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# U.S. NUCLEAR REGULATORY COMMISSION

## CERTIFICATE OF COMPLIANCE

For Radioactive Materials Packages

	15842°	er 1.(b	Revision No.	1.(c) Pack	R790441/B(0)Po.	1.(d) Pages No.	1.(e) Total No. Page		
2 PREAMBL	E								
2.(a)	This cert Materials Transpor	ficate is issued to satisf Regulations (49 CFR 1 tation Dangerous Cargo	y Sections 173.393a, 70-189 and 14 CFR es Regulations (48 CF	173.394, 173.3 103) and Sectio R 146-149), a	95, and 173.396 of the ns 146-19-10a and 14 s amended.	Department of Tra 6-19-100 of the I	insportation Hazardou Department of		
2.(b)	The paci Federal Certain (	ckaping and contents described in item 5 below, meets the safety standards set forth in Subpart C of Title 10, Code of Regulations, Part 71, "Packaging of Ramioactive Materials for Transport and Transportation of Radioactive Material Ur Conditions."							
2.(c)	This cert Transpor will be t	ficate does not relieve tation or other applicab ransported.	the consignor from co le regulatory agencies	im compliance with any requirement of the regulations of the U.S. Department of encies, including the government of any country through or into which the package					
3. This certif	icate is is	ued on the basis of a se	ifety analysis report o	f the package o	esign or application-				
3.(a)	Prepared	by (Name and address)	3.(b)	3.(b) Title and identification of report or application					
General Electric Company P. O. Box 460 Pleasanton, CA 94566		G	eneral El anuary 8,	ectric Company 1969, as suppl	application lemented.	dated			
riedstarton, on store			3.(c)	3.(c) Docket No. 71-9044					
5. Description	n of Packaging and Authorized Contents, Model Number, Fissile Class, Other Conditions, and References: ) Packaging								
	(1)	Model No.: G	E-1600						
	(2)	Description							
	( = )								
		Steel encased cylinder prot bolted to a s plug fitted w cavity is equ as follows:	lead shielde ective jacket teel pallet. ith a silicon ipped with a	d shippin encloses The cask e rubber drain lin	g cask. A dout the cask durin is closed by a gasket and bolt e and the physt	ole-walled s ng transport a lead-fille ted closure. ical descrip	teel . It is d flanged The tion is		

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- 5. (a) Packaging (continued)
  - (3) Drawings

The packaging is constructed in accordance with the following General Electric Company Drawing Nos.:

212E255, Rev. 7	106D3973, Rev.	5
106D3986, Rev. 4	129D4687, Rev.	0
174F237, Rev. 4	129D4688, Rev.	1
135C5598, Rev. 2	106D3989, Rev.	1
913E307, Rev. 1		

#### (b) Contents

(1) Type, form and maximum quantity of material per package

Plutonium in excess of twenty (20) curies per package must be in the form of metal, metal alloy or reactor fuel elements; and

 Byproduct material and special nuclear material as solid metal or oxides. Decay heat not to exceed 600 watts. The radioactive material shall be in the form of fuel rods, or plates, fuel assemblies, or meeting special form requirements of 10 CFR \$71.4(0).

500 gm U-235 equivalent mass; or

(ii) Neutron sources in special form.

500 gm U-235 equivalent mass. Decay heat not to exceed 50 watts; or

(iii) Irradiated PuO<sub>2</sub> and UO<sub>2</sub> fuel rods clad in zircaloy or stainless steel. Decay heat not to exceed 600 watts. All fuel rods shall be contained within a closed 5-inch Schedule 40 pipe with a maximum useable length of 39-5/8 inches.

1,200 gm fissile material with no more than 300 gm fissile material per 5-inch Schedule 40 pipe.

(iv) Irradiated UC and ThC fuel particles clad in graphite and contained within a standard HTGR hexagonal cross-section graphite block. Decay heat not to exceed 600 watts. Each graphite block shall be contained within a sealed cylindrical inner container constructed in accordance with General Atomic Company Drawing No. 021583, Issue A, with three, 1/2-inch by 4-1/2-inch radial fins to provide centering within the cavity.

1,400 grams U-235 equivalent mass in each inner container with no more than one inner container per package.

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## 5. (b) (1) Contents (continued)

- (v) Process solids, either dewatered, solid, or solidified in a secondary sealed container meeting the requirements for low specific activity radioactive material.
- (vi) Solid nonfissile irradiated metal hardware, reactor control rods (blades), reactor start-up sources, and segmented boron carbide tubes (tube contents not to exceed a Type A quantity).
- (vii) Radioactive (Hot Cell) waste materials immobilized with cement grout and contained in a 55-gallon (or extended 55-gallon drum) DOT Specification 17H or 17C steel drum, lid and closure. The Waste material must be packaged in accordance with the Procedural Outline of the Immobilization of Cell Waste Using Cement Grout, Attachment 1 of the December 1, 1981 supplement. The cement grout must be at least 50 volume percent (estimated) of the drum contents and relatively uniformly distributed throughout the drum. At least 3/4" thick layer of grout must cover all radioactive waste contents. Decay heat not to exceed 100 watts, and fissile material not to exceed 500 grams U-235 equivalent mass.
- (c) Fissile Class

per shipment

Maximum number of packages (i) Contents 5.(b)(1)(i), 5.(b)(1)(ii), 5.(b)(1)(iii), or 5.(b)(1)(vii):

Two (2): or

III

(ii) Contents 5.(b)(1)(iv):

One (1)

- 6. The U-235 equivalent mass is determined by U-235 mass plus 1.66 times U-233 mass plus 1.66 times Pu mass.
- 7. For packaging of neutron sources, the cavity drain line must be closed with a plug with a melting temperature of 200°F and the cask cavity must be filled with water with a 5-inch air space within the cask cavity. When needed, sufficient antifreeze in the cask must be used to prevent damage to any component of the package due to freezing.
- 8. For packaging of other than neutron sources, the cask must be delivered to a carrier dry and the cavity drain line must be closed with a plug which will maintain its seal at temperatures up to at least=620°F.

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- 9. Shoring must be provided to minimize movement of contents during accident conditions of transport.
- Prior to each shipment the silicone rubber lid gasket(s) must be inspected. This gasket(s) must be replaced if inspection shows any defects or every twelve (12) months, whichever occurs first. Cavity drain line must be sealed with appropriate sealant applied to threads of pipe plug.
- 11. For packaging of neutron sources, measurements must be made to determine that the dose rate does not exceed 1,000 mrem/hr at 3 feet from the surface of a dry cask with no additional shielding within the cask.
- 12. The contents described in 5.(b)(1)(v) must be transported on a motor vehicle, railroad car, aircraft, inland water crafts, or hold or deck of a seagoing vessel assigned for sole use of the licensee.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12(b).
- 14. Expiration date: March 31, 1982.

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S.B.

### REFERENCES

General Electric application dated January 8, 1969.

Supplements dated: February 12, 20, and 27, and March 10 and 24, 1969; November 20, 1970; January 29 and March 12, 1971; July 3 and November 15, 1973; December 4, 1979; August 26, 1980; and August 31 and December 1, 1981.

Nuclear Plant Services supplement dated: July 7, 1975.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Certification Branch Division of Fuel Cycle and Materials Safety

Date: DEC 1 8 1981

U.S. Nuclear Regulatory Commission Transportation Certification Branch Approval Record Model No. GE-1600 Docket No. 71-9044

By application dated December 1, 1981, General Electric Company requested an amendment to Certificate of Compliance No. 9044 to permit additional contents for the Model No. GE-1600 packaging.

The applicant proposes to immobilize contaminated particles present on radioactive waste materials generated in their Vallecitos Nuclear Center (VNC) Hot Cell Complex by grouting the wastes into 55-gallon drums which are then placed within the Model No. GE-1600 shipping package. The grouted form of the waste material is intended to assure adequate containment of the radioactive material to satisfy the requirements of 10 CFR Part 71 for normal conditions of transport and accident damage conditions.

The applicant has shown that the configuration of the grouted drums is maintained for normal conditions of transport, and that the radioactive wastes maintain their protective coating of grout. Thus, the form of the material precludes release of radioactive contamination particles for normal conditions of transport.

The applicant has tested grout samples, and used the results to demonstrate that there can be no significant release of radioactive material for the package when wastes are shipped in the grouted form. A sample grout cylinder was tested to determine the extent of damage to the waste in grouted form when subjected to accident damage tests of 10 CFR Part 71. The extent of cracking, and the amounts and sizes of fragments and powder produced by the failed grout was determined from the test. The tests results were used along with reasonably conservative estimates of the contamination product release fractions and mechanisms to estimate the maximum quantities of radioactive material that could be released. The driving force was assumed as the maximum internal pressure due to expanded gas within the drum, heated to maximum temperature predicted for the fire test. The applicant estimated that the maximum quantities of mixed fission products (MFP) and Co-60 released would not exceed 0.018 Ci and 0.01 Ci, respectively. This is well within the criteria recommended by Regulatory Guide 7.4 for Type B(M) packages: 0.4 Ci and 7 Ci over one week for MFP and Co-60, respectively. Thus, the form of the material limits the maximum release of radioactive material for accident damage conditions of quantities that are sufficiently insignificant to satisfy the containment regiments of 10 CFR Part 71.

In addition, the applicant requested that the previously required sealed secondary containers for the shipment of irradiated segmented boron carbide tubes be deleted. The certificate has been revised to limit the dispersible material ( $B_4C$ ) to a Type A quantity of radioactive material. Thus, the amount of radioactive material contained within the  $B_4C$  and available for release under accident conditions, could not exceed a Type A quantity.

The requested approval of the revised drawings (submitted October 2, 1981) for the Model No. GE-1600 packaging was not approved at this time because of the concerns raised in our letter to the applicant on November 12, 1981.

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

Date DEC 1 8 1981

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