U.S. Department
of Transportation

**Pipeline and
Hazardous Materials
Safety Administration**

400 Seventh Street, S.W.
Washington, D.C. 20590

APR 1 4 2005

Dae Y. Chung
Director, Licensing Office, EM-24
Environmental Cleanup and Acceleration
Office of Environmental Management
Department of Energy
Washington, D.C. 20585

Dear Mr. Chung:

We have received your September 1, 2004 application for exemption (13962N) requesting relief from the 49 CFR 173.453(d) fissile materials - exception requirements to ship low enriched uranium trioxide (UO_3), exceeding a maximum of 1 percent of uranium-235 by weight, in 55-gallon drums (227 total) qualified as IP-1 packages, by highway, from the Savannah River Site to the Nevada Test Site, for disposal.

In accordance with the Memorandum of Understanding between the Department of Transportation and the Nuclear Regulatory Commission (NRC), we requested the NRC to review the application for exemption and provide their recommendations. Their recommendations, which we concur with, were recently received by us and forwarded to the members of your staff identified in the application for exemption. Based on these recommendations, we request you provide additional information on the following issues:

1. We believe it would be more appropriate to request an exemption (with sufficient justification and demonstration of equivalent safety) from the packaging requirements of 49 CFR 173.417, Authorized fissile material packages, rather than from the material definition in 49 CFR 173.453, Fissile material - exceptions. Therefore, the exemption application should be revised or withdrawn/resubmitted to request a packaging requirement exemption rather than a fissile material definition exemption.

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2. The criticality analysis should be revised to include the appropriate uncertainty in establishing the maximum enrichment. It is not clear from the criticality evaluation whether or not the measurement uncertainty was included in the maximum enrichment considered in the calculations. The enrichment value for the material considered in the calculation should be the measured value plus the measurement uncertainty. Furthermore, the basis for the 1.3% measurement uncertainty is not known. There are no measurement uncertainties indicated in Attachment 2C which includes the initial measurements for U-235 for all the drums except one in March 1986. Attachment 2B, which includes measurements of U-235 on selected drums for validation purposes, indicates 3.5% as the measurement uncertainty.

3. The criticality analysis should be revised based on a bounding value of UO_3 weight per drum. The criticality analysis under normal conditions of transport assumed 750 pounds of UO_3 per drum. Attachment 1 shows the majority of drums to be shipped exceed 750 pounds. The criticality analysis for normal conditions of transport should be revised to bound the amount of material to be shipped.

4. The application should be revised to provide more information about how the range of applicability of the benchmark analysis was extrapolated down to 0.5 weight-percent from 2.0 weight-percent. Reference 5 should be provided, as well as an explanation of how the guidance from this document was applied to the benchmark data in the criticality analysis.

5. The criticality analysis should be revised to show how the 2.2% bias for the calculations using MCNP was determined. We do not agree that a 3% administrative margin on k_{eff} is appropriate for the criticality analysis, considering the magnitude of the code bias and the fact that the enrichment for the material to be shipped lies outside of the range of applicability of the benchmark analysis. We believe a revised analysis should include a 5% administrative margin on k_{eff}.

6. The criticality analysis should be revised to consider 2N damaged packages according to the requirements of 10 CFR 71.59(a). The criticality analysis for damaged packages considers the maximum subcritical mass of UO_3 optimally moderated in a spherical configuration. This mass should be considered to represent a number of packages, 2N, for the determination of a Criticality Safety Index (CSI). For instance, the application calculated that 5,250 kg of 1.084%

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enriched UO_3 would be safely subcritical under hypothetical accident conditions. At 340 kg per package, this mass represents approximately 15 packages, and N = 7.5 packages. Therefore, CSI = 50/7.5 = 6.7, meaning that up to 7 packages could be shipped in a non-exclusive use vehicle, and up to 14 could be shipped in an exclusive use vehicle.

7. Clarification of contradictory information should be provided on the total number of drums (380, 381, and 382) originally generated during the campaign.

8. Further detail needs to be provided concerning other elements included in the UO_3 mixture, and whether they include plutonium, uranium-233, beryllium, graphite, or hydrogenous material enriched in deuterium, as described in 49 CFR 173.453(d). If any of these specific materials are present, they need to be modeled in the criticality analysis.

9. The CSI instead of the Transport Index should be used per the revised regulations that became effective October 1, 2004.

10. Specific clarification of whether the shipments will be made in exclusive use vehicles needs to be provided.

The additional information requested is necessary for further consideration of your application. If you are unable to submit this information within 30 days, please consider withdrawing your application and reapplying at a later date. Failure to respond within 30 days from the date of this letter may result in a denial of your application.

Please contact James Williams at 202 366-6177 or James.Williams@dot.gov if you have any questions concerning our position on these ten issues.

Sincerely,

Delmer F. Billings
Director, Office of Hazardous Materials
Exemptions and Approvals