71-6639

RETURN TO
A. Machin
396-SS

FCTC:RHO
71-6639

MAY 3 1 1985

Department of Energy
ATTN: Mr. Roy F. Garrison
DP-122.2
Washington, DC 20545

Gentlemen:

This refers to your application dated February 19, 1985, requesting approval of the Model No. MH-1A package.

In connection with our review, we need the information identified in the enclosure to this letter.

Please advise us within 30 days from the date of this letter when this information will be provided. The additional information requested by this letter should be submitted in the form of revised pages. If you have any questions regarding this matter, we would be pleased to meet with you and your staff.

Sincerely,

Original Signed by
CHARLES E. MACDONALD

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

Enclosure: As stated

Distribution: w/encl
Docket File
NRC PDR
IE HQ
Region I
RHOdegaarden (2)
WHLake
CEWilliams
CRMarotta
WHLake HWLee
NMSS R/F
FCTC R/F

8506060480 850531
PDR ADOCK 07106639
C PDR

OFFICE	FCTC	FCTC	FCTC	FCTC	FCTC	FCTC
SURNAME	RHOdegaarden:alm	WHLake	CEWilliams	CRMarotta	HWLee	CEMacDonald
DATE	05/10/85	05/29/85	05/10/85	05/29/85	05/10/85	05/30/85

NRC FORM 318 (10-80) NRCM 0240

OFFICIAL RECORD COPY

Department of Energy
Model No. MH-1A Package
Docket No. 71-6639

Encl to ltr dtd: MAY 3 1 1985

STRUCTURAL

1. On page 2.1-3, the application specifies allowable stress criteria for the cask. However, the application does not show that the stresses in the cask meet this criteria. Many of the stresses reported in the application exceed allowable values. The application should show explicitly that the stresses in the cask are within allowable limits under both normal and accident conditions. Regulatory Guides 7.6 and 7.8 may be helpful in this regard. Also, note that certain bending stresses at the edge joint of the square pressure vessel should be classified as primary stresses (see definition of Secondary Stress in Regulatory Guide 7.6).

2. The discussion presented in the application for oblique drop is not adequate. The application should evaluate the stresses that would be produced under oblique impact orientations and by secondary impact and show explicitly that these stresses are within allowable limits. Also, because the cask is not a shell of revolution, the application should evaluate the cask in the most damaging angular orientation about its longitudinal axis (i.e., the effects produced by rotating the square containment vessel).

3. The application does not consider the combined effect of all the loads which act simultaneously on the containment vessel. For example, the impact analysis should consider the combined effects of impact and ambient temperature (differential thermal expansion/contraction). Regulatory Guide 7.8 specifies an acceptable set of load combinations.

4. The application does not adequately consider the following loads in evaluating stresses in the containment vessel:

   a. The lateral pressure that would be exerted by the lead against the containment vessel under 30-foot end, corner, and obluque orientations (the horizontal spring used in the anslysis does not adequately model this phenomena).

   b. The axial stresses that would be produced by differential thermal expansion/contraction of the inner shell, lead shielding, and the outer shell.

   c. The lateral pressure that would be exerted by the lead against the containment vessel due to differential thermal contraction at the -40°F and -20°F temperature conditions specified in 10 CFR §§71.71 and 71.73.

OFFICE							
SURNAME							
DATE							

5. The buckling evaluation in the application is not adequate to show that the inner shell does not buckle under 30-foot drop test conditions.

    a. The application does not consider possible inelastic buckling (note that stresses in the shell were calculated to be above yield).

    b. The application does not consider the combined effect of all loads that would be acting simultaneously on the containment vessel shell (e.g., impact forces, moments, and shear, lateral pressure of the lead due to impact, and axial and lateral differential thermal expansion/contraction).

    c. The application does not specify a factor of safety against buckling or show the interaction equations that will be used to evaluate the combined effects of different types of loads acting simultaneously.

6. The presentation of the finite element analysis is not clear in that many important aspects of the analysis has not been discussed in detail. All assumptions should be stated clearly and justified. Additional information is needed as follows:

    a. Justify the finite element model adequately represents the cask. Discuss in detail the capabilities of each type of element selected for the model including the input requirements and output obtained.

    b. Justify the boundary conditions used at the horizontal centerline of cask where all nodes are constrained in all directions for all loading conditions.

    c. Identify the mechanical and material properties used in the analysis for the elements of the model.

    d. Identify the loads and the distribution of loading in each analysis.

    e. Identify the procedure to combine different loads (i.e., R.G. 7.8 load combinations).

    f. Provide the rationale of using the average element stress at nodal points instead of using the element stresses directly. The procedure for averaging stresses at the node where two or more elements connected together is confusing and should be explained in more detail. For instance, it is not clear how the average stresses are derived for different types of elements connected together or for elements that do not intersect each other in the same plane (i.e., outer shell and the fins). In addition, the procedure to derive principal stresses and stress intensities at each location should be identified.

OFFICE ▶							
SURNAME ▶							
DATE ▶							

7. Based on dynamic and static test results reported in Sandia Laboratorys' Report No. SLA-74-0159, we believe the redwood crushing stress used in the impact limiter analysis is non-conservative for redwood crushed perpendicular or at an angle to its wood grain. Judging from the assumptions made for redwood crushed area and the compressibility, it is clear that the small safety margin does not provide adequate assurance to prevent redwood bottom-out before all the impact energy is dissipated. In addition, there are reasons to believe that the embedded corrugated cylinders will increase the impact force significantly higher than stated in the application.

8. The application does not analyze the cask for normal transport conditions which could produce governing stress.

9. The application does not report the stresses in the closure bolts or in the drain/vent lines which pass through the lead shielding.

10. The application does not consider potential displacement of shielding due to "lead slump."

11. The puncture evaluation does not consider potential collapse of the top closure plate or the bottom end plate.

12. The application does not analyze the stresses in the bottom end plate of the cask or in the bottom plate of the containment vessel.

<u>THERMAL</u>

The emissivity values chosen for the stainless steel appear to be low. Provide the reference items to justify these values.

<u>OPERATING PROCEDURES</u>

1. Step 42 on pages 7.1-10, 19, and 28; Step 46 on page 7.1-38; and Step 50 on page 7.1-47 provide instructions relative to monitoring cask surface temperature prior to shipment to verify compliance with §71.43(g). The accessible cask surface, when the cask is assembled for shipment, is the fire shell. Discuss the rationale for selecting a location above the fire shell to monitor cask surface temperature.

2. In Section 7.3.1, Steps 1, 3, 4, and 5 are not consistent with the conditions being discussed.

OFFICE ▶							
SURNAME ▶							
DATE ▶							

ACCEPTANCE TESTS AND MAINTENANCE PROGRAM

1. An instruction should be added to the second paragraph in Section 8.2, Maintenance Program, requiring a check on the moisture content of the wood whenever the steel sheathing has been breached. An acceptance criteria should be given.

2. Paragraph 8.2.7, Miscellaneous, should be expanded to require a check on the moisture content of the wood if initial inspection reveals moisture in the steel sheathing.

URANIUM ALUMINUM AND SILICIDE FUELS

Your request of April 15, 1985, concerning additional fuel types should be incorporated into the safety analysis for the package. This should include a physical description of the fuel and reactivity analyses as may be appropriate.

OFFICE ▶							
SURNAME ▶							
DATE ▶							