

Docket 070-0036

COMBUSTION ENGINEERING

June 15, 1989
LD-89-064

Docket No. 71-9022
Certificate of Compliance No. 9022

Mr. Charles E. MacDonald, Chief
Transportation Branch
Division of Safeguards and Transportation
Office of Nuclear Material Safety
and Safeguards
U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Subject: CE-250-2 Shipping Container Criticality Evaluation

Reference: (A) Letter LD-89-030, A. E. Scherer (C-E) to
C. E. MacDonald (NRC), dated March 17, 1989

(B) Letter, C. E. MacDonald (NRC) to
A. E. Scherer (C-E), dated February 6, 1989

Dear Mr. MacDonald:

In our letter of March 17, 1989, Reference (A), Combustion Engineering committed to providing the Nuclear Regulatory Commission with an additional criticality evaluation for our CE-250-2 shipping container representative of a flooded accident condition. The results of our evaluation are provided herewith.

As stated in our March 17, 1989, letter, this evaluation is being provided in fulfillment of Item 2 (a) of your request for additional information, Reference (B), because of the anticipated short term continued use of this container. Work is proceeding on the revitalization of our fuel manufacturing facilities and we continue to anticipate discontinuing use of the CE-250-2 shipping container by the end of 1989.

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Based on the short term continued use of the subject container and the results of the criticality evaluation provided in the Attachment, Combustion Engineering requests your concurrence with our continued use of the CE-250-2 shipping container until its use is no longer required. Once again, we anticipate that we will discontinue use of the CE-250-2 shipping container by the end of 1989.

Should you have any questions concerning this matter, please do not hesitate to call me or Mr. C. M. Molnar of my staff at (203) 285-5205.

Very truly yours,

COMBUSTION ENGINEERING, INC.



A. E. Scherer
Director
Nuclear Licensing

AES:jeb

Attachment: As Stated

cc: R. Chappell (NRC)
G. France (NRC-Region III)
D. McCaughey (NRC)
N. Osgood (NRC)
J. Roth (NRC-Region I)

**CE-250-2 Shipping Container
Supplemental Criticality Evaluation**

In response to a Nuclear Regulatory Commission concern about the leak tightness of the inner container and virgin powder cans in the CE-250-2 shipping container, an additional criticality analysis has been performed to address the concern. The new analysis follows the agreed upon conditions outlined in our March 17, 1989 letter (LD-89-030) to Mr. Charles E. MacDonald.

Specifically, the following assumptions were used in the analysis:

1. Each container was assumed to hold four (4) virgin powder cans. Three (3) of the virgin powder cans were assumed to contain a homogenous mixture of 35 kg UO_2 at 4.3 wt % U235 and water at maximum moderation. The density of UO_2 in the virgin powder can was 2.67 g/cc and, at maximum moderation, the water content was 0.76 g/cc. For this analysis, the fourth virgin powder can was assumed to be filled with water and was placed between two (2) UO_2 filled virgin powder cans in the CE-250-2 inner container.
2. The insulation between the outer shell and the inner container was neglected. Mist content was assumed to be the same density in all areas outside of the virgin powder cans.
3. In the KENO IV model, the outer wall of the CE-250-2 shipping container was modelled as a rectangle, conserving the volume while maintaining the center-to-center distance in a triangular pitch.
4. A 5x5x6 array reflected by 12" of water has been analyzed.
5. The damaged package diameter was used for container spacing.

The KENO IV code with sixteen-group Hansen-Roach cross sections was used to determine the reactivity of the system for various mist densities. From Table 1, it can be seen that the maximum K_{eff} obtained for the very conservative assumptions made was 0.9468 +0.0056. Combustion Engineering believes that these results demonstrate that there is no credible risk to the health and safety of the public from the continued use of the CE-250-2 shipping container. The empty virgin powder can assumed in the analysis will be a specially marked can and facility operations sheets will be modified to outline how the CE-250-2 shipping container is to be loaded.

Table 1

Results of Supplemental Criticality Evaluation

<u>MODERATION INSIDE UO2 POWDER CANS</u>	<u>MIST DENSITY EXTERNAL TO POWDER CANS</u>	<u>K-EFFECTIVE</u>
0.76 g/cc (max)	dry	0.9468 + .0056
0.76 g/cc (max)	0.01 g/cc	0.9448 + .0039
0.76 g/cc (max)	0.05 g/cc	0.9297 + .0052
0.76 g/cc (max)	0.25 g/cc	0.8591 + .0078
0.76 g/cc (max)	0.50 g/cc	0.8226 + .0069
0.76 g/cc (max)	0.76 g/cc	0.8643 + .0068
0.76 g/cc (max)	1.00 g/cc	0.8514 + .0078