8 and a maximum conductivity of 1 mS/m at 20^{oo}C. The total activity of the free volume of water shall be measured following the 7 day immersion of the test sample.	
704	71.75 (a)	TESTS FOR SPECIAL FORM RADIOACTIVE MATERIAL (704-711) **General** (704) Specimens that comprise or simulate special form radioactive material shall be subjected to the impact test, the percussion test, the bending test, and the heat test specified in paras. 705-709. A different specimen may be used for each of the tests. Following each test, a leaching assessment or volumetric leakage test shall be performed on the specimen by a method no less sensitive than the methods given in para. 710 for indispersible solid material or para. 711 for encapsulated material.	71.75(a) and 49 CFR 173.469 contain similar requirements to TS-R-1.
705	71.75 (b) (1)	**Test methods** (705-709) Impact test: The specimen shall drop onto the target from a height of 9 m. The target shall be as defined in para. 717.	71.75 (b) (1) is a similar requirement to TS-R-1 but also require that the specimen strike the target "in the orientation expected to result in maximum damage." 49 CFR 173.469 (b) (1) is essentially the same as TS-R-1.
706	71.75 (b) (2)	Percussion test: The specimen shall be placed on a sheet of lead which is supported by a smooth solid surface and struck by the flat face of a mild steel bar so as to cause an impact equivalent to that resulting from a free drop of 1.4 kg through 1 m. The lower part of the bar shall be 25 mm in diameter with the edges rounded off to a radium of (3.0 ±± 0.3) mm. The lead, of hardness number 3.5 to 4.5 on the Vickers scale and not more than 25 mm thick, shall cover an area greater than that covered by the specimen. A fresh surface of lead shall be used for each impact. The bar shall strike the specimen so as to cause maximum damage.	71.75 (b) (2) and 49 CFR 173.469 (b) (2) contain similar requirements to TS-R-1. The only difference is that the lead target in TS-R-1 must be "not more than 25 mm thick" and in Part 71 and Title 49 the lead target must be "25 mm or greater".
707	71.75 (b) (3)	Bending test: The test shall apply only to long, slender sources with both a minimum length of 10 cm and a length to minimum width ratio of not less than 10. The specimen shall be rigidly	71.75 (b) (3) and 49 CFR 173.469(b) (3) are essentially the same as TS-R-1.

		clamped in a horizontal position so that one half of its length protrudes from the face of the clamp. The orientation of the specimen shall be such that the specimen will suffer maximum damage when its free end is struck by the flat face of a steel bar. The bar shall strike the specimen so as to cause an impact equivalent to that resulting from a free vertical drop of 1.4 kg through 1 m. The lower part of the bar shall be 25 mm in diameter with the edges rounded off to a radius of (3.0 ±± 0.3)mm.	
708	71.75 (b) (4)	Heat test: The specimen shall be heated in air to a temperature of 800ººC and held at that temperature for a period 10 minutes and shall then be allowed to cool.	71.75 and 49 CFR 173.469 (b) (4) are essentially the same as TS-R-1.
709	71.75 (d)	Specimens that comprise or simulate radioactive material enclosed in a sealed capsule may be excepted from:	71.75 (d) and 49 CFR 173.469 (d) contain similar requirements to TS-R-1.
709 (a)	71.75 (d) (1)	The test prescribed in paras. 705 and 706 provided the mass of the special form radioactive material is less than 200 g and they are alternatively subjected to the Class 4 impact test prescribed in the International Organization for Standardization document ISO 2919: "Sealed Radioactive Sources - Classification" [11], and	71.75 (d) (1) and 49 CFR 173.469 (d) (1) contain similar requirements to TS-R-1, but do not contain the limitation that the mass of the special form must be less than 200 g.
7 0 9 (b)	71.75 (d) (2)	The test prescribed in para. 708 provided they are alternatively subjected to the Class 6 temperatures test specified in ISO 2919: "Sealed Radioactive Sources - Classification" [11].	71.75 (d) (2) and 49 CFR 173.469 (d) (2) are essentially the same as TS-R-1.
710	71.75 (c)	**Leaching and volumetric leakage assessment methods** (710-711) For specimens which comprise or simulate indispersible solid material, a leaching assessment shall be performed as follows:	71.75(c) and 49 CFR 173.469(c) contain similar requirements to TS-R-1.
710 (a)	71.75 (c) (1) (i)	The specimen shall be immersed for 7 days in water at ambient temperature. The volume of water to be used in the test shall be sufficient to ensure that at the end of the 7 day test period the free volume of the unabsorbed and unreacted water remaining shall be at least 10% of the volume of the solid test sample itself. The water shall have an initial pH of 6-8 and a maximum conductivity of 1 mS/m at 20ººC.	71.75(c)(1)(i) and 49 CFR 173.469(c)(1)(i) contain similar requirements to TS-R-1. They do not require that the volume of free water at the end of the test be at least 10% of the volume of the test sample.
7 1 0 (b)	71.75 (c) (1) (ii)	The water with specimen shall then be heated to a temperature of (50 ±± 5)°°C and maintained at this temperature for 4 hours.	71.75(c)(1)(ii) and 49 CFR 173.469(c)(1)(ii) are essentially the same as TS-R-1.

710 (c)	71.75 (c) (1) (iii)	The activity of the water shall then be determined.	71.75(c)(1)(iii) and 49 CFR 173.469(c)(1)(iii) are essentially the same as TS-R-1.
7 1 0 (d)	71.75 (c) (1) (iv)	The specimen shall then be kept for a least 7 days in still air at not less than 30°°C and relative humidity not less than 90%.	71.75(c)(1)(iv) and 49 CFR 173.469(c)(1)(iv) are essentially the same as TS-R-1.
710 (e)	71.75 (c) (1) (v)	The specimen shall then be immersed in water of the same specification as in (a) above and the water with the specimen heated to (50 ±± 5)°°C and maintained at this temperature for 4 hours.	71.75(c)(1)(v) and 49 CFR 173.469(c)(1)(v) are essentially the same as TS-R-1.
710 (f)	71.75 (c) (1) (vi)	The activity of the water shall then be determined.	71.75(c)(1)(vi) and 49 CFR 173.469(c)(1)(vi) are essentially the same as TS-R-1, with the addition of the acceptance criteria for the activity of the water (which TS-R-1 places in a different para.)..
711	71.75 (c) (2)	For specimens which comprise of simulate radioactive material enclosed in a sealed capsule, either a leaching assessment or a volumetric leakage assessment shall be performed as follows:	71.75(c)(2) and 49 CFR 173.469(c)(2) contain similar requirements to TS-R-1.
711 (a)	71.75 (c) (2)	Identifies the steps of the leaching assessment.	71.75(c)(2) and 49 CFR 173.469(c)(2) contain similar requirements to TS-R-1. Part 71 and Title 49 do not contain the TS-R-1 requirement that the 7 day storage period be in air with relative humidity of 90% or greater.
7 1 1 (b)	71.75 (a) (4)	The alternative volumetric leakage assessment shall comprise any of these tests prescribed in the ISO 9978 [8], which are acceptable to the competent authority.	71.75(a)(4) and 49 CFR 173.469(a)(4)(i) contain similar requirements to TS-R-1. The cited ISO standards are different (the TS-R-1 citation is more recent) and the acceptance criteria are specified in different unit.
712		TESTS FOR LOW DISPERSIBLE RADIOACTIVE MATERIAL (712) A specimen that comprises or simulates low dispersible radioactive material shall be subjected to the enhanced thermal test specified in para. 736 and the impact test specified in para. 737. A different specimen may be used for each of the tests. Following each test, the specimen shall be subjected to the leach test specified in para. 703. After each test it shall be determined if the applicable requirements of para. 605 have been met.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
713		TESTS FOR PACKAGES (713-737) **Preparation of a specimen for testing** (713-715) All specimens shall be inspected before testing in order to identify and record faults or damage including the following:	No similar requirement in Part 71. 49 CFR 173.462 is essentially the same as TS-R-1.

713 (a)		divergence from the design;	No similar requirement in Part 71. 49 CFR 173.462 is essentially the same as TS-R-1.
7 1 3 (b)		defects in manufacture;	No similar requirement in Part 71. 49 CFR 173.462 refers to "defects in construction".
713 (c)		corrosion or other deterioration; and	No similar requirement in Part 71. 49 CFR 173.462 is identical to TS-R-1.
7 1 3 (d)		distortion of features.	No similar requirement in Part 71. 49 CFR 173.462 is identical to TS-R-1.
714	71.33 (a) (4)	The containment system of the package shall be clearly specified.	71.33(a)(4) and 49 CFR 173.462(c) are essentially the same as TS-R-1.
715	71.33	The external features of the specimen shall be clearly identified so that reference may be made simply and clearly to any part of such specimen.	71.33 is similar to TS-R-1 and 49 CFR 173.462(d) is essentially the same as TS-R-1.
716	71.35	**Testing the integrity of the containment system and shielding and assessing critical safety** (716) After each of the applicable tests specified in paras. 718-737:	71.35 requires that an application for package approval include demonstration that all applicable requirements are met.
716 (a)	71.35	Faults and damage shall be identified and recorded:	71.35 requires that an application for package approval include demonstration that all applicable requirements are met.
7 1 6 (b)	71.35	It shall be determined whether the integrity of the containment system and shielding has been retained to the extent required in Section VI for the package under test; and	71.35 requires that an application for package approval include demonstration that all applicable requirements are met.
716 (c)	71.35	For packages containing fissile material, it shall be determined whether the assumptions and conditions used in the assessments required by paras. 671-682 for one or more packages are valid.	71.35 requires that an application for package approval include demonstration that all applicable requirements are met.
717	71.73 (c) (1)	**Target for drop tests** (717) The target for the drop tests specified in paras. 705, 722, 725(a), 727, 735 and 737 shall be a flat, horizontal surface of such a character that any increase in its resistance to displacement or deformation upon impact by the specimen would not significantly increase the damage to the specimen.	71.73 (c) (1) is similar to TS-R-1 and 49 CFR 173.465 (c) (5) is essential the same as TS-R-1.
718		**Test for packagings designed to contain uranium hexafluoride** (718) Provides requirements for testing and approval of packagings designed to contain UF6. Specimens that comprise or simulate packagings designed to contain 0.1 kg or more	No similar requirements in Part 71. 49 CFR 173.420 requires compliance with ANSI N14.1 which specifies internal test pressures for uranium hexafluoride packages which are similar to TS-R-1.

		of UF6 shall be tested hydraulically at an internal pressure of at least 1.4 MPa but, when the test pressure is less than 2.8 MPa, the design shall require multilateral approval. For retesting packagings, any other equivalent nondestructive testing may be applied subject to multilateral approval.	
719	71.71	**Test for demonstrating ability to withstand normal condition of transport** (719-724) The tests are: the water spray test, the free drop test, the stacking test, and the penetration test. Specimens of the package shall be subjected to the free drop test, the stacking test and the penetration test, preceded in each case by the water spray test. One specimen may be used for all the tests, provided that the requirements of para. 720 are fulfilled.	71.71 contains similar requirements to TS-R-1 and 49 CFR 173.465 is essentially the same as TS-R-1.
720	71.71 (c) (7)	The time interval between the conclusion of the water spray test and the succeeding test shall be such that the water has soaked in to the maximum extent, without appreciable drying of the exterior of the specimen. In the absence of any evidence to the contrary, this interval shall be taken to be two hours if the water spray is applied from four direction simultaneously. No time interval shall elapse if the water spray is applied from each of the four directions consecutively.	71.71 (c) (7) requires a period of time between 1.5 and 2.5 hours between the water spray and drop tests. 49 CFR 173.465 (b) is essentially the same as TS-R-1.
721	71.71 (c) (6)	Water spray test: The specimen shall be subjected to a water spray test that simulates exposure to rainfall of approximately 5 cm per hour for at least one hour.	71.71 (c) (6) and 49 CFR 173.465 (b) are essentially the same as TS-R-1.
722	71.71 (c) (7)	Free drop test: The specimen shall drop onto the target so as to suffer maximum damage in respect of the safety features to be used.	71.71 (c) (7) and 49 CFR 173.465 (c) are essentially the same as TS-R-1.
722 (a)	71.71 (c) (7)	The height of drop measured from the lowest point of the specimen to the upper surface of the target shall be not less than the distance specified in Table XIII - Free Drop Distance for Testing Packages to Normal Conditions of Transport.	71.71 (c) (7) and 49 CFR 173.465 (c) are essentially the same as TS-R-1, except that for packages with a mass of exactly 15,000 kg, Part 71 and Title 49 require a drop of 0.6 m and TS-R-1 requires a drop of 0.3 m.
7 2 2 (b)	71.71 (c) (8)	For rectangular fiberboard or wood packages not exceeding a mass of 50 kg, a separate specimen shall be subjected to a free drop onto each corner from a height of 0.3.	71.71 (c) (8) and 49 CFR 173.465 (c) (3) are essentially the same as TS-R-1.
722 (c)	71.71 (c) (8)	For cylindrical fiberboard packages not exceeding a mass of 100 kg, a separate specimen shall be subjected to a free drop onto each of the quarters of each rim from a height of 0.3.	71.71 (c) (8) extends the test requirement to wooden cylindrical packages and fissile materials packages. 49 CFR 173.465 (c) (3) is essentially the same as TS-R-1, but 49 CFR 173.465 (c) (2) imposes additional drop tests for fissile materials packages.

723	71.71 (c) (9)	Stacking test: Unless the shape of the packaging effectively prevents stacking, the specimen shall be subjected, for a period 24 h, to a compressive load equal to the greater of the following:	71.71 (c) (9) is similar to TS-R-1 but limits the test to packages weighing 5,000 kg or less. 49 CFR 173.465 (d) is similar to TS-R-1. Neither Part 71 nor Title 49 contains the TS-R-1 provision excepting packages whose shape effectively prevents stacking.
723 (a)	71.71 (c) (9)	the equivalent of 5 times the mass of the actual package;	71.71 (c) (9) and 49 CFR 173.465 (d) (1) (i) are essentially the same as TS-R-1.
7 2 3 (b)	71.71 (c) (9)	the equivalent of 13 kPa multiplied by the vertically projected areas of the package. The load shall be applied uniformly to two opposite sides of the specimen, on of which shall be the base on which the package would typically test.	71.71 (c) (9) and 49 CFR 173.465 (d) (1) (ii) and (d) (2) are essentially the same as TS-R-1.
724		Penetration test: The specimen shall be placed on a rigid, flat, horizontal surface which will not move significantly while the test is being carried out.	No similar requirement in Part 71. 49 CFR 173.465 (e) is essentially the same as TS-R-1.
724 (a)	71.71 (c) (10)	A bar of 3.2 cm in diameter with a hemispherical end and a mass of 6 kg shall be dropped and directed to fall, with its longitudinal axis vertical, onto the center of the weakest part of the specimen, so that, if it penetrates sufficiently far, it will hit the containment system. The bar shall not be significantly deformed by the test performance.	71.71 (c) (10) is similar to TS-R-1, but does not contain the requirements relating to striking the containment system nor concerning bar deformation. 49 CFR 173.465 (e) (1) is essentially the same as TS-R-1.
7 2 4 (b)	71.71 (c) (10)	The height of drop of the bar measured from its lower end to the intended point of impact on the upper surface of the specimen shall be 1 m.	71.71 (c) (10) and.49 CFR 173.465 (e) (2) are essentially the same as TS-R-1.
725		**Additional tests for type A packages designed for liquids and gases** (725) A specimen or separate specimens shall be subjected to each of the following tests unless it can be demonstrated that one test is more severe for the specimen in question than the other, in which case one specimen shall be subjected to the more severe test.	Part 71 does not address liquids in Type A packages. 49 CFR 173.466 is similar, but it requires that both tests be taken into account.
725 (a)	71.5 (a)	Free drop test: The specimen shall drop onto the target so as to suffer the maximum damage in respect of containment. The height of the drop measured from the lowest part of the specimen to the upper surface of the target shall be 9 m. The target shall be as defined in para. 717.	Part 71 does not address liquids in Type A packages. 49 CFR 173.466 is essentially the same as TS-R-1.
7 2 5 (b)	71.5 (a)	Penetration test: The specimen shall be subjected to the test specified in para. 724 except that the height of drop shall be increased to 1.7 m from the 1 m specified in para. 724(b).	Part 71 does not address liquids in Type A packages. 49 CFR 173.466 is essentially the same as TS-R-1.
726	71.73 (a)	**Tests for demonstrating ability to withstand accident conditions of transport** (726-729)	71.73 (a) is similar to TS-R-1, however, the deep water immersion test in (para. 730) is limited in

		The specimen shall be subject to the cumulative effects of the tests specified in para. 727 and para. 728, in that order. Following these tests, either this specimen or a separate specimen shall be subjected to the effect(s) of the water immersion test(s) as specified in para. 729 and, if applicable, para 730.	Part 71 to just irradiated nuclear fuel packages (see TS-R-1 para. 657 above).
727	71.73 (c) (1), (2) and (3)	Mechanical Test: The mechanical test consists of three difference drop tests. Each specimen shall be subjected to the applicable drops as specified in para. 656 or para. 682. The order in which the specimen is subjected to the drops shall be such that, on the completion of the mechanical test, the specimen shall have suffered such damage as will lead to the maximum damage in the thermal test which follows.	71.73 (c) (1), (2) and (3) are similar to TS-R-1. Part 71 requires that the free drop test be performed before the crush and puncture test, rather than in the most damaging order.
727 (a)	71.73 (c) (1)	For drop I, the specimen shall drop onto the target so as to suffer the maximum damage, and the height of the drop measured from the lowest point of the specimen to the upper surface of the target shall be 9 m. The target shall be as defined in para. 717.	Essentially the same as TS-R-1.
7 2 7 (b)	71.73 (c) (3)	For drop II, the specimen shall drop so as to suffer the maximum damage onto a bar rigidly mounted perpendicularly on the target. The height of the drop measured from the intended point of impact of the specimen to the upper surface of the shall be 1 m. The bar shall be of solid mild steel of circular section, (15.0 ±± 0.5) cm in diameter and 20 cm long unless a longer bar would cause greater damage. The upper end of the bar shall be flat and horizontal with its edges rounded off to a radius of not more than 6 mm. The target on which the bar is mounted shall be as described in para. 717.	Essentially the same as TS-R-1.
727 (c)	71.73 (c) (2)	For drop III, the specimen shall be subjected to a dynamic crush test by positioning, the specimen on the target so as to suffer maximum damage by the drop of a 500 kg mass from 9 m onto the specimen. The mass shall consist of a solid mild steel plate 1 m and shall fall in a horizontal attitude. The height of the drop shall be measured from the underside of the plate to the highest point of the specimen. The target on which the specimen rests shall be as defined in para. 717.	Essentially the same test as TS-R-1, however, in Part 71 it is applied in addition to drop I (free drop).
728	71.73 (c) (4)	Thermal test: The specimen shall be in thermal equilibrium under conditions of an ambient temperature of 38^{oo}C, subject to the solar insolation conditions specified in Table IX and subject to the design maximum rate of internal heat generation within the package from the	71.73 (c) (4) contains similar requirements to TS-R-1.

		radioactive contents. Alternatively, any of these parameters are allowed to have different values prior to and during the test, providing due account is taken of them in the subsequent assessment of package response. The thermal test shall consist of (a), (b) below. During and following the test the specimen shall not be artificially cooled and any combustion of materials of the specimen shall be permitted to proceed naturally.	
728 (a)	71.73 (c) (4)	Exposure of a specimen for a period 30 minutes to a thermal environment which provides a heat flux at least equivalent to that of a hydrocarbon fuel/air fire in sufficiently quiescent ambient conditions to give a minimum average flame emissivity coefficient of 0.9 and an average temperature of at least 800°°C, fully engulfing the specimen, with a surface absorptivity coefficient of 0.8 or that value which the package may be demonstrated to possess if exposed to the fire specified, followed by:	71.73(c)(4) contains similar requirements to TS-R-1.
7 2 8 (b)	71.73 (c) (4)	Exposure of the specimen to an ambient temperature of 38°°C, subject to the solar insolation conditions specified in Table XI and subject to the design maximum rate of internal heat generation within the package by the radioactive contents for a sufficient period to ensure that temperatures in the specimen are everywhere decreasing and/or are approaching initial steady state conditions.	71.73(c)(4) contains similar requirements to TS-R-1.
729	71.73 (c) (6)	Water immersion test: The specimen shall be immersed under a head of water of a least 15 m for a period of not less than eight hours in the attitude which will lead to maximum damage. For demonstration purposes, an external gauge pressure of at least 150 kPa shall be considered to meet these conditions.	71.73(c)(6) contains similar requirements to TS-R-1, but does not include the 8 hour test duration.
730	71.61	**Enhanced water immersion test for Type B(U) and Type B(M) packages containing more than 10(sup)5 A(sub)2 and Type C packages** (730) Enhanced water immersion test: The specimen shall be immersed under a head of water of at least 200 m for a period of not less than one hour. For demonstration purposes, an external gauge pressure of at least 2 Map shall be considered to meet these conditions.	71.61 contains similar requirements to TS-R-1, but TS-R-1 applies the test to all packages, not just irradiated nuclear fuel packages, above a certain activity threshold.
731	71.73 (c) (5)	**Water leakage test for packages containing fissile material** (731-733) Packages for which water in-leakage or out-leakage to the extent which results in greatest	71.73(c)(5) contains similar requirements to TS-R-1, but does not impose the test where water out-leakage has not been assumed.

		reactivity has been assumed for purposes of assessment under paras. 677-682 shall be excepted from the test.	
732	71.73	Before the specimen is subjected to the water leakage test specified below, it shall be subjected to the tests in para. 727(b), and either para. 727(a) or (c) as required by para. 682, and the test specified in para. 728.	71.73 contains similar requirements to TS-R-1 regarding the order of tests.
733	71.73 (c) (5)	The specimen shall be immersed under a head of water of a least 0.9 m for a period of not less than eight hours and in the attitude for which maximum leakage is expected.	71.73(c)(5) contains similar requirements to TS-R-1, but does not include the 8 hour test duration.
734		**Test for Type C packages** (734-737) Specimens shall be subjected to the effects of each of the following test (a and b below) sequences in the orders specified: Separate specimens are allowed to be used for each of the sequences (a) and (b).	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
734 (a)		the test specified in para 727(a), 727(c), 735 and 736; and	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
7 3 4 (b)		the test specified in para. 737. Separate specimens are allowed to be used for each of the sequences (a) and (b).	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
735		Puncture/tearing test: The specimen shall be subjected to the damaging effects of a solid probe made of mild steel. The orientation of the probe to the surface of the specimen shall be such as to cause maximum damage at the conclusion of the test sequence specified in para. 734(a).	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
735 (a)		The specimen, representing a package having a mass less than 250 kg, shall be placed on a target and subjected to a probe having a mass of 250 kg falling from a height of 3 m above the intended impact point. For this test the probe shall be a 20 cm diameter cylindrical bar with the striking end forming a frustum of a right circular cone with the following dimensions: 30 cm height and 2.5 cm diameter at the top. The target on which the specimen is placed shall be as specified in para. 717.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
7 3 5 (b)		For packages having a mass of 250 kg or more, the base of the probe shall be placed on a target and the specimen dropped onto the probe. The height of the drop, measured from the point of impact with the specimen to the upper surface of the probe shall be 3 m. For this test the probe shall have the same properties and dimensions as specified in (a) above, except	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.

		that the length and mass of the probe shall be such as to incur maximum damage to the specimen. The target on which the base of the probe is placed shall be as specified in para. 717.	
736		Enhanced thermal test: The conditions for this test shall be as specified in para 728, except that the exposure to the thermal environment shall be for a period of 60 minutes.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
737		Impact test: The specimen shall be subject to an impact on a target at a velocity of not less than 90 m/s, at such an orientation as to suffer maximum damage. The target shall be as defined in para. 717.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
801		**Section VIII - APPROVAL AND ADMINISTRATIVE REQUIREMENTS** GENERAL (801-802) For packages designs where it is not required that a competent authority issue an approval certificate the consignor shall, on request, make available for inspection by the relevant competent authority, documentary evidence of the compliance of the package design with all the applicable requirements.	No similar requirement in Part 71 as this is within DOT's area of responsibility. 49 CFR 173.411(c) requires this for IP-2 and IP-3 packages and 173.415(a) requires this for Type A packages.
802		Competent authority approval shall be required for:	Both Part 71 and Title 49 have similar requirements.
802 (a)	71.12	designs for: (i)special form radioactive material; (ii) low dispersible radioactive material; (iii) packages containing 0.1 kg or more of UF6; (iv) all packages containing fissile material unless excepted by para. 672; (v) Type B(U) packages and Type B(M) packages; (vi) Type C packages	71.12 provides a general license which is dependent on the licensee using a package for which a license or certificate of compliance or other approval has been issued. This applies to all fissile material and Type B and packages (consistent with TS-R-1 802(a)(iv) and (a)(v)). Title 49 has requirements that are similar to (i), (iv) and (v). There are no similar requirements for (ii), (iii) and (vi).
8 0 2 (b)	71.8	special arrangements	71.8 (specific exemptions) has similar requirements to TS-R-1 802 (b). 49 CFR Part 107, Subpart B has similar requirements for exemptions.
802 (c)		certain shipments	No similar requirement, however, this topic is within DOT's area of responsibility.
8 0 2 (d)		radiation protection program for special use vessels; and	No similar requirement, however, this topic is within DOT's area of responsibility.
802 (e)		calculation of radionuclide values that are not listed in Table I.	Part 71,Appendix A, II and 49 CFR 173.433(b) are essentially the same as TS-R-1.
803		APPROVAL OF SPECIAL FORM	No similar requirement in Part 71. 49 CFR

		RADIOACTIVE MATERIAL AND LOW DISPERSIBLE RADIOACIVE MATERIAL (803-804) The design for special form radioactive material shall require unilateral approval. The design for low dispersible radioactive material shall require multilateral approval. In both cases, an application shall include:	173.476 contains a similar requirement for special form material. No similar requirement exists for low dispersible material.
803 (a)		a detailed description of the radioactive material, or, if a capsule, the contents; particular reference shall be made to both physical and chemical states;	No similar requirement in Part 71. 49 CFR 173.476 contains a similar requirement for special form material. No similar requirement exists for low dispersible material.
8 0 3 (b)		a detailed statement of the design of any capsule to be used;	No similar requirement in Part 71. 49 CFR 173.476 contains a similar requirement for special form material. No similar requirement exists for low dispersible material.
803 (c)		a statement of the tests which have been done and their results, or evidence based on calculative methods to show that the radioactive material is capable of meeting the performance standards, or other evidence that the special form radioactive material or low dispersible radioactive material meets the applicable requirements of these Regulations.	No similar requirement in Part 71. 49 CFR 173.476 contains a similar requirement for special form material. No similar requirement exists for low dispersible material.
8 0 3 (d)		a specification of the applicable quality assurance program as required in para. 310; and	No similar requirement in Part 71. 49 CFR 173.476 contains a similar requirement for special form material. No similar requirement exists for low dispersible material.
803 (e)		any proposed pre-shipment actions for use in the consignment of special form radioactive material or low dispersible radioactive material	No similar requirement.
804		The competent authority shall establish an approval certificate stating that the approved design meets the requirements for special form radioactive material or low dispersible radioactive material and shall attribute to that design an identification mark.	No similar requirement in Part 71. 49 CFR 173.476 contains a similar requirement for special form material. No similar requirement exists for low dispersible material.
805		APPROVAL OF PACKAGE DESIGNS (805-814) **Approval of package designs to contain uranium hexafluoride** (805) Provides requirements for the approval of packages containing 0.1 kg or more of UF6.	Part 71 does not contain package approval requirements for uranium hexafluoride packages. 49 CFR 173.420 contains packaging and transport requirements, but does not contain requirements for package design approval.
805 (a)		After 31 December 2000, each design that meets the requirements of para. 632 shall require multilateral approval. After 31 December 2003, each design that meets the requirements of paras. 623-631 shall require	Part 71 does not contain package approval requirements for uranium hexafluoride packages. 49 CFR 173.420 contains packaging and transport requirements, but does not contain requirements for package design approval.

		unilateral approval by the competent authority of the country of origin of the design;	
8 0 5 (b)		The application for approval shall include all information necessary to satisfy the competent authority that the design meets the requirements of para. 629, and a specification of the applicable quality assurance program as required in para. 310;	Part 71 does not contain package approval requirements for uranium hexafluoride packages. 49 CFR 173.420 contains packaging and transport requirements, but does not contain requirements for package design approval.
805 (c)		The competent authority shall establish an approval certificate stating that the approved design meets the requirements of para. 629 and shall attribute to that design an identification mark.	Part 71 does not contain package approval requirements for uranium hexafluoride packages. 49 CFR 173.420 contains packaging and transport requirements, but does not contain requirements for package design approval.
806	71.12	**Approval of Type B(U) and Type C package designs** (806-808) Each Type B(U) and Type C package design requires unilateral approval, except that:	71.12 is similar to TS-R-1 for Type B(U) packages. 49 CFR 173.471 and 173.472 are similar for Type B packages. No similar requirement for Type C packages.
806 (a)	71.12	a package design for fissile material, which is also subject to paras 812-814, shall require multilateral approval; and	71.12 is similar to TS-R-1 for fissile packages. 49 CFR 173.471 and 173.472 are similar for fissile packages. However, both Part 71 and Title 49 only require approval by NRC and DOT, they do not impose multilateral approval (approval by other countries) requirements.
8 0 6 (b)		a Type B(U) package design for low dispersible radioactive material shall require multilateral approval.	No similar requirement; this is a new requirement in TS-R-1 and is being considered in the Part 71 rulemaking.
807	7 1 . 3 1 , 71.33	Provides the requirements for the information which must be contained in an application for approval for Type B(U) and Type C packages.	71.31and 71.33, and 49 CFR 173.471, 173.472 and 173.473 contain similar requirements for Type B packages. No similar requirements exist for Type C packages.
807 (a)	7 1 . 3 1 , 71.33	a detailed description of the proposed radioactive contents with reference to their physical and chemical states and the nature of the radiation emitted;	71.31and 71.33, and 49 CFR 173.471, 173.472 and 173.473 contain similar requirements for Type B packages. No similar requirements exit for Type C packages.
8 0 7 (b)	7 1 . 3 1 , 71.33	a detailed statement of the design, including complete engineering drawings and schedules of materials and methods of manufacture;	71.31and 71.33, and 49 CFR 173.471, 173.472 and 173.473 contain similar requirements for Type B packages. No similar requirements exist for Type C packages.
807 (c)	7 1 . 3 1 , 71.33	a statement of the tests which have been done and their results, or evidence based on calculative methods or other evidence that the design is adequate to meet the applicable requirements;	71.31and 71.33, and 49 CFR 173.471, 173.472 and 173.473 contain similar requirements for Type B packages. No similar requirements exist for Type C packages.
8 0 7 (d)		the proposed operating and maintenance instructions for the use of the packaging;	No similar requirement.

807 (e)	71.33	if the package is designed to have a maximum normal operating pressure in excess of 100 kPa gauge, a specification of the materials of manufacture of the containment system, the samples to be taken, and the tests to be made;	71.33 requires detailed descriptions of the materials of construction for all packages.
807 (f)	71.35 (c)	where the proposed radioactive contents are irradiated fuel, the applicant shall state and justify any assumption in the safety analysis relating to the characteristics of the fuel and describe any preshipment measurement required by para. 674(b);	71.35(c) contains a similar requirement.
8 0 7 (g)	71.33	any special stowage provisions necessary to ensure the safe dissipation of heat from the package considering the various modes of transport to be used and type of conveyance or freight container;	71.33 contains a similar requirement.
8 0 7 (h)	71.33	a reproducible illustration, not larger than 21 cm by 30 cm, showing the make-up of the package; and`	71.33 requires a description of the package. 49 CFR 173.471and 173.472 contain similar requirements for Type B packages. No similar requirements for Type C packages.
807 (i)	71.37 (a) 71.37 (b)	a specification of the applicable quality assurance program as required in para. 310.	71.37 contains a similar requirement.
808		The competent authority shall establish an approval certificate stating that the design meets requirements for Type B(U) or Type C packages and shall attribute an identification mark to the design.	No similar requirement in Part 71, although this is done in practice. 49 CFR 173.471and 173.472 contain similar requirements for Type B packages. No similar requirements for Type C packages.
809	71.12	**Approval of Type B(M) package design** (809-811) Each Type B(M) package, including those for fissile material and low dispersible radioactive material, shall require multilateral approval.	71.12 requires approval of Type B packages, including Type B(M). 49 CFR 173.471 is similar. 71.16 and 49 CFR 173.473 also require that foreign approved packages receive US approval. There are no requirements related to obtaining multilateral approval for US origin design Type B(M) packages.
810	71.31 71.33	An application for approval of a Type B(M) package design shall include, in addition to the information required in para. 807 for Type B(U) packages:	All package approval applications must meet 71.31 and 71.33.
810 (a)		a list of the requirements specified in paras. 637, 653, 654, and 657-664 with which the package does not conform;	No similar requirement. Non-conforming designs are only allowed under exemption (71.8).
8 1 0 (b)		any proposed supplementary operational controls to be applied during transport not regularly provided for in these Regulations, but which are necessary to ensure the safety of the package or to compensate for the deficiencies listed in (a) above;	No similar requirement. Non-conforming designs are only allowed under exemption (71.8).
810 (c)		a statement relative to any restrictions on the mode of transport and to any special loading, carriage, unloading or handling procedures; and	No similar requirement. Non-conforming designs are only allowed under exemption (71.8).

8 1 0 (d)		the range of ambient conditions (temperature, solar radiation) which are expected to be encountered during transport and which have been taken into account in the design.	No similar requirement. Non-conforming designs are only allowed under exemption (71.8).
811		The competent authority shall establish an approval certificate stating that the approved design meets the applicable requirements for Type B(M) packages and shall attribute to that design an identification mark.	No similar requirement in Part 71, although this is done in practice. 49 CFR 173.471and 173.472 contain similar requirements for Type B packages.
812	71.12	**Approval of package designs to contain fissile material** (812-814) Each package design for fissile material which is not excepted according to para. 672 from the requirements that apply specifically to packages containing fissile material shall require multilateral approval.	71.12 requires approval of fissile material package designs. 49 CFR 173.471 is similar. 71.16 and 49 CFR 173.473 also require that foreign approved packages receive US approval. There are no requirements related to obtaining multilateral approval for US origin design fissile material packages.
813	7 1 . 3 3 , 71.35, 71.37	An application for approval shall include all information necessary to satisfy the competent authority that the design meets the requirements of para. 671, and a specification of the applicable quality assurance program as required in para. 310.	71.33, 71.35 and 71.37 contain similar requirements. 49 CFR 173.471 contains similar requirements.
814		The competent authority shall establish an approval certificate stating that the approved design meets the requirements of para. 671 and shall attribute to that design an identification mark.	No similar requirement in Part 71, although this is done in practice. 49 CFR 173.471and 173.472 contain similar requirements for Type B packages.
815		TRANSITIONAL ARRANGEMENTS (815-818) **Packages not requiring competent authority approval of design under the 1985 and 1985 (As Amended 1990) Editions of These Regulation** Excepted packages, Industrial packages Type IP-1, Type IP-2, and Type IP-3 and Type A packages that did not require approval of design by the competent authority and which meet the requirements of the 1985 or 1985 (As Amended 1990) Editions of these Regulations may continue to be used subject to the mandatory program of QA and the activity limits of TS-R-1. Any packaging modified, unless to improve safety, or manufactured after 31 December 2003, shall meet this Edition of the Regulations in full. Packages prepared for transport not later than 31 December 2003 under the 1985 or 1985 (As Amended 1990) Editions of these Regulations may continue in transport. Packages prepared for transport after this date shall meet this Edition of the Regulations in	No similar provision, however, this topic is within DOT's area of responsibility. 49 CFR 173.415(a) contains a similar requirement for packages complying with earlier versions of Title 49.

		full.	
816	71.13 (b)	**Packages approved under the 1973, 1973 (As Amended), 1985 and 1985 (As Amended 199) Editions of these Regulations (816-817)** Packagings manufactured to a design approved under the provision of the 1973 or 1973 (As Amended) Editions of the IAEA regulations may continue to be used, subject to: multilateral approval of package design; a mandatory program of quality assurance; the activity limits and material restrictions of TS-R-1; and, for a package containing fissile material and transported by air, the requirements of para. 680. No new manufacture of such packagings is allowed to begin. Changes in the package design or nature or quantity of the contents which, as determined by the competent authority, would significantly affect safety shall require that this Edition of the Regulations by met in full. A serial number shall be assigned and marked on the outside of each packaging.	71.13(b) contains a similar provisions. 71.13(b) is applicable to packages approved under the 1973 (As Amended) regulations. 71.13(a) contains provisions for packages approved under the 1967 regulations and TS-R-1 does not contain this provision.
817		Packagings manufactured to a package design approved by the competent authority under the provisions of the 1985 or 1985 (As Amended 1990) Editions of these Regulations may continue to be used until 31 December 2003, subject to: the mandatory program of quality assurance; the activity limits and material restrictions of Section IV,; and, for a package containing fissile material and transported by air, the requirement of para. 680. After this date use may continue subject, additionally, to multilateral approval of package design, Changes in the design of the packaging or in the nature or quantity of the authorized radioactive contents which, as determined by the competent authority, would significantly affect safety shall require that this Edition of the Regulations be met in full. All packagings for which manufacture begins after 30 December 2006 shall meet this Edition of the Regulations in full.	No similar provision; this is a new provision in TS-R-1 and is being considered in the Part 71 rulemaking.
818		**Special form radioactive material approved under the 1973, 1973 (As Amended), 1985 and 1985 (As Amended 1990) Editions of these Regulations** (818) Special form radioactive material approved under the 1973, 1973 (As Amended), 1985 and 1985 (As Amended 1990) Editions of these Regulations may continue to used when in compliance with the mandatory program of QA	No similar provision.

		in accordance with the applicable requirements of para. 310. All special form radioactive material manufactured after 31 December 2003 shall meet this Edition of the Regulations in full.	
819		NOTIFICATION AND REGISTRATION OF SERIAL NUMBERS (819) The competent authority should maintain a register of serial numbers.	No similar requirement.
820		APPROVAL OF SHIPMENTS (820-823) Multilateral approval shall be required:	No similar requirement.
820 (a)		the shipment of Type B(M) packages not conforming with the requirements of para. 637 or designed to allow controlled intermittent venting;	No similar requirement.
8 2 0 (b)		the shipment of Type B(M) packages containing radioactive material with an activity greater than 3000 A (sub)1 or 3000 A (sub) 2, as appropriate, or 1000 TBq, whichever is the lower;	No similar requirement.
820 (c)		the shipment of packages containing fissile materials if the sum of the criticality safety indexes of the packages exceeds 50; and	No similar requirement.
8 2 0 (d)		radiation protection programs for shipments by special use vessels according to para. 575 (a).	No similar requirement.
821		A competent authority may authorize transport into or through its country without shipment approval, by a specific provision in its design approval (see para. 827).	No similar requirement.
822		An application for shipment approval shall include:	No similar requirement.
822 (a)		the period of time, related to the shipment, for which the approval is sought;	No similar requirement.
8 2 2 (b)		the actual radioactive contents, the expected modes of transport, the type of conveyance, and the probable or proposed route; and	No similar requirement.
822 (c)		the details of how the precautions and administrative or operational controls, referred to in the package design approval certificates issued under paras. 808, 811, and 814, are to be put into effect.	No similar requirement.
823		Upon approval of the shipment, the competent authority shall issue an approval certificate.	No similar requirement.

824		APPROVAL OF SHIPMENTS UNDER SPECIAL ARRANGEMENT (824-865) Each consignment transported internationally under special arrangement shall require multilateral approval.	If the special arrangement uses a foreign-made package, 49 CFR 173.473 requires Competent Authority approval.
825		An application for approval of shipments under special arrangement shall include all the information necessary to satisfy the competent authority that the overall level of safety in transport is at least equivalent to that which would be provided if all the applicable requirements of these Regulations had been met. The application shall also include:	No similar requirement. 71.8 provides for specific exemptions which are similar to special arrangements, but 71.8 does not include an "equivalent safety" provision. 49 CFR 107 Subpart B is similar to TS-R-1.
825 (a)		A statement of the respects in which, and of the reasons why, the consignment cannot be made in full accordance with the applicable requirements; and	No similar requirement in Part 71. 49 CFR 107 Subpart B is similar to TS-R-1.
8 2 5 (b)		A statement of any special precautions or special administrative or operational controls which are to be employed during transport to compensate for the failure to meet the applicable requirements.	No similar requirement in Part 71. 49 CFR 107 Subpart B is similar to TS-R-1.
826		Upon approval of shipments under special arrangement, the competent authority shall issue an approval certificate.	No similar requirement in Part 71. 49 CFR 107 Subpart B is similar to TS-R-1.
827		COMPETENT AUTHORITY APPROVAL CERTIFICATES (827-829) Five types of approval certificates may be issued: special form radioactive material, low dispersible radioactive material, special arrangement, shipment, and package design. The package design and shipment approval certificates may be combined into a single certificate.	No similar statement.
828		**Competent authority identification marks** (828-829) Each approval certificate issued by a competent authority shall be assigned an identification mark. The mark shall be of the following generalized type: VRI/Number/Type Code Each approval certificate issued by a competent authority shall be assigned an identification mark. The mark shall be of the following generalized type:	No similar requirement, although this is done in practice.

828 (a)		Except as provided in para. 829(b), VRI represents the international vehicle registration identification code of the country issuing the certificate	No similar requirement, although this is done in practice.
8 2 8 (b)		The number shall be assigned by the competent authority, and shall be unique and specific with regard to the particular design or shipment. The shipment approval identification marks shall be clearly related to the design approval identification mark.	No similar requirement, although this is done in practice.
828 (c)		The following type codes shall be used in the order listed: AF Type A package design for fissile material B(U) Type B(U) package design [B(U)F if for fissile material] B(M) Type B(M) package design [B(M)F if for fissile material] C Type C package design [CF if for fissile material] IF Industrial package design for fissile material S Special form radioactive material LD Low dispersible radioactive material T Shipment X Special arrangement. For non-fissile or fissile excepted UF6, where none of the above codes apply: H(U) Unilateral approval H(M) Multilateral approval	No similar requirement, although this is done in practice. Type C, IF, LD, H(U) or H(M) package designs are not reflected in Part 71 nor Title 49.
8 2 8 (d)		For package design and special form radioactive material approval certificates, other than those issued under the provisions of paras. 816-818, and for low dispersible radioactive material approval certificates, the symbols "––96" shall be added to the type code.	No similar requirement.
829		Type codes shall be applied as follows:	No similar requirement, although this is done in practice.
829 (a)		Each certificate and each package shall bear the appropriate identification mark, comprising the symbols prescribed in para. 828(a), (b), (c) and (d) above, except that, for packages, only the applicable design type codes including, if applicable, the symbols '––96', shall appear following the second stroke, that is, the 'T', or 'X' shall not appear in the identification marking on the package. Where the design approval and shipment approval are combined, the applicable type codes do not need to be repeated.	No similar requirement, although this is done in practice. However, the "-96" provision is not contained in Part 71 nor Title 49.

		Examples of these are given in TS-R-1. A/132/B(M)F-96: A Type B(M) package design approved for fissile material, requiring multilateral approval, for which the competent authority of Austria has assigned the design number 132 (to be marked on both the package and on the package design approval certificate).	
8 2 9 (b)		Where multilateral approval is effected by validation according to para. 834, only the identification mark issued by the country of origin of the design or shipment shall be used. Where multilateral approval is effected by issue of certificates by successive countries, each certificate shall bear the appropriate identification mark and the package whose design was so approved shall bear all appropriate identification marks. For example: A/132/B(M)F-96 and CH/28/B(M)F-96 would be the identification mark of a package which was originally approved by Austria and was subsequently approved, by separate certificate, by Switzerland. Additional identification marks would be tabulated in a similar manner on the package.	No similar requirement in Part 71. 49 CFR 173.473 requires that the US issued identification mark be displayed on the shipping paper and the package.
829 (c)		The revision of a certificate shall be indicated by a parenthetical expression following the identification mark on the certificate. For example, A/132/B(M)F-96(Rev.2) would indicate revision 2 of the Austrian package design approval certificate; or A/132/B(M)F-96(Rev.0) would indicate the original issuance of the Austrian package design approval certificate. For original issuance, the parenthetical entry is optional and other words such as 'original issuance' may also be used in place of 'Rev0'. Certificate revision numbers may only be issued by the country issuing the original approval certificate.	No similar requirement, although a revision number is used in practice.
8 2 9 (d)		Additional symbols (as may be necessitated by national requirements) may be added in brackets to the end of the identification mark; for example, A/13/B(M)F-96(SP503).	No similar provision.
829 (e)		It is not necessary to alter the identification mark on the packaging each time that a revision to the design certificate is made. Such re-marking shall be required only in those cases where the revision to the package design certificate involves a change in the letter type codes for the package design following the second stroke.	No similar requirement, although this is done in practice.
830		CONTENTS OF APPROVAL CERTIFICATES (830-833)	No similar requirement, although this is done in practice by DOT for special form. No similar

		Special form radioactive material and low dispersible radioactive material approval certificates (830) Each approval certificate issued by a competent authority for special form radioactive material shall include the following information:	requirement exists for low dispersible material.
830 (a)		Type of certificate	No similar requirement, although this is done in practice by DOT.
830 (b)		The competent authority identification mark	No similar requirement, although this is done in practice by DOT.
830 (c)		The issue date and expiration date.	No similar requirement, although this is done in practice by DOT.
830 (d)		List of applicable nation and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the special form radioactive material or low dispersible radioactive material is approved	No similar requirement, although this is done in practice by DOT for special form material.
830 (e)		The identification of the special form radioactive material or low dispersible radioactive or low dispersible radioactive material	No similar requirement, although this is done in practice by DOT for special form material.
830 (f)		A description of the special form radioactive material or low dispersible radioactive material.	No similar requirement, although this is done in practice by DOT for special form material.
830 (g)		Design specifications for the special form radioactive material or low dispersible radioactive material which may include references to drawings.	No similar requirement, although this is done in practice by DOT for special form material.
830 (h)		A specification of the radioactive contents which includes the activities involved and which may include the physical and chemical form.	No similar requirement, although this is done in practice by DOT for special form material.
830 (i)		A specification of the applicable quality assurance program as required in para. 310	No similar requirement, although this is done in practice by DOT for "-85" approvals.
830 (j)		Reference to information provided by the applicant relating to specific actions to be taken prior to shipment	No similar requirement, although this may be done in practice by DOT.
830 (k)		If deemed appropriate by the competent authority, reference to the identity of the applicant.	No similar requirement, although this is done in practice by DOT for special form material.
830 (l)		Signature and identification of the certifying official.	No similar requirement, although this is done in practice by DOT for special form material.
831		**Special arrangement approval certificates** (831) Each approval certificate issued by a competent authority for a special arrangement shall include	No similar requirement, although this is done in practice.

		the following information:	
831 (a)		Type of certificate	No similar requirement, although this is done in practice.
8 3 1 (b)		The competent authority identification mark.	No similar requirement, although this is done in practice.
831 (c)		The issue date and an expiration date.	No similar requirement, although this is done in practice.
8 3 1 (d)		Mode(s) of transport.	No similar requirement, although this is done in practice.
831 (e)		Any restrictions on the modes of transport, type of conveyance, freight container, and any necessary routing instructions.	No similar requirement, although this is done in practice.
831 (f)		List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the special arrangement is approved.	No similar requirement, although this is done in practice.
8 3 1 (g)		The following statement: "This certificates does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported."	No similar requirement, although this is done in practice.
8 3 1 (h)		References to certificates for alternative radioactive contents, other competent authority validation, or additional technical data or information, as deemed appropriate by the competent authority.	No similar requirement, although this is done in practice.
831 (i)		Description of the packaging by a reference to the drawings or a specification of the design. If deemed appropriate by the competent authority, a reproducible illustration, not larger than 21 cm by 30 cm, showing the make-up of the package should also be provided, accompanied by a brief description of the packaging, including materials of manufacture, gross mass, general outside dimension and appearance.	No similar requirement, although this is done in practice.
831 (j)		A specification of the authorized radioactive contents, including any restrictions on the radioactive contents which might not be obvious from the nature of the packaging. This shall include the physical and chemical forms, the activities involved (including those of the various isotopes, if appropriate), amounts in grams (for fissile material), and whether special form radioactive material or low dispersible radioactive material, if applicable.	No similar requirement, although this is done in practice.
8 3 1 (k)		Additionally, for packages of fissile material: a detailed description of the authorized radioactive contents; the value of the criticality safety index; reference to the documentation	No similar requirement, although this is done in practice. There are no provision for the criticality safety index (the transport index for criticality control purposes is used).

		that demonstrates the criticality safety of the contents; any special features, on the basis of which the absence of water from certain void spaces has been assumed in the criticality assessment; any allowance (based on para. 674(b)) for a change in neutron multiplication assumed in the criticality assessment as a result of actual irradiation experience; and the ambient temperature range for which the special arrangement has been approved.	
831 (l)		A detailed listing of any supplementary operational controls required for preparation, loading, carriage, unloading and handling of the consignment, including any special stowage provisions for the safe dissipation of heat.	No similar requirement, although this is done in practice.
8 3 1 (m)		If deemed appropriate by the competent authority, reasons for the special arrangement	No similar requirement, although this is done in practice.
8 3 1 (n)		Description of the compensatory measures to be applied as a result of the shipment being under special arrangement.	No similar requirement, although this is done in practice.
8 3 1 (o)		Reference to information provided by the applicant relating to the use of the packaging or specific actions to be taken prior to the shipment.	No similar requirement, although this is done in practice.
8 3 1 (p)		A statement regarding the ambient conditions assumed for purposes of design if these are not in accordance with those specified in paras. 653, 654, and 664, as applicable.	No similar requirement, although this may be done in practice.
8 3 1 (q)		Any emergency arrangement deemed necessary by the competent authority.	No similar requirement, although this may be done in practice.
831 (r)		A specification of the applicable quality assurance program as required in para. 310.	No similar requirement, although this may be done in practice.
831 (s)		If deemed appropriate by the competent authority, reference to the identity of the applicant and to the identity of the carrier.	No similar requirement, although this is done in practice.
831 (t)		Signature and identification of the certifying official.	No similar requirement, although this is done in practice.
832		**Shipment approval certificates** (832) Each approval certificate for a shipment issued by a competent authority shall include the following information:	No similar requirement, although this is done in practice by DOT.
832 (a)		Type of certificate	No similar requirement, although this is done in practice by DOT.
8 3 2 (b)		The competent authority identification mark(s).	No similar requirement, although this is done in practice by DOT.
832 (c)		The issue date and an expiry date.	No similar requirement, although this is done in practice by DOT.
8 3 2 (d)		List of applicable national and international regulations, including the edition of the IAEA	No similar requirement, although this is done in practice by DOT.

		Regulations for the Safe Transport of Radioactive Material under which the shipment is approved.	
832 (e)		Any restrictions on the modes of transport, type of conveyance, freight container, and any necessary routing instructions.	No similar requirement, although this is done in practice by DOT.
832 (f)		The following statement: "This certificates does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported."	No similar requirement, although this is done in practice by DOT.
8 3 2 (g)		A detailed listing of any supplementary operational controls required for preparation, loading, carriage, unloading, and handling of the consignment, including any special stowage provisions for the safe dissipation of heat or maintenance of criticality safety.	No similar requirement, although this is done in practice by DOT.
8 3 2 (h)		Reference to information provided by the applicant relating to specific actions to be taken prior to shipment.	No similar requirement, although this is done in practice by DOT.
832 (i)		Reference to the applicable design approval certificate(s).	No similar requirement, although this is done in practice by DOT.
832 (j)		A specification of the actual radioactive contents, including any restrictions on the radioactive contents which might not be obvious from the nature of the packaging. This shall include the physical and chemical forms, the total activities involved (including those of the various isotopes, if appropriate), amounts in grams (for fissile material), and whether special form radioactive material or low dispersible radioactive material, if applicable.	No similar requirement, although this is done in practice by DOT.
8 3 2 (k)		Any emergency arrangements deemed necessary by the competent authority.	No similar requirement, although this is done in practice by DOT.
832 (l)		A specification of the applicable quality assurance program as required in para. 310.	No similar requirement, although this may be done in practice by DOT.
8 3 2 (m)		If deemed appropriate by the competent authority, reference to the identity of the applicant.	No similar requirement, although this is done in practice by DOT.
8 3 2 (n)		Signature and identification of the certifying official.	No similar requirement, although this is done in practice by DOT.
833		**Package design approval certificates** (833) Each approval certificate of the design of a package issued by a competent authority shall include the following information:	No similar requirement, although this is done in practice.
833 (a)		Type of certificate.	No similar requirement, although this is done in practice.
8 3 3 (b)		The competent authority identification mark.	No similar requirement, although this is done in practice.

833 (c)		The issue date and expiry date.	No similar requirement, although this is done in practice.
8 3 3 (d)		Any restriction on the modes of transport, if appropriate.	No similar requirement, although this is done in practice.
833 (e)		List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under the design is approved.	No similar requirement, although this is done in practice.
833 (f)		The following statement: "This certificates does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported."	No similar requirement, although this is done in practice by DOT.
8 3 3 (g)		References to certificates for alternative radioactive contents, other competent authority validation, or additional technical data or information, as deemed appropriate by the competent authority.	No similar requirement, although this is done in practice.
8 3 3 (h)		A statement authorizing shipment where shipment approval is required under para. 820, if deemed appropriate.	No similar requirement, although this is done in practice by DOT.
833 (i)		Identification of the packaging.	No similar requirement, although this is done in practice.
833 (j)		Description of the packaging by a reference to the drawings or specification of the design. If deemed appropriate by the competent authority, a reproducible illustration, not larger than 21 cm by 30 cm, showing the make-up of the package should also be provided, accompanied by a brief description of the packaging, including materials of manufacture, gross mass, general outside dimensions and appearance.	No similar requirement, although this is done in practice.
8 3 3 (k)		Specification of the design by reference to the drawings.	No similar requirement, although this is done in practice.
833 (l)		A specifications of the authorized radioactive content, including any restrictions on the radioactive contents which might not be obvious from the nature of the packaging. This shall include the physical and chemical forms the activities involved (including those of the various isotopes, if appropriate), amounts in grams (for fissile material), and whether special form radioactive material or low dispersible radioactive material, if applicable.	No similar requirement, although this is done in practice (except for low dispersible material).
8 3 3 (m)		Additionally, for packages of fissile material: a detailed description of the authorized radioactive contents; the value of the criticality safety index; reference to the documentation that demonstrates the criticality safety of the	No similar requirement, although this is done in practice, as deemed appropriate (except for the criticality safety index, since the transport index for criticality control purposes is used).

		contents; any special features, on the basis of which the absence of water from any certain void spaces has been assumed in the criticality assessment; any allowance (based on para. 674(b)) for a change in neutron multiplication assumed in the criticality assessment as a result of actual irradiation experience; and the ambient temperature range for which the package design has been approved.	
8 3 3 (n)		For Type B(M) packages, a statement specifying those prescriptions of paras. 637, 653, 654, and 657-664 with which the package does not conform and any amplifying information which may be useful to other competent authorities.	No similar requirement, although this is done in practice.
8 3 3 (o)		A detailed listing of any supplementary operational controls required for preparation, loading, carriage, unloading, and handling of the consignment, including any special stowage provisions for the safe dissipation of heat.	No similar requirement, although this is done in practice.
8 3 3 (p)		Reference to information provided by the applicant relating the use of the packaging or specific actions to be taken prior to shipment.	No similar requirement, although this is done in practice.
8 3 3 (q)		A statement regarding the ambient conditions assumed for purpose of design if these are not in accordance with those specified in paras. 653, 654, and 664, as applicable.	No similar requirement, although this may done in practice.
833 (r)		A specification of the applicable QA program as required in para. 310.	No similar requirement, although this is done in practice.
833 (s)		Any emergency arrangements deemed necessary by the competent authority.	No similar requirement, although this is done in practice by DOT.
833 (t)		If deemed appropriate by the competent authority, reference to the identity of the applicant.	No similar requirement, although this is done in practice.
8 3 3 (u)		Signature and identification of the certifying official.	No similar requirement, although this is done in practice.
834		VALIDATION OF CERTIFICATES Multilateral approval may be by validation of the original certificate issued by the competent authority of the country of origin of the design or shipment. Such validation may take the form of an endorsement on the original certificate or the issuance of a separate endorsement, annex, supplement, etc., by the competent authority of the country through or into which the shipment is made.	No similar requirement, although this is done in practice by DOT.
	71.0 (a)		This statement of purpose and scope is narrower than the broader scope of TS-R-1.
	71.0 (d)		TS-R-1 does not contain similar requirements pertaining to licensing. Some of the

			requirements such as applications for package approval and operating controls and procedures are similar to TS-R-1.
	71.1 (a) (b)		TS-R-1 does not address record retention requirements
	71.2		TS-R-1 does not contain similar requirements.
	71.3		TS-R-1 does not contain similar requirements.
	71.5 (b)		TS-R-1 does not contain similar requirements.
	71.6 (a) (b)		TS-R-1 does not contain similar text on information collection.
	71.7 (a) (b)		TS-R-1 does not contain similar requirements concerning completeness and accuracy of information.
	71.9		TS-R-1 does not contain similar text on information collection.
	71.10 (b) (3)		TS-R-1 does not contain similar exceptions for special form americium and plutonium.
	71.10 (c)		TS-R-1 does not contain similar requirements.
	71.11 (a) (b) (c) (d)		TS-R-1 does not contain similar requirements pertaining to deliberate misconduct.
	71.14 (a) (b) (c)		TS-R-1 does not contain similar provisions as it does not include "specification containers".
	71.16 (a) (b) (c)		TS-R-1 does not contain similar requirements.
	71.18 (a) (b) (c) (d) (e)		TS-R-1 does not contain provisions for fissile material, limited quantity per package.
	71.20 (a) (b) (c)		TS-R-1 does not contain provisions for fissile material, limited moderator per package.
	71.22 (a) (b) (c) (d) (e) (f)		TS-R-1 does not contain provisions for fissile material, limited quantity, controlled shipments.
	71.24 (a) (b) (c)		TS-R-1 does not contain provisions for fissile material, limited moderator, controlled shipments.
	71.35 (a) (b)		TS-R-1 paras. 807 and 808 are somewhat similar, but are more specific for Type B packages and less specific for fissile material packages.
	71.38 (a) (b) (c)		TS-R-1 does not contain requirements addressing renewal of certificates and approvals.
	71.39		TS-R-1 does not contain similar requirements.
	71.41 (b) (c)		TS-R-1 does not contain similar requirements. TS-R-1 has requirements similar to 71.41(c), but these are tied to Type B(M) package

			designs.
	71.57		Reserved
	71.63 (a) (b)		TS-R-1 does not contain special requirements for plutonium shipments.
	71.64 (a) (b)		TS-R-1 does not contain special requirements for plutonium air shipments.
	71.65		TS-R-1 does not contain similar requirements
	71.74 (a) (b) (c)		TS-R-1 does not contain similar requirements for plutonium packages, although the Type C package performance requirements are similar (but less severe).
	71.81		TS-R-1 does not contain a similar general statement of requirement.
	71.88 (a) (b) (c)		TS-R-1 does not contain similar requirements for the air transport of plutonium.
	71.89		TS-R-1 does not contain similar requirements.
	71.91 (a) (b) (c)		TS-R-1 does not contain similar requirements
	71.93 (a)		TS-R-1 does not contain similar requirements.
	71.93 (b)		TS-R-1 does not contain similar requirements.
	71.93 (c)		TS-R-1 does not contain similar requirements.
	71.95		TS-R-1 does not contain similar requirements.
	71.97 (a) (b) (c) (d) (e) (f)		TS-R-1 does not contain similar requirements for advance notification of shipments of irradiated nuclear fuel and nuclear waste.
	71.99 (a) (b)		TS-R-1 does not contain similar requirements.
	71.100 (a) (b)		TS-R-1 does not address criminal penalties.
	71.101 (a) (b) (c) (d) (e) (f) (g)		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority.
	71.103 (a) (b) (c) (d) (e) (f)		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority.
	71.105 (a) (b) (c) (d)		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority.
	71.107 (a) (b) (c)		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the

			Competent Authority.
	71.109		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority.
	71.111		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority.
	71.113		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority.
	71.115 (a) (b) (c)		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority.
	71.117		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority.
	71.119		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority.
	71.121		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority
	71.123		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority.
	71.125		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority.
	71.127		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority.
	71.129 (a) (b)		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority.
	71.131		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority.
	71.133		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the

			Competent Authority.
	71.135		TS-R-1 does not contain similar requirements regarding quality assurance records. However, para. 310 does require that a manufacturer, consignor or user be able to demonstrate compliance with the QA program, which necessarily would include records.
	71.137		TS-R-1 does not contain similar detailed requirements, although para. 310 requires a QA program based on standards acceptable to the Competent Authority.