

Virginia Administrative Code
Title 12. Health
Agency 5. Department of Health
Chapter 481. Virginia Radiation Protection Regulations

12VAC5-481-2950. Purpose and Scope.

Part XIII. Transportation of Radioactive Material

Article 1. Purpose and Scope

The regulations in this part apply to any licensee authorized by specific or general license issued by the agency to receive, possess, use, or transfer licensed material, if the licensee delivers that material to a carrier for transport, transports the material outside the site of usage as specified in the agency license, or transports that material on public highways. No provision of this part authorizes possession of licensed material.

12VAC5-481-2960. Requirement for License.

Article 2. General Regulatory Provisions

No person shall transport radioactive material or deliver radioactive material to a carrier for transport except as authorized in a general or specific license issued by the agency or as exempted in [12VAC5-481-2970](#).

12VAC5-481-2970. Exemptions.

A. Common and contract carriers, freight forwarders, and warehouse workers that are subject to the requirements of the United States Department of Transportation (DOT) in 49 CFR Part 170 through 49 Part CFR 189 or the United States Postal Service in the Postal Service Domestic Mail Manual (DMM), Section C-023.9.0, and the United States Postal Service, are exempt from the requirements of this part to the extent that they transport or store radioactive material in the regular course of their carriage for others or storage incident thereto. Common and contract carriers that are not subject to the requirements of the DOT or United States Postal Service are subject to [12VAC5-481-2960](#) and other applicable requirements of these regulations.

B. A licensee is exempt from all the requirements of this part with respect to shipment or carriage of the following low-level materials:

1. NARM and ores containing naturally occurring radionuclides that 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 Table A-2 of [12VAC5-481-3770](#).
2. Materials for which the activity concentration is not greater than the activity concentration values specified in Table A-2 of [12VAC5-481-3770](#), or for which the consignment activity is not greater than the limit for an exempt consignment found in Table A-2 of [12VAC5-481-3770](#).

C. Fissile material meeting one of the following requirements are exempt from classification as fissile material and from the fissile material package standards of 10 CFR 71.55 and 71.59, but are subject to all other requirements of 10 CFR 71, except as noted.

1. Individual package containing two grams or less fissile material.
2. Individual or bulk packaging containing 15 grams or less of fissile material provided the package has at least 200 grams of solid nonfissile material for every gram of fissile material. Lead, beryllium, graphite, and hydrogenous material enriched in deuterium may be present in the package but must not be included in determining the required mass for solid nonfissile material.
3. Low concentrations of solid fissile material commingled with solid nonfissile material, provided that there is at least 2,000 grams of solid nonfissile material for every gram of fissile material, and there is no more than 180 grams of fissile material distributed within 360 kg of contiguous nonfissile material. Lead, beryllium, graphite, and hydrogenous material enriched in deuterium may be present in the package but must not be included in determining the required mass of solid nonfissile material.
4. Uranium enriched in uranium-235 to a maximum of 1.0% by weight, and with total plutonium and uranium-233 content of up to 1.0% of the mass of uranium-235, provided that the mass of any beryllium, graphite, and hydrogenous material enriched in deuterium constitutes less than 5.0% of the uranium mass.
5. Liquid solutions of uranyl nitrate enriched in uranium-235 to a maximum of 2.0% 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 ratio (N/U) of 2. The material must be contained in at least a DOT Type A package.
6. Packages containing, individually, a total plutonium mass of not more than 1,000 grams, of which not more than 20% by mass may consist of plutonium-239, plutonium-241, or any combination of these radionuclides.

D. Any physician licensed by the Commonwealth of Virginia to dispense drugs in the practice of medicine is exempt from this section with respect to transport by the physician of radioactive material for use in the practice of medicine provided the physician is an authorized user under Part VII ([12VAC5-481-1660](#) et seq.).

12VAC5-481-2980. Transportation of Licensed Material.

A. Each licensee who transports licensed material outside the site of usage, as specified in the agency license, or where transport is on public highways, or who delivers licensed material to a carrier for transport, shall:

1. Comply with the applicable requirements, appropriate to the mode of transport, of the regulations of the DOT; particularly the regulations of the DOT in the following areas:
 - a. Packaging – 49 CFR Part 173: Subparts A and B and I.
 - b. Marking and labeling – 49 CFR Part 172: Subpart D, 172.400 through 172.407 and

172.436 through 172.441.

c. Placarding – 49 CFR Part 172: Subpart F, especially §§ 172.500 through 172.519, 172.556, and Appendices B and C.

d. Accident reporting – 49 CFR Part 171: §§ 171.15 and 171.16.

e. Shipping papers and emergency information – 49 CFR Part 172: Subpart C and Subpart G.

f. Hazardous material employee training – 49 CFR Part 172: Subpart H.

g. Hazardous material shipper/carrier registration – 49 CFR Part 107: Subpart G.

h. Security plans – 49 CFR Part 172: Subpart I.

2. The licensee shall also comply with applicable DOT regulations pertaining to the following modes of transportation:

a. Rail – 49 CFR Part 174: Subparts A through D and K.

b. Air – 49 CFR Part 175.

c. Vessel – 49 CFR Part 176: Subparts A through F and M.

d. Public Highway – 49 CFR Part 177 and Parts 390 through 397.

3. Assure that any special instructions needed to safely open the package are sent to or have been made available to the consignee in accordance with [12VAC5-481-900](#).

B. If, for any reason, the regulations of the DOT are not applicable to a shipment of licensed material, the licensee shall conform to the standards and requirements of 49 CFR Parts 107, 171 through 180, and 390 through 397, appropriate to the mode of transport to the same extent as if the shipment was subject to the regulations.

12VAC5-481-2990. General Licenses for Carriers.

Article 3. General Licenses

A. A general license is hereby issued to any common or contract carrier not exempt under [12VAC5-481-2970](#) to receive, possess, transport, and store radioactive material in the regular course of their carriage for others or storage incident thereto, provided the transportation and storage is in accordance with the applicable requirements, appropriate to the mode of transport, of the United States Department of Transportation insofar as such requirements relate to the loading and storage of packages, placarding of the transporting vehicle, and incident reporting. Notification of an incident shall be filed with, or made to, the agency as prescribed in 49 CFR, regardless of or in addition to notification made to the United States Department of Transportation or other agencies.

B. A general license is hereby issued to any private carrier to transport radioactive material, provided the transportation is in accordance with the applicable requirements, appropriate to the mode of transport, of the United States Department of Transportation insofar as such

requirements relate to the loading and storage of packages, placarding of the transporting vehicle, and incident reporting. Notification of an incident shall be filed with, or made to, the agency as prescribed in 49 CFR, regardless of or in addition to notification made to the United States Department of Transportation or other agencies.

C. Persons who transport radioactive material pursuant to the general licenses in subsection A or B of this section are exempt from the requirements of Parts IV ([12VAC5-481-600](#) et seq.) and X ([12VAC5-481-2250](#) et seq.) of this chapter to the extent that they transport radioactive material.

12VAC5-481-3000. General License: Nrc-Approved Packages.

A. A general license is hereby issued to any licensee to transport, or to deliver to a carrier for transport, licensed material in a package for which a license, certificate of compliance (CoC), or other approval has been issued by the NRC.

B. This general license applies only to a licensee who:

1. Has a copy of the specific license, CoC, or other approval by the NRC of the package and has the drawings and other documents referenced in the approval relating to the use and maintenance of the packaging and to the actions to be taken prior to shipment;
2. Complies with the terms and conditions of the license, certificate, or other approval by the NRC, as applicable, and the applicable requirements of Part XIII ([12VAC5-481-2950](#) et seq.) of this chapter;
3. Prior to the licensee's first use of the package, submits in writing to the NRC the licensee's name and license number and the package identification number specified in the package approval using the appropriate method listed in 10 CFR 71.1(a); and
4. Has a quality assurance program that complies with [12VAC5-481-3130](#) .

C. The general license in subsection A of this section applies only when the package approval authorizes use of the package under this general license.

D. For a Type B or fissile material package, the design of which was approved by the NRC before April 1, 1996, the general license is subject to the additional restrictions of [12VAC5-481-3010](#) .

12VAC5-481-3010. Previously Approved Packages.

A Type B(U) package, a Type B(M) package or a fissile material package, previously approved by the NRC but without the designation "-85" in the identification number of the NRC CoC, may be used under the general license of [12VAC5-481-3000](#) with the following additional conditions:

1. Fabrication of the package is satisfactorily completed by April 1, 1999, as demonstrated by application of its model number in accordance with 10 CFR 71.85(c);
2. A package used for a shipment to a location outside the United States is subject to

multilateral approval except approved under special arrangement in accordance with United States Department of Transportation regulations at 49 CFR 173.403; and

3. A serial number that uniquely identifies each packaging that conforms to the approved design is assigned to and legibly and durably marked on the outside of each packaging.

12VAC5-481-3020. General License: United States Department of Transportation Specification Container.

A. A general license is issued to any licensee to transport, or to deliver to a carrier for transport, licensed material in a specification container for fissile material or for a Type B quantity of radioactive material as specified in 49 CFR Parts 173 and 178.

B. This general license applies only to a licensee who:

1. Has a copy of the specification;
2. Complies with the terms and conditions of the specification and the applicable requirements of this part; and
3. Has a quality assurance program that complies with [12VAC5-481-3130](#) .

C. The general license in subsection A of this section is subject to the limitation that the specification container may not be used for a shipment to a location outside the United States except by multilateral approval as defined in 49 CFR 173.403.

12VAC5-481-3030. General License: Use of Foreign Approved Package.

A. A general license is issued to any licensee to transport, or to deliver to a carrier for transport, licensed material in a package the design of which has been approved in a foreign national competent authority certificate that has been revalidated by the DOT as meeting the applicable requirements of 49 CFR 171.12.

B. This general license applies only to international shipments.

C. This general license applies only to a licensee who:

1. Has a copy of the applicable certificate, the revalidation, and the drawings and other documents referenced in the certificate relating to the use and maintenance of the packaging and to the actions to be taken prior to shipment;
2. Complies with the terms and conditions of the certificate and revalidation, and with the applicable requirements of this part; and
3. The licensee has a quality assurance program that complies with [12VAC5-481-3130](#) .

12VAC5-481-3040. General License: Fissile Material.

A. A general license is issued to any licensee to transport fissile material, or to deliver fissile material to a carrier for transport, if the material is shipped in accordance with this section. The fissile material need not be contained in a package that meets the standards of 10 CFR

Part 71, Subparts E and F; however, the material must be contained in a Type A package. The Type A package must also meet the DOT requirements of 49 CFR 173.417(a).

B. The general license applies only to a licensee who has a quality assurance program that complies with [12VAC5-481-3130](#).

C. The general license applies only when a package's contents:

1. Contain no more than a Type A quantity of radioactive material; and
2. Contain less than 500 total grams of beryllium, graphite, or hydrogenous material enriched in deuterium.

D. The general license applies only to packages containing fissile material that are labeled with a CSI that:

1. Has been determined in accordance with subsection E of this section;
2. Has a value less than or equal to 10; and
3. For a shipment of multiple packages containing fissile material, the sum of the CSIs must be less than or equal to 50 (for shipment on a nonexclusive use conveyance) and less than or equal to 100 (for shipment on an exclusive use conveyance).

E. The value for the CSI must be greater than or equal to the number calculated by the following equation:

$$CSI = 10 \left[\frac{\text{grams of } ^{235}\text{U}}{X} + \frac{\text{gram of } ^{233}\text{U}}{Y} + \frac{\text{grams of Pu}}{Z} \right]$$

1. The calculated CSI must be rounded up to the first decimal place;
2. The values of X, Y, and Z used in the CSI equation must be taken from Tables 5 or 6, as appropriate;
3. If Table 5 is used to obtain the value of X, then the values for the terms in the equation for uranium-233 and plutonium must be assumed to be zero; and
4. Table 4 values for X, Y, and Z must be used to determine the CSI if:
 - a. Uranium-233 is present in the package;
 - b. The mass of plutonium exceeds one percent of the mass of uranium-235;
 - c. The uranium is of unknown uranium-235 enrichment or greater than 24 weight percent enrichment; or
 - d. Substances having a moderating effectiveness (i.e., an average hydrogen density greater than H₂O) (e.g., certain hydrocarbon oils or plastics) are present in any form, except as polyethylene used for packing or wrapping.

Table 4

Mass Limits for General License Packages Containing Mixed Quantities of

Fissile Material or Uranium-235 of Unknown Enrichment

Fissile material	Fissile material mass mixed with moderating substances having an average hydrogen density less than or equal to H ₂ O (grams)	Fissile material mass mixed with moderating substances having an average hydrogen density greater than H ₂ O ^a (grams)
U-235 (X)	60	38
U-233 (Y)	43	27
Pu-239 or Pu-241 (Z)	37	24

^aWhen mixtures of moderating substances are present, the lower mass limits shall be used if more than 15 percent of the moderating substance has an average hydrogen density greater than H₂O.

Table 5
Mass Limits for General License Packages Containing Uranium-235 of Known Enrichment

Uranium enrichment in weight percent of U-235 not exceeding	Fissile material mass of U-235 (X) (grams)
24	60
20	63
15	67
11	72
10	76
9.5	78
9	81
8.5	82
8	85
7.5	88
7	90
6.5	93
6	97
5.5	102
5	108

4.5	114
4	120
3.5	132
3	150
2.5	180
2	246
1.5	408
1.35	480
1	1,020
0.92	1,800

12VAC5-481-3050. (Repealed.)

12VAC5-481-3051. General License: Plutonium-Beryllium Special Form Material.

A. A general license is issued to any licensee to transport fissile material in the form of plutonium-beryllium (Pu-Be) special form sealed sources, or to deliver Pu-Be sealed sources to a carrier for transport, if the material is shipped in accordance with this section. This material need not be contained in a package that meets the standards of Subparts E and F of 10 CFR Part 71; however, the material must be contained in a Type A package. The Type A package must also meet the DOT requirements of 49 CFR 173.417(a).

B. The general license applies only to a licensee who has a quality assurance program that complies with [12VAC5-481-3130](#) .

C. The general license applies only when a package's contents:

1. Contain no more than a Type A quantity of radioactive material; and
2. Contain less than 1,000 grams of plutonium, provided that: plutonium-239, plutonium-241, or any combination of these radionuclides, constitutes less than 240 grams of the total quantity of plutonium in the package.

D. The general license applies only to packages labeled with a CSI that:

1. Has been determined in accordance with subsection E of this section;
2. Has a value less than or equal to 100; and
3. For a shipment of multiple packages containing Pu-Be sealed sources, the sum of the CSIs must be less than or equal to 50 (for shipment on a nonexclusive use conveyance) and less than or equal to 100 (for shipment on an exclusive use conveyance).

E. The value for the CSI must be greater than or equal to the number calculated by the following equation:

$$\text{CSI} = 10 \left[\frac{\text{grams of Pu-239} + \text{grams of Pu-241}}{24} \right]$$

The calculated CSI must be rounded up to the first decimal place.

12VAC5-481-3060. Assumptions As to Unknown Properties of Fissile Material.

Article 4. Operating Controls and Procedures

When the isotopic abundance, mass, concentration, degree of irradiation, degree of moderation, or other pertinent property of fissile material in any package is not known, the licensee shall package the fissile material as if the unknown properties have credible values that will cause the maximum neutron multiplication.

12VAC5-481-3070. Preliminary Determinations.

Prior to the first use of any packaging for the shipment of radioactive material:

1. The licensee shall ascertain that there are no cracks, pinholes, uncontrolled voids, or other defects which could significantly reduce the effectiveness of the packaging;
2. Where the maximum normal operating pressure will exceed 35 kilopascal (5 lbf/in²) gauge, the licensee shall test the containment system at an internal pressure at least 50% higher than the maximum normal operating pressure to verify the capability of that system to maintain its structural integrity at that pressure;
3. The licensee shall determine that the packaging has been fabricated in accordance with the design approved by the NRC; and
4. The licensee shall conspicuously and durably mark the packaging with its model number, serial number, gross weight, and a package identification number as assigned by the NRC.

12VAC5-481-3080. Routine Determinations.

Prior to each shipment of licensed material, the licensee shall determine that:

1. The package is proper for the contents to be shipped;
2. The package is in unimpaired physical condition except for superficial defects such as marks or dents;
3. Each closure device of the packaging, including any required gasket, is properly installed and secured and free of defects;
4. Any system for containing liquid is adequately sealed and has adequate space or other specified provision for expansion of the liquid;

5. Any pressure relief device is operable and set in accordance with written procedures;
6. The package has been loaded and closed in accordance with written procedures;
7. For fissile material, any moderator or neutron absorber, if required, is present and in proper condition;
8. Any structural part of the package that could be used to lift or tie down the package during transport is rendered inoperable for that purpose unless it satisfies design requirements specified in 10 CFR 71.45;
9. The level of nonfixed radioactive contamination on the external surfaces of each package offered for shipment is ALARA and within the limits specified in 49 CFR 173.443;
10. External radiation levels around the package and around the vehicle, if applicable, will not exceed the limits specified in 10 CFR 71.47 at any time during transportation; and
11. Accessible package surface temperatures will not exceed the limits specified in 10 CFR 71.43(g) at any time during transportation.

12VAC5-481-3090. Air Transport of Plutonium.

Notwithstanding the provisions of any general licenses and notwithstanding any exemptions stated directly in this part or included indirectly by citation of the DOT regulations, as may be applicable, the licensee shall assure that plutonium in any form is not transported by air, or delivered to a carrier for air transport, unless:

1. The plutonium is contained in a medical device designed for individual human application;
2. The plutonium is contained in a material in which the specific activity is less than or equal to the activity concentration values for plutonium specified in Table A-2 of [12VAC5-481-3770](#) and in which the radioactivity is essentially uniformly distributed;
3. The plutonium is shipped in a single package containing no more than an A2 quantity of plutonium in any isotope or form and is shipped in accordance with [12VAC5-481-2980](#);
4. The plutonium is shipped in a package specifically authorized, in the CoC, issued by the NRC, for the shipment of plutonium by air and the licensee requires, through special arrangement with the carrier, compliance with 49 CFR 175.704, the DOT regulations applicable to the air transport of plutonium.

12VAC5-481-3091. Opening Instructions.

Before delivery of a package to a carrier for transport, the licensee shall ensure that any special instructions needed to safely open the package have been sent to, or otherwise made available to, the consignee for the consignee's use in accordance with [12VAC5-481-900](#).

12VAC5-481-3100. Shipment Records.

Each licensee shall maintain for a period of three years after shipment a record of each

shipment of licensed material not exempt under [12VAC5-481-2970](#) , showing, where applicable:

1. Identification of the packaging by model number and serial number;
2. Verification that the packaging, as shipped, had no significant defect;
3. Volume and identification of coolant;
4. Type and quantity of licensed material in each package, and the total quantity of each shipment;
5. Date of the shipment;
6. Name and address of the transferee;
7. Address to which the shipment was made; and
8. Results of the determinations required by [12VAC5-481-3080](#) and by the conditions of the package approval.

12VAC5-481-3110. Reports.

The licensee shall report to the agency within 30 days:

1. Any instance in which there is significant reduction in the effectiveness of any packaging during use;
2. Details of any defects with safety significance in the packaging after first use, with the means employed to repair the defects and prevent their recurrence; or
3. Instances in which the conditions of approval in the CoC were not observed in making a shipment.

12VAC5-481-3120. Advance Notification of Transport of Nuclear Waste.

A. Prior to the transport of any nuclear waste outside of the confines of the licensee's facility or other place of use or storage, or prior to the delivery of any nuclear waste to a carrier for transport, each licensee shall provide advance notification of such transport.

B. Advance notification for transport of licensed material is required when:

1. The licensed material is required to be in Type B packaging for transportation;
2. The licensed material is being transported through Virginia en route to a disposal facility or to a collection point for transport to a disposal facility; and
3. The quantity of licensed material in a single package exceeds:
 - a. 3000 times the A1 value of the radionuclides as specified in [12VAC5-481-3770](#);
 - b. 3000 times the A2 value of the radionuclides as specified in [12VAC5-481-3770](#); or
 - c. 1000 terabecquerel (27,000 curies).

C. Each advance notification required by subsections A and B of this section shall contain the following information:

1. The name, address, and telephone number of the shipper, carrier, and receiver of the shipment;
2. A description of the nuclear waste contained in the shipment as required by 49 CFR 172.202 and 172.203(d);
3. The point of origin of the shipment and the seven-day period during which departure of the shipment is estimated to occur;
4. The seven-day period during which arrival of the shipment at state boundaries is estimated to occur;
5. The destination of the shipment, and the seven-day period during which arrival of the shipment is estimated to occur; and
6. A point of contact with a telephone number for current shipment information.

D. The notification required by subsections A and B of this section shall be made in writing to the office of the governor or governor's designee, the office of each appropriate tribal official or tribal official's designee, and to the agency. A notification delivered by mail shall be postmarked at least seven days before the beginning of the seven-day period during which departure of the shipment is estimated to occur. A notification delivered by messenger shall reach the office of the governor or governor's designee, the office of each appropriate tribal official or tribal official's designee, and the agency, at least four days before the beginning of the seven-day period during which departure of the shipment is estimated to occur. A copy of the notification shall be retained by the licensee for three years.

E. The licensee shall notify the governor or governor's designee, the office of each appropriate tribal official or tribal official's designee, and the agency of any changes to schedule information provided pursuant to subsections A and B of this section. Such notification shall be by telephone to a responsible individual in the office of the governor or governor's designee, the office of each appropriate tribal official or tribal official's designee, and the agency. The licensee shall maintain for three years a record of the name of the individual contacted.

F. Each licensee who cancels a nuclear waste shipment, for which advance notification has been sent, shall send a cancellation notice, identifying the advance notification that is being canceled, to the governor or governor's designee, the office of each appropriate tribal official or tribal official's designee, and to the agency. A copy of the notice shall be retained by the licensee for three years.

12VAC5-481-3130. Quality Assurance.

Article 5. Quality Assurance

A. Quality assurance requirements apply to the design, purchase, fabrication, handling, shipping, storing, cleaning, assembly, inspection, testing, operation, maintenance, repair,

and modification of components of packaging that are important to safety. Quality assurance comprises all those planned and systematic actions necessary to provide adequate confidence that a system or component will perform satisfactorily in service. Quality assurance includes quality control, which comprises those quality assurance actions related to control of the physical characteristics and quality of the material or component to predetermined requirements. The licensee, certificate holder, and applicant for a CoC are responsible for the quality assurance requirements as they apply to design, fabrication, testing, and modification of packaging. Each licensee is responsible for the quality assurance provision that applies to its use of packaging for the shipment of licensed material subject to this chapter.-

B. Each licensee, certificate holder and applicant for a CoC shall establish, maintain, and execute a quality assurance program satisfying each of that applicable criteria of this section, 10 CFR Part 71, Subpart H and satisfying any specific provisions that are applicable to the licensee's activities including procurement of packaging. The licensee, certificate holder, and applicant for CoC shall execute the applicable criteria in a graded approach to an extent that is commensurate with the quality assurance requirement's importance to safety.

C. Before the use of any package for the shipment of licensed material subject to this rule, each licensee shall obtain NRC approval of its quality assurance program.

D. A program for transport container inspection and maintenance limited to radiographic exposure devices, source changers, or packages transporting these devices and meeting the requirements of [12VAC5-481-1270](#) , is deemed to satisfy the requirements of [12VAC5-481-3000](#) and subsection B of this section.

E. The licensee, certificate holder, and applicant for a CoC shall be responsible for the establishment and execution of the quality assurance program. The licensee, certificate holder, and applicant for a CoC may delegate to others, such as contractors, agents, or consultants, the work of establishing and executing the quality assurance program, or any part of the quality assurance program, but shall retain responsibility for the program. The licensee shall clearly establish and delineate, in writing, the authority and duties of persons and organizations performing activities affecting the safety-related functions of structures, systems, and components. These activities include performing the functions associated with attaining quality objectives and the quality assurance functions. While the term licensee is used in these criteria, the requirements are applicable to whatever design, fabrication, assembly, and testing of the package is accomplished with respect to a package before the time a package is issued.

F. The quality assurance functions are:

1. Assuring that an appropriate quality assurance program is established and effectively executed; and
2. Verifying, by procedures such as checking, auditing, and inspection, that activities affecting the safety-related functions have been performed correctly.

G. The persons and organizations performing quality assurance functions must have sufficient authority and organizational freedom to:

1. Identify quality problems;
2. Initiate, recommend, or provide solutions; and
3. Verify implementation of solutions.