

AUG 10 1988

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SGTB:CRM  
71-9022

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Combustion Engineering, Inc.  
ATTN: Mr. H. V. Lichtenberger  
1000 Prospect Hill Road  
Windsor, CT 06095

Gentlemen:

As requested by your application dated July 1, 1988, as supplemented, enclosed is Certificate of Compliance No. 9022, Revision No. 12, for the Model No. CE-250-2 shipping package. This certificate supersedes, in its entirety, Certificate of Compliance No. 9022, Revision No. 11, dated October 30, 1987.

Changes made to the enclosed certificate are indicated by vertical lines in the margin.

Those on the attached list have been registered as users of this package under the general license provisions of 10 CFR §71.12 or 49 CFR §173.471.

This approval constitutes authority to use this package for shipment of radioactive material and for the package to be shipped in accordance with the provisions of 49 CFR §173.471.

Sincerely,

Original Signed by  
CHARLES E. MACDONALD

Charles E. MacDonald, Chief  
Transportation Branch  
Division of Safeguards and  
Transportation, NMSS

Enclosures:

1. Certificate of Compliance  
No. 9022, Rev. 12
2. Approval Record

cc w/encls:  
Mr. Michael E. Wangler  
Department of Transportation

71-64

OFC: SGTB	: SGTB	: SGTB	: SGTB	:	:	:
NAME: CRMarotta	: RHodegaarden	: CRChappell	: CEMacDonald	:	:	:
DATE: 08/8/88	: 08/8/88	: 08/9/88	: 08/9/88	:	:	:

OFFICIAL RECORD COPY

Model No. CE-250-2 Package  
USA/9022/AF

Addresses: w/encls

Ltr dtd: AUG 10 1988

Combustion Engineering, Inc.  
ATTN: Mr. H. V. Lichtenberger  
1000 Prospect Hill Road  
Windsor, CT 06095

Exxon Nuclear Company, Inc.  
ATTN: Mr. L. D. Gerrald  
P.O. Box 130  
Richland, WA 99352

**CERTIFICATE OF COMPLIANCE  
FOR RADIOACTIVE MATERIALS PACKAGES**

U.S. NUCLEAR REGULATORY COMMISSION

1. a. CERTIFICATE NUMBER 9022	b. REVISION NUMBER 12	c. PACKAGE IDENTIFICATION NUMBER USA/9022/AF	d. PAGE NUMBER 1	e. TOTAL NUMBER PAGES 3
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2. PREAMBLE

- a. This certificate is issued to certify that the packaging and contents described in Item 5 below, meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."
- b. 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

a. ISSUED TO (Name and Address)

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION:

Combustion Engineering, Inc.  
1000 Prospect Hill Road  
Windsor, CT 06095

Combustion Engineering, Inc. application  
dated January 11, 1980, as supplemented.

71-9022

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No. CE-250-2

(2) Description

The packaging consists of a 16-gauge steel containment vessel, 11-5/8 inches ID by 57-1/4 inches long with a bolted and gasketed top flange closure and steel welded bottom plate. The containment vessel is centered and supported in a 22-3/2-inch ID by 58-3/8-inch long, 16-gauge steel drum by twelve 3/4-inch diameter spring steel rods welded to the containment vessel at the top flange and the bottom of the vessel. The void space between the containment vessel and outer container is filled with vermiculite.

Closure of the containment vessel is maintained by a gasket (either silicone rubber or asbestos and rubber) and six 1/2-inch hex head bolts and nuts. The outer container closure is made with a 12-gauge bolt locking ring with drop forged lugs, one of which is threaded, having a 5/8-inch diameter bolt and lock nut.

The gross weight of the packaging and contents is approximately 575 pounds.

(3) Drawing

The packaging is constructed in accordance with Combustion Engineering Company, Inc. Drawing No. NFM-E-Z2175, Revision 03.

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## (b) Contents

## (1) Type and form of material

- (i) Dry uranium oxide pellets and powder enriched to a maximum 4.1 w/o in the U-235 isotope. The maximum H/U atomic ratio, considering all sources of hydrogenous material within the containment vessel shall not exceed 2.26.
- (ii) Dry uranium oxide powder enriched to a maximum 5.0 w/o in the U-235 isotope. The maximum H/U atomic ratio, considering all sources of hydrogenous material within the containment vessel shall not exceed 1.32.

## (2) Maximum quantity of material per package

(i) For the contents described in 5(b)(1)(i):  
The total contents not to exceed 300 pounds, with the U-235 content not to exceed 4.5 kilograms. The contents shall be contained within sealed steel containers with a maximum cross sectional area of 73.2 square inches.

(ii) For the contents described in 5(b)(2)(ii):  
The contents not to exceed 265 pounds, with the U-235 content not to exceed 5.3 kilograms. The contents shall be contained within sealed steel containers with a maximum cross-sectional area of 73.2 square inches.

## (c) Fissile Class

- |  |  |     |
|--|--|-----|
| (1) Minimum transport index to be shown on label | For contents described in 5(b)(1)(i) and limited in 5(b)(2)(i)   | 0.6 |
| (2) Minimum transport index to be shown on label | For contents described in 5(b)(1)(ii) and limited in 5(b)(2)(ii) | 0.5 |

6. The containment vessel closure gasket (Item No. 12, Drawing No. NFM-E-Z2175, Rev. 03) must be made of silicone rubber, or an Anchor Packing Company gasket "Target" or "425."
7. Spacers and product containers shall be used to provide a snug axial fit of the product containers within the containment vessel.

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8. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
9. Expiration date: June 30, 1990.

REFERENCES

Combustion Engineering, Inc. application dated January 11, 1980.

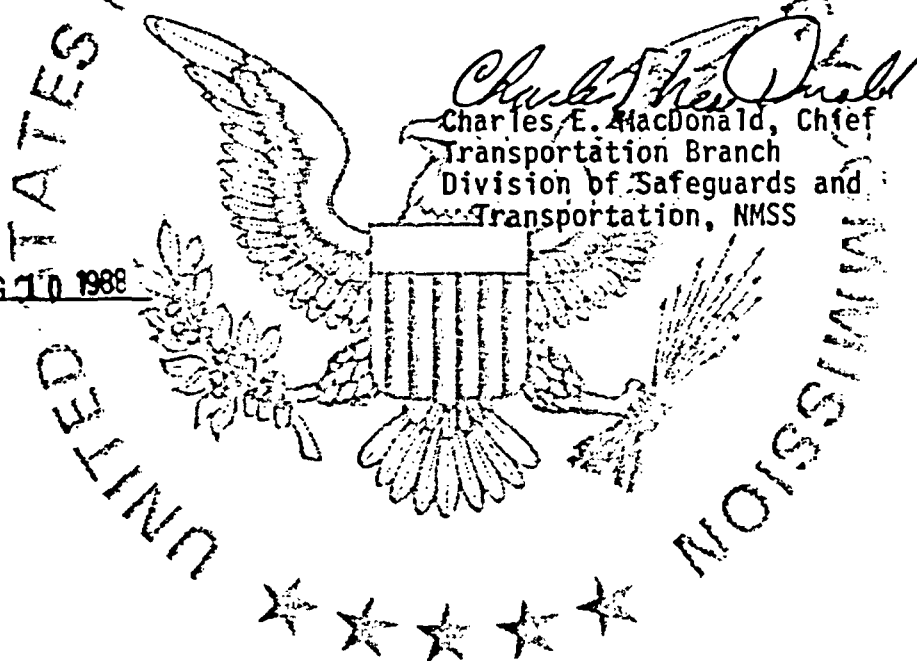
Supplement dated: June 6, 1980; September 1, 1987; and July 1, 22 and 28 and August 4, 1988.

Exxon Nuclear Company supplement dated: May 13, 1981.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

*Charles E. MacDonald*  
Charles E. MacDonald, Chief  
Transportation Branch  
Division of Safeguards and  
Transportation, NMSS

Date: AUG 10 1988





UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

Transportation Branch  
Approval Record  
Model No. CE-250-2 Package  
Docket No. 71-9022  
Revision No. 12

By application dated July 1, 1988, as amended July 22 and 28 and August 4, 1988, Combustion Engineering, Inc. (CE) requested approval of  $U(5)O_2$  powder as new contents in the Model No. CE-250-2 package for Fissile Class<sup>2</sup>II with Transport Index of 0.5. Maximum  $U(5)O_2$  powder per pail is restricted to 30 Kgs with a maximum H/U of 1.32 considering all sources of homogeneous material within the containment vessel. The maximum total contents per package are not to exceed 265 lbs, with the U-235 content not to exceed 5.3 kilograms.

The applicant established the subcriticality of the single damaged package and normal and accident arrays of the CE-250-2 packages with the subject contents using the KENO-IV Monte Carlo computer program with the 16-group Hansen-Roach cross-section set. Appropriate U-238/U-235 cross-section sets were determined by the  $s/\text{atom}$  of the system under consideration. This calculational approach has successfully calculated standard benchmarks and actual criticals.

The staff validated all the computer input-output atomic densities, geometric specifications and cross-sections supplied by CE for the normal and accident arrays, and the single damaged package. All computer runs were shown to be accurate and represented the cases intended.

The Keff calculated by CE are given in the following table:

Maximum Keff Calculated  
for  
Model No. CE-250-2 Package with  
5 w/o U-235  $UO_2$  Powder

Condition	Array of Packages	KENO-IV, Keff <sup>(a)</sup>
Normal interpacks dry with max 5 w/o <sup>(b)</sup> water in fuel; intersp. hyd. mod.; array reflected by water	8x8x8 = 512	0.814
Accident same as normal, but crushed packages in contact; intr. mod. & array reflected by water	12x12x12 = 1728	0.912


(a) Max Keff = Avg Keff + 3  $\sigma$  (with Hansen-Roach 16-gp x-sect)

(b) 5 w/o water in fuel translates to H/U = 1.32.

Maximum Keff's Calculated (Continued)

<u>Condition</u>	<u>Array of Packages</u>	<u>KENO-IV, Keff</u>
<u>Single Damaged Package</u> cans flooded plus cavity free space; closely reflected by water; optimally moderated contents.	1x1x1 = 1	0.937

The staff thus concludes that the Model No. CE-250-2 package satisfies requirements of 10 CFR Part 71 for the new requested contents of  $UO_2$  powder up to a maximum of 5 w/o in the U-235 isotope.

  
Charles E. MacDonald, Chief  
Transportation Branch  
Division of Safeguards and  
Transportation, NMSS

Date: AUG 10 1988