

From: Shawn Williams
To: Rick Boyle
Date: 8/3/05 10:50AM
Subject: TN-106 DOT Revalidation

Hi Rick,

All technical reviewers will not completely finish their review for the TN-106 DOT revalidation until mid Sept., but our Materials and Criticality reviewers have already identified additional information that they need to complete their review.

As a courtesy to the applicant, we are providing their draft questions to you now. Of course, it is up to DOT's discretion, whether or not you want to forward these to them. If you do, ensure the applicant understands that these are just draft questions that will most likely be asked in a formal Request for Additional Information (RAI) sometime in September and that more information may be needed as the other reviewers continue their review.

Also, please inform them that, if they need clarification on the questions, we can schedule a conference call, however, they should not submit responses to the draft RAIs. They should wait until they receive the formal set of RAIs sometime in September.

Sincerely,

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Mail Envelope Properties (42F0D9B5.85F : 22 : 1320)

Subject: TN-106 DOT Revalidation
Creation Date: 8/3/05 10:50AM
From: Shawn Williams

Created By: SAW8@nrc.gov

Recipients	Action	Date & Time
dot.gov Fred.ferate CC (Fred Ferate)	Transferred	08/03/05 10:51 AM
nrc.gov twf4_po.TWFN_DO SAW8 CC (Shawn Williams)	Delivered Opened	08/03/05 10:50 AM 08/03/05 10:50 AM
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RSPA.dot.gov rick.boyle (Rick Boyle)	Transferred	08/03/05 10:51 AM

Post Office	Delivered	Route
twf4_po.TWFN_DO	08/03/05 10:50 AM	dot.gov
twf5_po.TWFN_DO	08/03/05 10:50 AM	nrc.gov nrc.gov RSPA.dot.gov

Files	Size	Date & Time
MESSAGE	2350	08/03/05 10:50AM
TN-106 Draft RAIs.wpd	20788	08/03/05 08:06AM

Options
Auto Delete: No
Expiration Date: None
Notify Recipients: Yes
Priority: Standard
Reply Requested: No
Return Notification: None

Concealed Subject: No
Security: Standard

To Be Delivered: Immediate
Status Tracking: Delivered & Opened

TN-106 Materials DRAFT RAIs

1. Provide manufacturing specification/data sheet for the Resin F being used for the neutron shield. The specification should include the useful range of operation (radiation and temperature), mechanical properties, thermal conductivity, and melting point.

The manufacturing data is needed to verify the durability of the resin . In particular, it is needed to determine if the material is qualified at the temperatures and stresses at or above the design limits for the package.

This information is needed to determine if requirements 501c, requiring the confirmation of the presence and distribution of neutron poisons, 615 and 664, requiring the design to account for ambient pressures and temperatures, 651b, requiring that there is no cracking or melting of the radiation shielding material due to thermal expansion, 656 bi, requiring that the radiation shield should survive a 9 meter drop are met.

2. Revise the application to describe what provisions exist in the Resin F design to assure that excessive neutron streaming will not occur as a result of shrinkage under conditions of extreme cold.

This description is required because polymers generally have a relatively large coefficient of thermal expansion when compared to metals.

This information is needed to determine if requirements 501c, requiring the confirmation of the presence and distribution of neutron poisons, 615 and 664, requiring the design to account for ambient pressures and temperatures, 651b, requiring that there is no cracking or melting of the radiation shielding material due to thermal expansion, are met.

3. Revise the application to describe any changes or substitutions made to the Resin F material formulation. For such changes, describe how the resin was tested and how that data correlated with the original test data regarding shielding, thermal stability, and handling properties during mixing and pouring or casting.

The application has no information concerning any changes to the Resin F formulation.

This information is needed to determine if requirements 501c, requiring the confirmation of the presence and distribution of neutron poisons, 615 and 664, requiring the design to account for ambient pressures and temperatures, 651b, requiring that there is no cracking or melting of the radiation shielding material due to thermal expansion, 656 bi, requiring that the radiation shield should survive a 9 meter drop are met.

4. Describe the acceptance tests that were conducted to verify that any filled channels/cavities used on production package did not have significant voids or defects that could lead to greater than calculated dose rates.

There is no information in the application explaining how the applicant will ensure the pour is uniform or free from voids.

This information is needed to determine if requirements 501c, requiring the confirmation of the presence and distribution of neutron poisons, 615 and 664, requiring the design to account for ambient pressures and temperatures, 651b, requiring that there is no cracking or melting of the radiation shielding material due to thermal expansion, 656 bi, requiring that the radiation shield should survive a 9 meter drop are met.

5. Discuss the acceptance tests that will be conducted to confirm the B-10 areal density in the Resin F.

The discussion should include test(s) (i.e., neutron attenuation), acceptance criteria, and sampling plan for the resin.

This information is needed to determine if requirements 501c, requiring the confirmation of the presence and distribution of neutron poisons, 615 and 664, requiring the design to account for ambient pressures and temperatures, 651b, requiring that there is no cracking or melting of the radiation shielding material due to thermal expansion, 656 bi, requiring that the radiation shield should survive a 9 meter drop are met.

6. Describe the inert matrices for the UO_2 alluded to in Appendix 1a.

This is needed to determine if the requirement for compatibility of materials (613) is met.

7. Provide evidence that the proposed drying procedure will actually result in drying the package cavity and the leaktight spent fuel capsules

The applicant stated that one option is a leaktight container (page 4/15 of the CoC). If the spent fuel is loaded into the leaktight capsules underwater before being placed in the cask cavity, how will the water be dried from the sealed capsule. b) In the drying procedure, the pressure is dropped between 6 and 10 mbars and held with no more than a 1 mbar rise over a 5 minute period. Since this is less stringent than the drying guidelines in NUREG-1536.

This information is needed to assess if the requirement related to radiolytic decomposition (642), and corrosion (651c) are met.

8. Provide a reference for the Young's modulus of 42 GPa for Pb in Table on page 8 section 6.1.2 of the application.

This property is needed for assess the requirement 656bi that the radiation shield should survive a 9 meter drop.

9. Provide a reference source for the conductivity and emissivity of the black painted stainless steel for normal conditions in Table 2-1.1 of Sec 3.

These properties are needed for thermal calculations to determine if requirement 615 related to thermal performance is met.

Criticality

1. Provide the correct material specification of the resin.

Both Table 5A-1.1 in Chapter 6 (Criticality) and page 10 of Attachment 6 (TN-106 Criticality Analysis, Calc 41199-02) state that the resin contains zinc. However Table 4A-1.2 states that the resin contains copper.

This information is needed to satisfy the requirements of TS-R-1 sections 806(b) and 813.

2. Provide additional justification for the use of lattice cross-sections with homogenized geometry.

Section 5.2 of Attachment 6 states that in order to simplify the calculations cell weighted cross-sections were generated considering heterogeneous fuel pellets and moderator and these cross sections were then applied to a homogenous fuel/moderator volume. Further explanation is needed to determine the implications of this simplification.

This information is needed to determine compliance with TS-R-1 section 673.