Form NRC-618
(12-73)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE

For Radioactive Materials Packages

1.(a) Certificate Number	1.(b) Revision No.	1.(c) Package Identification No.	1.(d) Pages No.	1.(e) Total No. Pages
9001	11	USA/9001/B( )F	1	7

2. PREAMBLE

2.(a) This certificate is issued to satisfy Sections 173.393a, 173.394, 173.395, and 173.396 of the Department of Transportation Hazardous Materials Regulations (49 CFR 170-189 and 14 CFR 103) and Sections 146-19-10a and 146-19-100 of the Department of Transportation Dangerous Cargoes Regulations (46 CFR 146-149), as amended.

2.(b) The packaging and contents described in item 5 below, meets the safety standards set forth in Subpart C of Title 10, Code of Federal Regulations, Part 71, "Packaging of Radioactive Materials for Transport and Transportation of Radioactive Material Under Certain Conditions."

2.(c) This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. This certificate is issued on the basis of a safety analysis report of the package design or application—

3.(a) Prepared by (Name and address):

General Electric Company
175 Curtner Avenue
San Jose, CA 95125

3.(b) Title and identification of report or application:

General Electric Company application dated October 8, 1979, as supplemented.

3.(c) Docket No. 71-9001

4. CONDITIONS

This certificate is conditional upon the fulfilling of the requirements of Subpart D of 10 CFR 71, as applicable, and the conditions specified in item 5 below.

5. Description of Packaging and Authorized Contents, Model Number, Fissile Class, Other Conditions, and References:

(a) Packaging

(1) Model No.: IF-300

(2) Description

A stainless steel encased, depleted uranium shielded cask. The cask is cylindrical in shape, 64 inches in diameter and a maximum of 210 inches long with maximum cavity dimensions of 37-1/2 inches in diameter by 180-1/4 inches long. Shielding is provided by 4 inches of depleted uranium, 2-1/8 inches of stainless steel and a minimum of 4-1/2 inches of water.

Two closure heads are provided for the shipment of BWR and PWR fuel assemblies. The heads are 304 stainless steel forgings and end plates which encase the 3-inch thick depleted uranium shielding.

The closure heads are secured to the cask body by means of 32, 1-3/4 inch studs and nuts. The cask is sealed with a metallic ring gasket.

The cavity is penetrated by a vent line at the top and a drain line at the bottom. These lines are sealed by bellows seal stainless steel globe valves and valved quick-disconnect couplings. The vent line is also equipped with a 375 psig relief valve. All valves are housed in protected boxes on the cask exterior.

5. (a) Packaging (continued)

(2) Description (continued)

Neutron shielding is provided by a liquid-filled, thin-walled, corrugated containment on the cask exterior. This cylindrical structure is separated into two longitudinal compartments, each equipped with two expansion tanks, fill and relief valves. The fill line from each compartment is terminated by a stainless steel globe valve in a protected box (separate from cavity boxes) on the cask exterior. The vent line from each compartment goes to an expansion tank which is provided with a pressure relief valve set at 200 psig.

The cask has two types of fuel baskets which can be interchanged to accommodate various fuels. The PWR basket holds 7 assemblies, the BWR basket hold 18 assemblies. The BWR fuel basket may be provided with supplementary shielding (depleted uranium) near the cask closure.

The cask is shipped horizontally with the bottom supported in a tipping cradle between two pedestals and the upper end resting in a semi-circular saddle; the upper end is pinned to the saddle. The cask supports are welded to the framing of a 37-1/2-foot long by 8-foot wide structural steel skid. The skid also holds the cask cooling system which consists of two diesel engines driving two blowers which discharge into common ducting. Four ducts run the length of the cask and direct cooling air to the corrugated surface. Operation of the auxiliary cooling system is not a requirement of this package approval.

The entire cask and cooling system is covered by a retractable aluminum enclosure. Access to the enclosure is via locked panels in the side and a locked door in one end. Although the Model No. IF-300 cask can be transported for short distances on the highway, its principal mode of transportation is by railroad.

The gross weight of the cask is approximately 140,000 pounds. The skid and other external components weigh approximately 35,000 pounds.

(3) Drawing

The Model No. IF-300 shipping cask is described by the following General Electric Company Drawing No.: 159C5238-Sheets 1 thru 2, Rev. 2; Sheet 3, Rev. 3; Sheets 4 thru 5, Rev. 4; Sheet 6, Rev. 5; Sheet 7, Rev. 3; Sheet 8, Rev. 3 or 4; Sheet 9, Rev. 3; Sheet 10, Rev. 5; and Sheet 11, Rev. 2.

(b) Contents - water as primary coolant

(1) Type and form of material

Irradiated PWR or BWR uranium oxide fuel assemblies. The specific power of each fuel assembly shall not exceed 40 kw/kgU and the burnup of each fuel assembly shall not exceed 35,000 MWD/MTU. The minimum cooling time of each assembly shall be no less than 120 days. Prior to irradiation, the PWR and BWR fuel assemblies have the following dimensions and specifications:

5. (b) Contents- water as primary coolant (continued)

	PWR	BWR
Fuel form	Clad UO_2 pellets	Clad UO_2 pellets
Cladding material	Zr or SS	Zr or SS
Maximum initial U content/assembly, kg	465	198
Maximum initial U-235 enrichment, w/o	4.0	3.5
Maximum bundle cross section, inches	8.75	5.75
Fuel pin array	14x14/15x15	7x7
Fuel diameter, inch	0.380-0.460	0.500-0.600
Fuel pin pitch range, inch	0.502-0.582	0.647-0.809
Maximum active fuel length, inches	145	146

The assemblies may be shipped with or without burnable poison rods or control rods.

(2) Maximum quantity of material per package

Maximum decay heat per package not to exceed 210,000 Btu/hr. Maximum 37,500/Btu/hr/PWR assembly. Maximum 14,600/Btu/hr/BWR assembly.

Seven (7) PWR fuel assemblies, or eighteen (18) BWR fuel assemblies.

Above assemblies to be contained in their respective fuel baskets are shown in GE Drawing No. 159C5238-Sheet 6, Rev. 5.

(c) Contents - air as primary coolant

(1) Type and form of material

Irradiated PWR and BWR uranium oxide fuel assemblies. The specific power of each fuel assembly shall not exceed 40 Kw/KgU and the burnup of each fuel assembly shall not exceed 35,000 MWD/MTU. The minimum cooling time of each assembly shall be no less than 120 days. Prior to irradiation, the BWR and PWR fuel assemblies shall have the following dimensions and specifications:

5. (c) Contents- air as primary coolant (continued)

	PWR	BWR
Fuel form	Clad UO_2 pellets	Clad UO_2 pellets
Cladding material	Zr or SS	Zr or SS
Maximum initial U content/assembly, kg	465	198
Maximum initial U-235 enrichment, w/o	4.0	3.5
Maximum bundle cross section, inches	8.75	5.75
Fuel pin array	14x14/15x15	7x7
Fuel diameter, inch	0.380-0.460	0.500-0.600
Fuel pin pitch range, inch	0.502-0.582	0.647-0.809
Maximum active fuel length, inches	145	146

The assemblies may be shipped with or without burnable poison rods or control rods.

(2) Maximum quantity of material per package

Maximum decay heat per package not to exceed 40,000 Btu/hr. Maximum 5,725 Btu/hr/PWR assembly. Maximum 2,225 Btu/hr/BWR assembly.

Seven (7) PWR fuel assemblies, or eighteen (18) BWR fuel assemblies.

Above assemblies to be contained in their respective fuel baskets as shown in GE Drawing No. 159C5238-Sheet 6, Rev. 5.

(d) Unloaded package - contents and maximum quantity of material

Greater than a Type A quantity of residual radioactive material consisting of mixed-fission and activation products adhering to interior cavity and fuel basket surfaces.

(e) Fissile Class I

6. (a) The end of life (after irradiation) calculated fuel pin pressure shall not exceed 1,800 psia, at 900°F for contents 5(b).

(b) The end of life total calculated residual gas that could become available from the fuel pins shall not exceed 0.23 lb moles for content 5(c) and individual calculated fuel pin pressure shall not exceed 2,500 psia, at 900°F.

7. The maximum gross weight of the cavity contents shall not exceed 21,000 pounds.

8. (a) For the contents described in 5(b) (water coolant) the cavity fill specifications shall include the following: A 21.0 + 1.0 - 0.5 cu ft cavity air void shall be established for PWR and BWR loadings. These air voids are established when the bulk water temperature is at 100°F for both the PWR and BWR loadings. If less than the maximum number of fuel assemblies is loaded into the basket, a void displacement equivalent to the missing fuel assemblies shall be inserted into the basket. In addition, the licensee shall take sufficient time-temperature-pressure data to show that the cavity pressure will not exceed 346 psig during a 130°F day with no auxiliary cooling. Under freezing conditions, the minimum heat load shall be 36,400 Btu/hr when water is used as the primary cavity coolant.

   (b) For the contents described in 5(c) (air coolant) the cavity fill specifications shall include the following: An air void shall be established such that not more than 1.0 cu ft of water (corresponding to a bulk water temperature of 70°F) remains in the cavity. The licensee shall take sufficient time-temperature-pressure data to ensure that the cavity pressure will not exceed 45 psig, and that the average cavity wall temperature will not exceed 210°F during the 130°F day with no auxilary cooling.

9. A determination shall be made for each water coolant shipment (for contents described in 5(b) that the total radioactivity of the primary coolant will not exceed, during the anticipated period of transport, the limits specified in 10 CFR §71.36(a)(2). This determination shall include monitoring of the coolant and verification of the coolant activity upon arrival of the package at its destination. Records of such determinations shall be maintained for a period of two years after its generation.

10. For the contents described in 5(c) and 5(d), the air coolant is considered part of the package contents. The radioactivity limits specified in 10 CFR §71.35(a)(4) do not apply.

11. Prior to each shipment, the licensee shall confirm that the cask is properly sealed by testing as Subsection 11.3.3.1.

12. The cask contents shall be so limited that under normal conditions of transport, 111 times the neutron dose rate plus 11.3 times the gamma dose rate will not exceed 1000 mrem/hr at three (3) feet from a) all external surfaces of the cask for wet shipments or b) all external surfaces except the ends (top and bottom) of the cask for dry shipments.

13. The neutron shielding tanks shall be filled with water during the months of May through October and approximately a 50/50 volume pe' t mixture of ethylene glycol and water during the months of October through May the total package decay heat is greater than 183,400 BTU/hr (70% of design basis). If the total package decay heat is less than 183,400 BTU/hr the ethylene glycol and water mixture may remain in place all year.

14. In addition the requirements of Subpart D of 10 CFR Part 71, each package prior to first use shall meet all of the acceptance tests and criteria specified in Subsections 6.7.6.2, 11.3.1.1, and 11.3.1.7.

15. The maximum allowable heat load shall be documented for each cask and conspicuously and durably marked on the cask.

16. Each cavity relief valve, typical glove valves, and typical shielding tank (barrel expansion tank) relief valves shall be tested as stated in Subsections 6.5.3.3, 6.6.1.1, and 6.6.1.2.

    In lieu of the requirements of 10 CFR §71.54(h), valve testing and maintenance frequency shall be as stated in Subsections 6.5.3.4, 6.6.2.1, and 6.6.2.2 except during periods of cask inactivity. During inactive periods the maintenance and testing frequency may be disregarded provided that the package is brought into full compliance with these requirements prior to the next use of the package.

17. The cask cavity shall be equipped with a Target Rock 73J pressure relief valve set at a pressure of 375 psig (450°F). The valve is shown in Target Rock Corporation Drawing No. 73J-001, Rev. H, J, K, or L.

18. The uranium shielding material shall be separated from all steel surfaces with a minimum copper thickness of 4-mils, except that the stud bolts attaching the shield assemblies to top of the BWR basket shall be coated with a minimum of 1/2-mil of copper.

19. For casks using air as the primary coolant, the cavity pressure relief valve specified in Item 16 shall be installed and operating during the cooldown prior to unloading.

20. No shutoff valve shall be installed between each neutron shield tank and its respective thermal expansion tank.

21. The package authorized by the certificate is hereby approved for use under the general license provisions of 10 CFR §71.12(b).

22. Expiration date: October 31, 1994.

REFERENCES

General Electric Company consolidated application dated October 8, 1979.

Supplement dated: May 12, July 21, and November 26, 1980.

Documentation of maximum package heat load as determined by Item 15 above. Section XI, Quality Assurance and Testing, is deleted from the application.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief
Transportation Certification branch
Division of Fuel Cycle and
Material Safety

Date: JAN 23 1981