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September 25, 1978

JDR/78/16/ETS

71-6698

Mr. C. E. MacDonald, Chief
Transportation Branch
Division of Fuel Cycle & Material Safety
Nuclear Regulatory Commission
Washington, D. C. 20555

RE: Letter from J. D. Rollins to C. E. MacDonald, July 18, 1978, JDR/78/09/ETS

Dear Mr. MacDonald:

In accordance with Mr. Odegaarden's request in our telephone conversation of August 18, 1978, we hereby resubmit our referenced request for amendment to USNRC Certificate of Compliance No. 6698, Revision 7. The requested amendment will change references to NFS Drawing No. 10080, Sheets 1 through 4, Revision 14 to NFS Drawing No. 10080, Sheets 1 through 4, Revision 16. In addition pages 3-99.1 and 3-99.2, attached hereto, will be added to the Safety Analysis Report For Nuclear Fuel Services, Inc. Spent Fuel Shipping Cask, Model No. NFS-4 (SAR). This change to the SAR will be indicated as Revision 2 dated September 25, 1978.

In summary, the requested revision will permit limited local variations in effective lead thickness which will improve manufacturing ease for NFS-4 (NAC-1) type casks. Specifically the requested amendment permits effective local lead thickness reductions of up to 13.5 percent. The local region of lead thickness reduction is limited by an acceptance criteria specified in Note 14 on NFS Drawing No. 10080, Sheet 4, Revision 16. This criteria specifies that the maximum total cylindrical shield area which may be affected by an underlying reduction in effective lead thickness shall be no more than 2.4 percent of the total cylindrical surface.

This change will result in a decrease in packaging weight of no more than 75 lbs. This weight change is not significant to the thermal or structural performance of the packaging in an accident or other conditions prescribed by the regulations. Also, this change has no significant effect on the post accident ionizing radiation dose rate measured 1 meter from the cask surface. A shield void which may occur due to lead slump would increase from 0.315 inches, as calculated in the SAR, page 3-97, to 0.88 inches at the cask end. The additional .565 inch slump results

from the assumption that a reduced effective lead thickness regic compresses to nominal effective thickness under high deceleration forces. The lead region referred to is that which would have an effective reduction of lead thickness of 3/4 inch over 2.4% of the shield area. The total lead slump calculated is within the 1 inch allowable specified in the SAR. For nuclear criticality safety evaluation purposes, neutron interaction between like packagings will not be significantly affected by this change.

In our judgement, this change in design has no significant affect on the design normal or accident conditions performance of the packaging. Notwithstanding this judgement, the as-built packagings shall be subject to acceptance tests and inspections and evaluated against acceptance criteria specified in the Safety Analysis Report and in the USNRC Certification of Compliance No. 6698. In accordance with the schedule of fees published on page 7223 of the Federal Register, Volume 4, Number 35, dated February 21, 1978, a check for the amount of $2,800.00 was included with the referenced letter.

If you have any questions, please call Mr. C. C. Hoffman or Mr. R. E. Best.

Sincerely,

NUCLEAR ASSURANCE CORPORATION

James Rollins for

Jack D. Rollins
Vice President & General Manager
Engineering and Transport Services

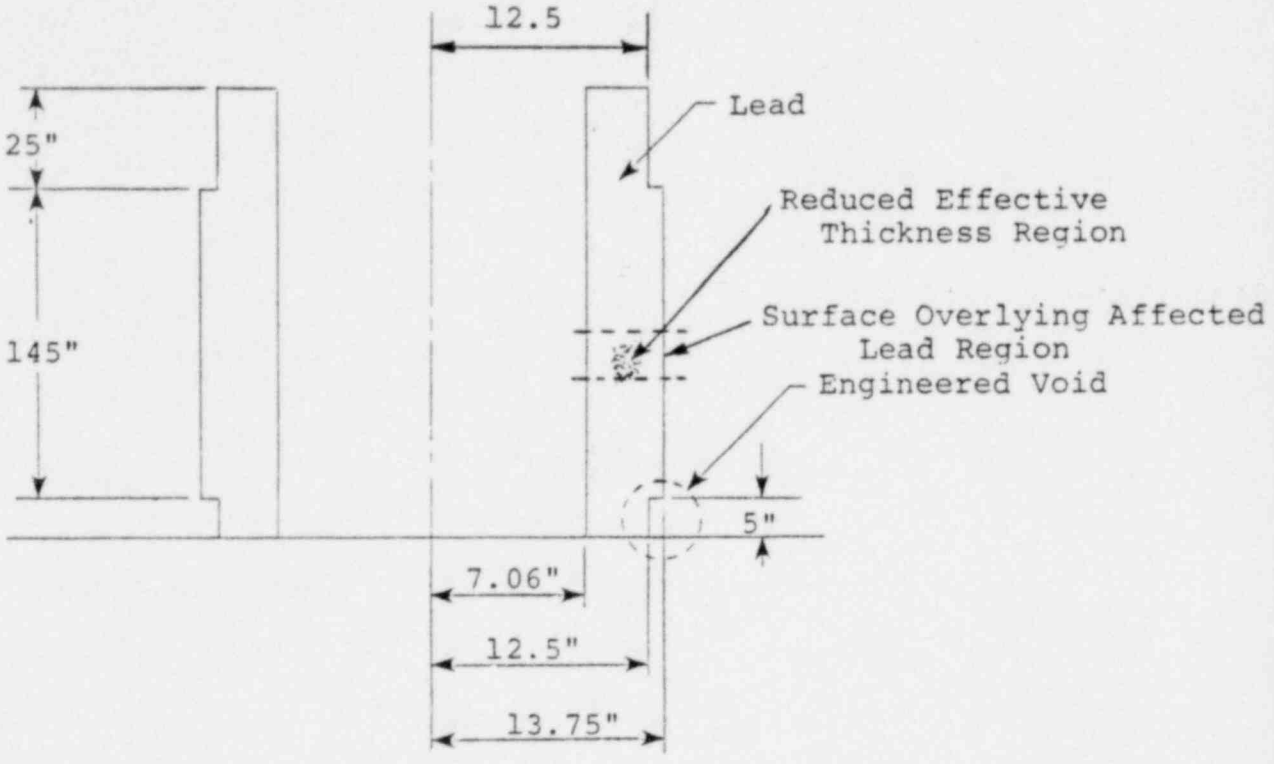
JDR:saf
Enclosure

NUCLEAR FUEL SERVICES, INC.

James R. Clark
Manager, Quality Assurance and
Licensing

ATTACHMENT

REVISION 2-ADDITIONAL
PAGES (dated 9/1/78) FOR
THE SAFETY ANALYSIS REPORT
FOR NUCLEAR FUEL SERVICES INC.
SPENT FUEL SHIPPING CASK
MODEL NO. NFS-4 (dated 12/30/71,
updated 9/29/72)



In addition to the engineered lead void provided at the base of the cask, there may be small regions of reduced effective radial thickness within the lead shield. This reduced effective thickness will not impair the structural or thermal performance of the packaging in an accident or other conditions prescribed by the regulations.

Assumption: Reduced effective thickness lead compresses under high deceleration loads.

Total lead volume of the cask= $\pi/4\ (25^2 - 14.12^2)\ x\ 25\ +$
$\pi/4(27.5^2 - 14.12^2)\ x\ 145\ +\ \pi/4(25^2 - 14.12^2)\ x\ 5$
or Total lead volume $V_\tau = 73447\ inch^3$

In section 3.1.6.1.4.4.1 the end lead void resulting from deceleration forces was computed to be 0.315 inches. The maximum permitted length of end void is 1.0 inches. To assure conservatism this analysis uses 0.88 inch as the permitted length of lead void at the cask ends.

Therfore, the additional end void length which may result from compression of the reduced effective thickness region = .565 inches

V_ρ = volume of the region = $\pi/4\ (27.5^2 - 14.12^2) \times .565$

or $V_\rho = 247.11\ \text{inch}^3$

Lead pour experience has shown that reduced effective thickness regions in free-poured lead are localized and easily detectable by non-destructive examination techniques. Accordingly, it is assumed here that the surface area of the heavy metal shield under which such regions may exist is no more than two and four tenths (2.4) percent of the cylindrical surface area of the 1¼ inch steel shell. The volume of the lead under this localized area is approximately:

$$V_{local} = 0.024 \times 76540\ \text{inch}^3\ (\pi/4 \times (27.5^2 - 14.12^2) \times 175)$$

$$= 1837\ \text{inch}^3$$

The allowable average percent reduced effective thickness in the lead shield in the localized region $= \frac{V_\rho}{V_{lead}} = \frac{247.1}{1837} \times 100$

$= 13.5\%$

Hence total lead slump in the cask = 0.315 + .565 = 0.88<"1.0" which is less than the one inch allowable specified in section 3.1.6.1.4.4.1.

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