November 5, 2009

Mr. Richard W. Boyle
Chief, Radioactive Materials Branch
Office of Hazardous Materials
Technology
U.S. Department of Transportation
1200 New Jersey Ave., S.E.
Washington, DC 20590

SUBJECT: REVIEW OF FRENCH CERTIFICATE OF APPROVAL F/357/B(U)F-96 FOR THE TN-MTR PACKAGE – REQUEST FOR ADDITIONAL INFORMATION

Dear Mr. Boyle:

This refers to your application dated April 8, 2009, requesting our recommendation concerning revalidation of French Certificate of Approval No. F/357/B(U)F-96, Revision Ct, for the Model No. TN-MTR package.

In connection with our review, we need the information identified in the enclosure to this letter. We request that you provide this information by December 29, 2009. Inform us at your earliest convenience, but no later than December 29, 2009, if you are not able to provide the information by that date. To assist us in re-scheduling your review, you should include a new proposed submittal date and the reasons for the delay.

Please reference Docket No. 71-3052, and TAC No. L24334 in future correspondence related to this request. If you have any questions regarding this matter, I may be contacted at (301) 492-3292.

Sincerely,

/RA/

Michele M. Sampson, Senior Project Manager
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-3052
TAC No. L24334

Enclosure: Request for Additional Information

November 5, 2009

Mr. Richard W. Boyle
Chief, Radioactive Materials Branch
Office of Hazardous Materials
Technology
U.S. Department of Transportation
1200 New Jersey Ave., S.E.
Washington, DC 20590

SUBJECT: REVIEW OF FRENCH CERTIFICATE OF APPROVAL F/357/B(U)F-96 FOR THE TN-MTR PACKAGE – REQUEST FOR ADDITIONAL INFORMATION

Dear Mr. Boyle:

This refers to your application dated April 8, 2009, requesting our recommendation concerning revalidation of French Certificate of Approval No. F/357/B(U)F-96, Revision Ct, for the Model No. TN-MTR package.

In connection with our review, we need the information identified in the enclosure to this letter. We request that you provide this information by December 29, 2009. Inform us at your earliest convenience, but no later than December 29, 2009, if you are not able to provide the information by that date. To assist us in re-scheduling your review, you should include a new proposed submittal date and the reasons for the delay.

Please reference Docket No. 71-3052, and TAC No. L24334 in future correspondence related to this request. If you have any questions regarding this matter, I may be contacted at (301) 492-3292.

Sincerely,
/RA/
Michele M. Sampson, Senior Project Manager
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-3052
TAC No. L24334

Enclosure: Request for Additional Information
Distribution:
Filename: G:/SFST/Sampson/RAI LTR.doc

OFC	SFST	E	SFST		SFST		SFST		SFST		SFST	
NAME	MSampson		JPiotter		ZLi		ASotomayor-Rivera		RParkhill		DNaujock/	
DATE	10/22/09		10/26/09		10/23/09		10/26/09		10/23/09		10/26/09	
OFC	SFST		SFST		SFST		SFST	E	SFST			
NAME	MRahimi		JP for CRegan		MWaters		MDeBose		SBaggett			
DATE	10/28/09		10/26/09		10/26/09		11/04/09		11/05/09			

C=Without attachment/enclosure E=With attachment/enclosure N=No copy **OFFICIAL RECORD COPY**

REQUEST FOR ADDITIONAL INFORMATION
Model No. TN-MTR Package
French Certificate of Approval No. F/357/B(U)F-96 (Rev. Ct)
Docket No. 71-3052

By application dated April 8, 2009, the U.S. Department of Transportation requested our recommendation regarding revalidation of French Certificate of Approval No. F/357/B(U)F-96, Revision Ct, for the Model No. TN-MTR package. This request identifies additional information needed by the Nuclear Regulatory Commission staff in connection with its review of the application. The requested information is listed by chapter number and title in NUREG-1617, "Standard Review Plan for Transportation Packages for Spent Nuclear Fuel," which was used by the staff in its review of the application. This request describes information needed by the staff for it to complete its review of the application and to determine whether the applicant has demonstrated compliance with regulatory requirements of TS-R-1, 1996 Edition (As Amended 2003).

1. GENERAL INFORMATION

1-1 Revise the application to update the material parts list to reference a material specification for Item 150.

The outer disk is screwed to the shell flange with 36, M30 lid screws and 36, M30, dichromated zinc-plated carbon steel washers. The type of material for lid screws is identified as Item 150, Class 8.8 in the parts list DOS-07-00084417-020 Table 0.1 and Table 0.7. Class 8.8 represent specific mechanical properties but is not tied to a specific material or referenced material specification.

This information is needed to determine compliance with paras. 650 and 638 of TS-R-1.

1-2 Revise the application to provide the acceptable ductility for the screw material at -40° C. Describe the testing used to verifying acceptable screw material ductility.

The lid screws (Item 150) may experience a transition temperature above -40°C.

This information is needed to determine compliance with TS-R-1, para. 664.

1-3 Provide the specific material specifications with mechanical properties that equal or exceed the mechanical properties listed in Table 0.7 of DOS-07-00084417-020, Revision 1, for Type B material or the process for resolving differences in mechanical properties between material specifications and the mechanical properties in Table 0.7.

The high strength stainless steel used for the SEC lid is identified as “Type B” in DOS-07-00084417-020 Revision 1, Table 0.1. In DOS-07-00084417-020, Revision 1, Table 0.7, the mechanical properties of Type B material are presented along with reference specification UNS S31803. The mechanical properties assigned to Type B are above the mechanical properties of referenced specification UNS S31803.

This information is needed to determine compliance with TS-R-1, para. 650.

2. STRUCTURAL

2-1 Provide a definition, or the location within the licensing documentation, which provides a description of why there are two lid designs, and any functional or usage differences between the two lid designs.

Staff was unable to discern the fundamental functional difference between the "Standard" lid and the "SEC" lid.

This information is needed to determine compliance with TS-R-1, para. 714.

2-2 Provide summary of the accident condition puncture test in the main section of Chapter 1, of the application.

There is no summary of the puncture test results nor is there a comparison with applicable regulations that this accident condition evaluation has been satisfied in the main body of the application.

This information is needed to determine compliance with TS-R-1, para. 735.

The following requests for additional information are based on the statement in Annex 1-8: "The parameter used for guaranteeing the leaktightness when using the SEC lid is the comparative study of movements around the seals."

2-3 Demonstrate that the movement near the seals is consistent with what was observed during testing.

The simulations evaluate only relative displacements between the two lid types, but they do not make a comparison with test observations, therefore no significance can be attributed to this comparison.

This information is needed to determine compliance with TS-R-1, paras. 714 and 716.

2-4 Justify the lack of inclusion of the seals and their relative levels of compression during accident conditions.

Relative movement of the standard lid and SEC lid without a comparison to test observations, as well as no quantitative or qualitative measure of seal performance does not demonstrate conclusively that positive seal performance is assured.

This information is needed to determine compliance with TS-R-1, paras. 714 and 716.

2-5 Clarify whether bolt preload was included in the simulations for the Standard and SEC lids.

Section 3.4.1 of Annex 8 indicates that load is applied to the closure bolts, but it is unclear as to what this load is and when it is applied during the simulation.

This information is needed to determine compliance with TS-R-1, para. 714 and 716.

2-6 Clarify whether contact definitions are violated based on Figures 1-8.8 and 1-8.10.

The figures provided appear to show interpenetration of the lid with the flange.

This information is needed to determine compliance with TS-R-1, paras. 714 and 716.

2-7 Provide a comparison of the reaction forces on the package flange due to preload of the closure bolts for both the Standard and SEC lid.

To provide reasonable assurance of seal performance, lid-flange reaction forces, stress state of the bolts, stress state of the seal(s), deformation of the seal(s), and movement of the lid with respect to the flange must be considered.

This information is needed to determine compliance with TS-R-1, paras. 714 and 716.

3. THERMAL

3-1 Justify the temperature limits for the gaskets, shown in Chapter 2- Annex 1, of 160°C and 190°C for NCT and HAC, respectively.

The Parker O-Ring Handbook shows a steady state temperature limit of 149° C for EPDM rubber gaskets (from Page A3-4) and a 10 hour seal life at a temperature limit approximation of 191° C (from Figure A3-6, Seal Life at Temperature). This seems to indicate that the HAC seal temperature limit is too low and that the seal could only last approximately 10 hours at the elevated temperature of 190° C. The HAC temperature limitation for EPDM material would indicate the need of a seal material upgrade such that no leakage would occur post fire.

This information is needed to determine compliance with TS-R-1, para. 501(b).

3-2 State in the licensing documentation that the package shall be held until equilibrium conditions have been approached closely enough to demonstrate compliance with the requirements for temperature and pressure.

Detailed procedures should be developed and followed to ensure that steady state conditions have been reached by measuring the temperature and pressure over a defined period.

This information is needed to determine compliance with TS-R-1, para. 502(d).

3-3 Explain why the external package surface temperature (shown in Chapter 2-Annex 1) is greater than the exclusive use temperature limit of 85°C. Explain how the 85°C temperature limit is being met.

Table 2-1.2 of the application identifies the external package surface temperature as ranging from 52°C up to 124°C.

This information is needed to determine compliance with TS-R-1, paras. 652, 662, and 807(g).

3-4 Justify quantitatively not considering the heat input to the package from the exposed wood of the impact limiter during and after the regulatory fire as described in Section 8 of Chapter 2-Annex 2. It would appear that this could potentially adversely affect the temperature of the seals which are already temperature challenged.

The application states that "the ignition of the wood volume exposed to the flames during the test does not affect significantly the internal cover temperatures." However, no data or analysis is provided to support this statement.

This information is needed to determine compliance with IAEA TS-R-1, para. 501(b)

4. CONTAINMENT

4-1 Identify the source term on a radionuclide basis for the bounding irradiated fuel being shipped considering its burnup, enrichment and cooling time. Also, provide the associated A_2 calculation for the mixture.

SAR Chapter 3A "Activity Release of TN-MTR Packaging Equipped with the MTR-52S or MTR-52SV2 Basket Loaded With Authorized Contents" does not identify the fuel's source term on a radionuclide basis, nor does it appear to use this source term (including gases, volatiles, and aerosols) to determine the A_2 calculation for the mixture which typically is used to determine reference air leakage rates for the package under normal and accident conditions.

This information is needed to determine compliance with TS-R-1, paras. 404, 501(b), and 807(a).

4-2 Explain how CRUD is considered in the source term and its associated release amount as an aerosol under NCT and HAC. If it is not considered, justify its omission.

Non fixed contamination inside of the containment cavity should also be considered as part of the source term. CRUD, if attached to the fuel, needs to be included in the source term for the fuel as cobalt-60, and considered in the A_2 calculation of the mixture as described in 4-1, above. The staff has typically accepted 15% of the CRUD releasable for NCT, unless justified otherwise.

This information is needed to determine compliance with TS-R-1, paras. 404, 501(b), and 807(a).

4-3 Provide References 6 and 7 from Chapter 3A which justify the maximum amount of fuel material released in aerosol form.

To verify the determination of the reference leakage rate a properly justified aerosol release rate needs to be utilized. Chapter 3A, Section 7 "Calculated Activity Release in Aerosol Form, Under Normal and Accident Conditions of Transport," does not provide the basis for the aerosol leakage rate other than to say it's based on experimental observation contained in the subject references. Typically, the staff is used to seeing aerosol released in the form of mass fractions of the fuel rather than in mass per volume.

This information is needed to determine compliance with TS-R-1, para. 501(b).

4-4 Reconcile the difference in leak rates stated in Chapter 7A, Section 2.5, "Containment Vessel Leak-Tightness Test," of 3.5 X E-5 Pa-m^3/sec SLR and Chapter 3A, page 3 of 4.7 X E-4 Pa-m^3/sec SLR.

This information is needed to determine compliance with TS-R-1, para. 502(e) and 807(c).

4-5 Specify a pre-shipment leak test of at least 1.0 E-3 ref-cm^3/sec.

From Tables 3A.1 and 3A.2 of Chapter 3A, the leak rate in SLR condition guaranteed before transport is 4.7 E-4 Pa-m^3/sec (4.6 E-3 atm-cm^3/sec). This does not meet the guidance of ANSI 14.5-1997 which recommends a pre-shipment leak test to at least 1.0 E-3 ref-cm^3/sec. Also Chapter 6A mentions these larger than recommended pre-shipment leak rates.

This information is needed to determine compliance with TS-R-1, Para. 807(c).

4-6 Submit the 'bill of materials' associated with the drawings contained in the SAR, such that the staff can verify the materials. Also since the SAR is complete, all associated drawings for this package should be included.

This information is needed to determine compliance with TS-R-1, para. 807(b).

5. SHIELDING

5-1 Provide information to demonstrate the accuracy of these computer codes, Mercure V and BDN, to generate gamma source terms and dose rates.

In Chapter 4A, the applicant states that "calculation is in two stages. First, the sources are determined from the BDN code. These are used to calculate the dose equivalent rates using Mercure V code." However, there is no information about these codes presented in the application and no further information about whether the cross-section library is appropriate or not for the fuel being considered in this application.

This information is needed to confirm that the package meets the requirements of TS-R-1, paras. 530, 531, 532, and 572.

5-2 Provide the energy breakdown for the 12-group gamma source.

The staff needs to assess the adequacy of the 12-group gamma source using the 18-group gamma source from the SCALE package for comparison purposes. However, the energy breakdown for the 12-group gamma source is not specified in the application.

This information is needed to confirm that the package meets the requirements of TS-R-1, paras. 530, 531, 532, and 572.

5-3 Provide the flux-to-dose-rate conversion factors for dose calculations.

There is no information provided in the application detailing the flux-to-dose-rate conversion factors used for dose calculations.

This information is needed to confirm that the package meets the requirements of TS-R-1, paras. 530, 531, 532, and 572.

6. CRITICALITY

6-1 Provide justification for using k_{eff} that is very close to the Upper Subcriticality Limit as a basis in determining the Criticality Safety Index (CSI) value for array of packages, or revise the CSI value, if necessary, based on a revised k_{eff} basis.

The applicant determined the CSI for an array of packages under Hypothetical Accident Conditions per the requirements of TS-R-1, paras. 681 and 682. However, the staff's review indicates that the k_{eff} value that the applicant used in determining the number of packages remains subcritical is statistically identical to the USL value, i.e., the maximum k_{eff} is 0.930 for the system of an infinite array of MTR-52SV2 packages with 640 grams of ^{235}U at the enrichment of 21 wt%. The USL of the package is 0.9306. As a result, the CSI value so determined may not be conservative. The applicant is requested to demonstrate that these two values are different with statistical significance. Otherwise, a revision of the CSI calculation and CSI value may be warranted based on a revised k_{eff} limit.

This information is needed pursuant to the requirements of TS-R-1, paras. 681 and 682.