§173.476 Approval of special form Class 7 (radioactive) materials.
(a) Each offeror of special form Class 7 (radioactive) materials must maintain on file for at least one year after the latest shipment, and provide to the Associate Administrator for Hazardous Materials Safety on request, a complete safety analysis, including documentation of any tests, demonstrating that the special form material meets the requirements of §173.469. An IAEA Certificate of Competent Authority issued for the special form material may be used to satisfy this requirement.

(b) Prior to the first export shipment of a special form Class 7 (radioactive) material from the United States, each offeror shall obtain a U.S. Competent Authority Certificate for the specific material. For special form material manufactured outside the United States, an IAEA Certificate of Competent Authority from the country of origin may be used to meet this requirement.

(c) Each request for a U.S. Competent Authority Certificate as required by the IAEA regulations must be submitted in writing, in triplicate, to the Associate Administrator for Hazardous Materials Safety. Each request is considered in the order in which it is received. To allow sufficient time for consideration, requests must be received at least 90 days before the requested effective date. Each petition for a U.S. Competent Authority Certificate must include the following information:
(1) A detailed description of the material, or if a capsule, a detailed description of the contents. Particular reference must be made to both physical and chemical states;
(2) A detailed statement of the capsule design and dimensions, including complete engineering drawings [22cm x 30cm (8-1/2 inches x 11 inches)] and schedules of material, and methods of construction;
(3) A statement of the tests that have been made and their results; or evidence based on calculative methods to show that the material is able to pass the tests; or other evidence that the special form Class 7 (radioactive) material complies with §173.469; and
(4) For the original request for a Competent Authority Certificate, evidence of a quality assurance program.

(d) Paragraphs (a) and (b) of this section do not apply in those cases where A_1 equals A_2 and the material is not required to be described on the shipping papers as ''Radioactive Material, Special Form, n.o.s.''

§173.477 Approval for export shipments.
(a) Each export shipment of a package for which an IAEA certificate of competent authority has been issued or revalidated in accordance with §173.471, §173.472, or §173.473 must have multilateral approval if the shipment includes:
(1) A vented Type B(M) package;
(2) A Type B(M) packaging containing Class 7 (radioactive) materials with an activity greater than 3×10^3 A_1, or 3×10^3 A_2, as appropriate, or 1000 TBq (27,000 curies), whichever is less;
(3) A shipment of packages containing fissile materials if the sum of the transport indices of the individual packages exceeds 50; or
(4) Transportation by special arrangement.

(b) Each application for shipment approval not under special arrangement must contain:
(1) The period of time for which the approval is sought;
(2) A description of the contents, the expected modes of transportation, the type of conveyance to be used, and the proposed route; and
(3) An explanation of how the special precautions and special administrative and operational controls referred to in the package design certificates are to be put into effect.

(c) Each application for shipment approval under special arrangement must contain:
(1) A statement of the reasons why the shipment cannot be made in accordance with the applicable requirements; and
(2) A statement of any special precautions or special administrative or operational controls that will be used during transport to ensure that the overall safety is at least equivalent to that provided by the applicable requirements.

(d) The packaging and shipment approvals may be combined into a single approval issued in accordance with §§173.471, 173.472 or 173.473.

(e) Approval by competent authorities is not required for packagings designed for materials covered by §§173.421 through 173.428 or for Type A packagings designed for non-fissile Class 7 (radioactive) materials.

§173.478 Notification to competent authorities for export shipments.
(a) Before the first export shipment of any packaging containing fissile materials packages exceeding 15 grams, or Class 7 (radioactive) materials exceeding A_1 or A_2, the offeror shall ensure that copies of each applicable competent authority certificate issued in accordance with §173.471, §173.472, or §173.473 have been submitted to the competent authority of each country through which or into which it is to be transported. Except as specified in §173.477, the offeror is not required to await an acknowledgment from the competent authority prior to shipping the Class 7 (radioactive) material, nor is the competent authority required to acknowledge receipt of the certificate.

(b) For each of the shipments described in this paragraph, the offeror shall notify the competent authority of each country through which or into which the shipment is to be transported. This notification must be received by each competent authority at least 7 days before the shipment starts for the following: an activity greater than 3×10^3 A_1, 3×10^3 A_2, as appropriate, or 1000 TBq (27,000 Curies), whichever is the least;
(2) Type B(M) packages; or
(3) Transportation by special arrangements.

(c) The offeror notification must include:
(1) Sufficient information to enable the packaging to be identified, including all applicable certificate numbers and identification marks;
(2) Information as to the date of shipment, the expected date of arrival, and the proposed routing;
(3) The name of the Class 7 (radioactive) material or nuclide;
(4) A description of the physical and chemical form of the Class 7 (radioactive) material; and
(5) The maximum activity of the Class 7 (radioactive) material, except that for fissile material, the mass of fissile material may be used instead of activity.

(d) The offeror is not required to send a separate notification if the required information has been included in the application for shipment approval.

Subpart J [Reserved]

Subpart K [Reserved]

Subpart L [Reserved]

Subpart M [Reserved]

Subpart N [Reserved]

Subpart O [Reserved]

Appendix A [Reserved]

Appendix B — Procedure for Testing Chemical Compatibility and Rate, of Permeation in Plastic Packaging and Receptacles
1. The purpose of this procedure is to determine the chemical compatibility and permeability of liquid hazardous materials packaged in plastic packaging and receptacles. Alternatives for this procedure are permitted as specified in §173.24(e)(3)(iii) of this subchapter.
2. Compatibility and rate of permeation are determined by subjecting full size plastic containers (or smaller containers as permitted in paragraph 4 of this Appendix) and hazardous material lading to one of the following combinations of time and temperature:
a. Test Method 1: 180 days at a temperature no lower than 18°C (64°F)
b. Test Method 2: 28 days at a temperature no lower than 50°°C (122°F)
c. Test Method 3: 14 days at a temperature no lower than 60°°C (140°F)
3. Regardless of which test method is used, at least three sample containers shall be tested for each combination of hazardous material and size and design of container. Fill containers to rated capacity with the specific hazardous material (at the concentration to be transported) and close as for shipment. For the first and last 24 hours of storage under the selected test method, place the containers with closures downward, except that containers fitted with a vent are so placed on each occasion for five minutes only.
4. For testing under Test Method 2 or 3 in those instances where it is not practicable to use full size containers, smaller containers may be used. The small

container shall be manufactured by the same process as the larger container (for example, using the same method of molding and processing temperatures) and be made of identical resins, pigments and additives.

5. Determine filled container weight or net weight of contents both before and after storage under the selected test method. Rate of permeation is determined from loss of hazardous materials contents, during the conduct of the test, expressed as a percentage of the original weight.

6. After storage under the selected test method, the container shall be drained, rinsed, filled to rated capacity with water and, with filled container at ambient temperature, dropped from a height determined in accordance with §178.603(e) of this subchapter onto a rigid non-resilient, flat and horizontal surface.

7. Each of the following constitute test failure:

a. Visible evidence of permanent deformation due to vapor pressure build-up or collapse of walls, deterioration, swelling, crazing, cracking, excessive corrosion, oxidization, embrittlement, leakage, rupture or other defects likely to cause premature failure or a hazardous condition.

b. For materials meeting the definition of a poison according to this subchapter, a rate of permeation in excess of 0.5% determined over the test period. For all other hazardous materials, a rate of permeation in excess of 2.0% determined over the test period.

Appendix C — Procedure for Base-Level Vibration Testing

Base-level vibration testing shall be conducted as follows:

1. Three sample packagings, selected at random, must be filled and closed as for shipment. A non-hazardous material may be used in place of the hazardous material if it has essentially the same physical characteristics.

2. The three packages must be placed on a vibrating platform that has a vertical double-amplitude (peak-to-peak displacement) of one inch. The packages should be constrained horizontally to prevent them from falling off the platform, but must be left free to move vertically, bounce and rotate.

3. The test must be performed continuously for one hour at a frequency that causes each package to be raised from the vibrating platform to such a degree that a piece of material of approximately 1.6 mm (0.063 inch) thickness (such as steel strapping or paperboard) can be passed between the bottom of any package and the platform.

4. Immediately following the period of vibration, each package shall be removed from the platform, turned on its side and observed for any evidence of leakage.

5. Rupture or leakage from any of the packages constitutes failure of the test.

Appendix D — Test Methods for Dynamite (Explosive, Blasting, Type A)

1. *Test method D-1—Leakage test.* A wooden stick, 114 mm (4.5 inches) long and 4.8 mm (0.2 inch) inch in diameter, with a sharpened end is used to punch 5 holes in one end of the wrapper of a dynamite cartridge. A cork stopper is placed on the bottom of a glass volumetric cylinder. The dynamite cartridge is placed, perforated end down, resting on the cork stopper in the cylinder. The entire assembly is placed in an oven at 35°C (100°F) for 48 hours and then examined visually for evidence of leakage.

2. *Test method D-2—Centrifugal exudation test.* The test apparatus consists of a glass tube, 135 mm (5.3 inches) long and one inch in diameter, with both ends open, and is assembled in the following manner:

(a) Close the bottom with a plastic plug of diameter equal to the inner diameter of the glass tube:

(b) Place a small amount of absorbent cotton on top of the plug;

(c) Place a plastic disk that matches the inner diameter to the glass tube and has seven small perforations on top of the cotton; and

(d) Place 10 g (0.35 ounce) of the dynamite sample on top of the disk.

The assembled glass tube is then placed in a hand-operated centrifuge and spun for one minute at 600 rpm (revolutions per minute). The dynamite sample is then removed from the glass tube and weighed to determine the percent of weight loss.

3. *Test method D-3—Compression exudation test.* The entire apparatus for this test is shown in Figure 1 of this appendix. The test is conducted using the following procedures:

(a) A glass tube, 135 mm (5.3 inches) long and one inch in diameter, is held on a wooden base;

(b) A small amount of absorbent cotton is placed into the bottom of the glass tube;

(c) Ten g (0.35 ounce) of dynamite sample are placed on top of the cotton in the glass tube:;

(d) A small amount of absorbent cotton is placed on top of the dynamite sample;

(e) A plastic disk that matches the inner diameter of the glass tube and has seven small perforations is placed on top of the cotton;

(f) A plastic plug matching the inner diameter of the glass tube is then placed on top of the disk;

(g) The glass tube assembly is placed under the compression rod, and compression is applied by means of the weight on the metal lever rod. The sample is compressed for one minute; and

(h) The dynamite sample is then removed from the glass tube and weighed to determine the percent of weight loss.

Appendix E — [Reserved]

Appendix F — [Reserved]

Appendix H — Method of Testing for Sustained Combustibility

1. *Method.* The method describes a procedure for determining if the material when heated under the test conditions and exposed to an external source of flame applied in a standard manner sustains combustion.

2. *Principle of the method.* A metal block with a concave depression (test portion well) is heated to a specified temperature. A specified volume of the material under test is transferred to the well, and its ability to sustain combustion is noted after application and subsequent removal of a standard flame under specified conditions.

3. *Apparatus.* A combustibility tester consisting of a block of aluminum alloy or other corrosion-resistant metal of high thermal conductivity is used. The block has a concave well and a pocket drilled to take a thermometer. A small gas jet assembly on a swivel is attached to the block. The handle and gas inlet for the gas jet may be fitted at any convenient angle to the gas jet. A suitable apparatus is shown in Figure 5.1 of the UN Recommendations, and the essential dimensions are given in Figures 5.1 and 5.2 of the UN Recommendations. The following equipment is needed:

(a) *Gauge,* for checking that the height of the center of the gas jet above the top of the test portion well is 2.2 mm (see Figure 5.1);

(b) *Thermometer,* mercury in glass, for horizontal operation, with a sensitivity not less than 1 mm/°C, or other measuring device of equivalent sensitivity permitting reading at 0.5°C intervals. When in position in the block, the thermometer bulb must be surrounded with thermally conducting thermoplastic compound;

(c) *Hotplate,* fitted with a temperature-control device. (Other types of apparatus with suitable temperature-control facilities may be employed to heat themetal block);

(d) *Stopwatch,* or other suitable timing device;

(e) *Syringe,* capable of delivering 2 ml to an accuracy of ±0.1 ml; and

(f) *Fuel source,* butane test fuel.

4. *Sampling.* The sample must be representative of the material to be tested and must be supplied and kept in a tightly closed container prior to test. Because of the possibility of loss of volatile constituents, the sample must receive only the minimum treatment necessary to ensure its homogeneity. After removing each test portion, the sample container must be immediately closed tightly to ensure that no volatile components escape from the container; if this closure is incomplete, an entirely new sample must be taken.

5. *Procedure.* Carry out the determination in triplicate.

WARNING—Do not carry out the test in a small confined area (for example a glove box) because of the hazard of explosions.

(a) It is essential that the apparatus be set up in a completely draft-free area (see warning) and in the absence of strong light to facilitate observation of flash, flame, etc.

(b) Place the metal block on the hotplate or heat the metal block by other suitable means so that its temperature, as indicated by the thermometer placed in the metal block, is maintained at the specified temperature within a tolerance of ±1°C. For the appropriate test temperature, see paragraph 5.(h) of this appendix. Correct this temperature for the difference in barometric pressure from the standard atmospheric pressure (101.3 kPa) by raising the test temperature for a higher pressure or lowering the test temperature for a lower pressure by 1.0°C for each 4 kPa difference. Ensure that the top of the metal block is exactly horizontal. Use the gauge to check that the jet is 2.2 mm above the top of the well when in the test position.

(c) Light the butane test fuel with the jet away from the test position (i.e., in the ''off'' position, away from the well). Adjust the size of the flame so that it is 8 mm to 9 mm high and approximately 5 mm wide.

(d) Using the syringe, take from the sample container at least 2 ml of the sample and rapidly transfer a test portion of 2 ml ±0.1 ml to the well of the combustibility tester and immediately start the timing device.

(e) After a heating time of 60 seconds (s), by which time the test portion is deemed to have reached its equilibrium temperature, and if the test fluid has not ignited, swing the test flame into the test position over the edge of the pool of liquid. Maintain it in this position for 15 s and then return it to the ''off'' position while observing the behavior of the test portion. The test flame must remain lighted throughout the test.