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
6387	4	USA/6387/B( )F	1	5

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*):

Battelle Pacific Northwest
Laboratories
Battelle Boulevard
Richland, Washington 99352

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

Battelle Pacific Northwest Laboratories application dated November 24, 1971, as supplemented.

3.(c) Docket No. 71-6387

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.: Model 60

(2) Description

A metal "birdcage" enclosing a steel containment vessel for non-irradiated fuel pins. The stainless steel containment vessel is a 6-inch diameter, 101-1/4-inch long, Schedule 40 pipe. One end is closed with a 1-inch thick cover plate, bolted with eight 3/4-inch diameter bolts to a welded, 150-pound, neck type flange. The gasket is a Flexitallic type, spiral wound, stainless steel, asbestos filter. The cover plate is fitted with a rupture disk assembly designed for up to 300 psi.

The containment vessel is centered inside a metal "birdcage" (18"x18"x112.5", prismatic, cage frame made of 1-1/2"x1-1/2"x1/4" angle iron), supported by six 0.188-inch steel welded perpendicular to its longitudinal axis and equally spaced along its body and by four Schedule 80 SS pipe spokes at each end. The outer spacer cage is covered with expanded steel mesh. The loaded container weight is approximately 1,000 pounds.

5.(a) Packaging (Continued)

(3) Drawings

The packaging is constructed in accordance with Drawing No. H-3-32429 (7 sheets), shown in Figures 3 through 9 in Hanford Engineering Development Laboratory Report No. TC-138, Rev. 1, January 1978, and Hanford Engineering Development Laboratory Drawings Nos. H-3-42514, Rev. 0; H-3-39691, Sheet 1, Rev. 1 and Sheet 2, Rev. 0; and H-3-44280, Rev. 0.

(b) Contents

(1) Type and form of material

(i) Nonfissile radioactive material, in capsules which meet the requirements of special form material as defined in 10 CFR §71.4(o).

(ii) Unirradiated fuel pins containing mixed PuO_2 in depleted or natural UO_2 or ThO_2 as pressed sintered pellets of the following specification:

Pellet diameter, inch	0.19 to 0.205
Pin diameter, inch	0.22 to 0.24
Maximum length, inches	37.0
Maximum PuO_2, w/o	31
Maximum U-235 enrichment, w/o	0.72
Minimum Pu-240 enrichment, w/o	10
Cladding material	SS
Minimum cladding thickness, inch	0.015

(iii) Unirradiated fuel pins containing mixed PuO_2 in UO_2 enriched to any degree in the U-235 isotope; ThO_2 may be substituted for depleted or natural UO_2; plutonium or uranium carbides and nitrides are allowed. All of the above as solid pellets of the following specifications:

Maximum pin diameter, inch	0.600
Maximum length, inch	37
Minimum Pu-240 enrichment in PuO_2, w/o	10
Maximum Pu-241 content	<1/2 content of Pu-240
Cladding material	SS
Minimum cladding thickness, inch	0.010
Maximum fissile density, Kg-fissile per length of containment vessel:	
for PuO_2 in UO_2, Kg/ft	2.0
for plutonium or uranium carbides and nitrides, Kg/ft	1.6

5(b) Contents (Continued)

(iv) PuO_2 and UO_2 enriched in the U-235 isotope in fuel pins or capsules which meet the requirements of special form material as defined in 10 CFR §71.4(o).

(v) U-233 in any solid physical or chemical form with any moderation in capsules which meet the requirements of special form material as defined in 10 CFR §71.4(o).

(vi) Np-237 and Am-241 in any solid physical or chemical form with any moderation in capsules which meet the requirements of special form material as defined in 10 CFR §71.4(o).

(vii) Pu-241 (in isolated form), Am-242, Cm-243, Cm-244, Cm-245, Cf-249 and Cf-251 in any solid physical or chemical form with any moderation in capsules which meet the requirements of special form material as defined in 10 CFR §71.4(o).

(viii) Pu-241 (non-isolated form), Pu-238, Pu-239, Pu-240 and U-235 in any solid physical or chemical form; provided the Pu-241 content of the plutonium does not exceed 50% of the Pu-240 content in capsules which meet the requirements of special form material as defined in 10 CFR §71.4(o).

(2) Maximum quantity of material per package

The maximum package heat load shall not exceed 12.3 watts/ft of fuel length with the maximum package heat load not to exceed 37.0 watts, and plutonium in excess of twenty (20) curies per package must be in the form of metal, metal alloy or reactor fuel elements; and:

(i) For the contents described in 5(b)(1)(ii) abd 5(b)(1)(iii): 120 fuel pins, constrained in appropriate pin holders as shown in drawings specified in 5(a)(3).

(ii) For the contents described in 5(b)(1)(iv): Greater than Type A quantity of radioactive material and fissile material contents not to exceed the generally licensed mass limits as specified in §71.11(a) of 10 CFR Part 71.

(iii) For the contents described in 5(b)(1)(v): 280 grams.

(iv) For the contents described in 5(b)(1)(vi): 15 kgs total.

(v) For the contents described in 5(b)(1)(vii): 3 grams total.

(vi) For the contents described in 5(b)(1)(viii): 900 grams fissile.

5. (Continued)

(c) Fissile Class II and III

(1) Minimum transport index to be shown on label for Class II.

(i) For contents described in 5(b)(1)(ii) and limited in 5(b)(2)(i): 0.4

(ii) For contents described in 5(b)(1)(iii) and limited in 5(b)(2)(i): 7.0

(iii) For contents described in 5(b)(1)(v) and limited in 5(b)(2)(iii): 1.3

(iv) For contents described in 5(b)(1)(vi) and limited in 5(b)(2)(iv): 0.2

(v) For contents described in 5(b)(1)(vii) and limited in 5(b)(2)(v): 0.6

(vi) For contents described in 5(b)(1)(viii) and limited in 5(b)(2)(vi):

Maximum grams fissile per container	Transport Index
150	0.1
500	1.3
900	7.0

(2) Maximum number of packages per shipment for Class III

Contents described in 5(b)(1)(iv) and limited in 5(b)(2)(ii): One (1)

6. For mixtures of isotopes specified in 5(b)(1)(viii) and 5(b)(1)(v) and limited in 5(b)(2)(vi), 5(c)(1)(vi), 5(b)(2)(iii) and 5(c)(1)(iii) the sum of the ratios of the content masses to their respective approved mass limits shall not exceed unity.

7. For the contents specified in 5(b)(1)(iii) and 5(b)(1)(ii) and limited in 5(b)(2)(i) and 5(c)(1)(ii) nitrides and carbides may be shipped under the same limits as oxides. The pins shall be confined to a stainless steel cylinder, close packed within a 5.7-inch diameter, and:

(a) For cylinders containing between 58 and 120 pins the minimum cylinder wall thickness shall be 0.035 inch;

(b) For cylinders containing between 35 and 57 pins the minimum cylinder wall thickness shall be 0.050 inch, or the linear density of fissile material shall not exceed 1.5 kg per foot of containment vessel.

8. The packaging shall be equipped with a FIKE Assembly Number 1/2 SP 10A rupture unit having a muffled outlet, 304 SS body, and nickel rupture disc to burst at less than 300 psi.

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

10. Expiration date: June 30, 1980.

REFERENCES

Hanford Engineering Development Laboratory letter dated March 19, 1979.

FOR THE CONTENTS DESCRIBED IN 5(b)(1)(ii) and 5(b)(1)(iv):

Battelle Pacific Northwest Laboratories' application dated November 24, 1971.

Supplement dated: July 18, 1972.

Hanford Engineering Development Laboratory letter dated June 13, 1975.

FOR THE CONTENTS DESCRIBED IN 5(b)(1)(i), 5(b)(1)(iii), 5(b)(1)(v), 5(b)(1)(vi), 5(b)(1)(vii), AND 5(b)(1)(viii).

Hanford Engineering Development Laboratory Report No. TC-138, Rev. , January 1978.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

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

Date: MAY 29 1979