

Non-Proprietary Request for Additional Information
NAC International
Docket No. 71-9356
Certificate of Compliance No. 9356
Model No. MAGNATRAN® Transportation Package

By application dated November 26, 2012, as supplemented on February 15 and March 29, 2013, December 1, 2014, January 13 and 21, 2015, and October 15, 2015, NAC International (NAC or the applicant) submitted an application for approval of Certificate of Compliance No. 9356, for the Model No. MAGNATRAN® transportation package. This request for additional information (RAI) identifies non-proprietary information needed by the U.S. Nuclear Regulatory Commission staff in connection with its review of the application. The requested information is listed by chapter number and title in the applicant's safety analysis report (SAR). The staff used the guidance provided in NUREG-1617, "Standard Review Plan for Transportation Packages for Spent Nuclear Fuel," in its review of the application.

Each question 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.

Chapter 1 – General Information Evaluation

1. Modify Table 1.3-16 of the application to remove the heading for neutron source assemblies (NSA) from the column for guide tube plug devices (GTPD).

Table 1.3-16 currently has two columns showing additional cooling time for loading neutron source assemblies, NSAs. The shielding analysis supports the last, or right-most, column values. To avoid confusion, the column heading 'GTPD/NSA' should be changed to read just 'GTPD'.

This information is needed to confirm compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) 71.33 and 71.47.

Chapter 2 – Structural Evaluation

No Questions

Materials Questions

1. See Enclosure 1
2. See Enclosure 1

Chapter 3 – Thermal Evaluation

1. Provide a thermal analysis for the hypothetical accident condition fire transient that models the thermal inertia associated with the transportable storage canister (TSC) and spent fuel contents.

The previously supplied analyses did not consider the thermal inertia effect or adequately show that the analyses were bounding. In addition, recognizing that the

extent of aluminum fin degradation after reaching their melting point is uncertain, explain and clarify that the approach used to model the aluminum fins is bounding during the transient.

This information is needed to determine compliance 10 CFR 71.73.

Chapter 4 – Containment Evaluation

No Questions

Chapter 5 – Shielding Evaluation

1. Provide tolerances on the technical drawings for items relied on in the shielding analysis.

As stated in the NRC RAI dated June 2, 2015 (see ADAMS Accession No. ML15181A013), it is not clear that the drawings include the tolerances for items important to shielding:

- Packaging (i.e., overpack) lead shielding radial (thickness) and axial dimensions,
- Packaging inner and outer steel shell thicknesses,
- Packaging neutron shield assembly component tolerances (radial/thickness and axial and width),
- Packaging lid thickness,
- Cask cavity spacer axial length,
- Packaging bottom forging thickness,
- TSC lid thickness,
- TSC wall thickness,
- TSC base thickness,
- TSC basket tube thickness, and
- Absorber plate tolerances.

Thus, it is not clear that the dimensions in the shielding analysis are consistent with the package's tolerances. The drawings should include tolerances on appropriate dimensions of the items relied on for shielding, which are listed in this question. This information is needed to confirm compliance with 10 CFR 71.33 and 71.47.

2. Modify the package shielding analysis to include the effects of dimensional tolerances of the TSC and its components.

Based on the information provided in the application to date, the applicant's shielding analysis appears to only include tolerances for the overpack (Sections 6.3.3.5 and 4.3 of the calculation package (Calculation Number 71160-5508)). Thus, it is not clear whether and how the analyses includes the tolerances for the TSC components (including the basket) listed in item 1, immediately above. If these tolerances are included, the applicant should clearly demonstrate how they are included in the analyses and models. If they aren't included, then the applicant should modify the analyses to address these tolerances. Another option for evaluating these tolerances, particularly if the tolerances are quite small, would be for the applicant to clarify or describe the (estimated) impact

the TSC components' tolerances would have on dose rates and how other conservatisms compensate for the TSC components' tolerances.

This information is needed to confirm compliance with 10 CFR 71.47.

3. Clarify how the specific activity analyzed for the greater than class C (GTCC) waste should be applied in the package operations, modifying either the contents specification in Section 1.3.2 or the package operations in Chapter 7 of the application as appropriate.

The analysis assumes a specific activity for the GTCC waste that is uniform over the entire contents. In reality, GTCC waste that is loaded into a package can have varying specific activities. This variation may be from component (or object) to component. Also, large components may have significant variation in specific activity from one area of the component to the other. Furthermore, loose contamination may be present that can collect in one area of the TSC cavity. It is not clear how or whether, the application treats these kinds of variation in the contents' specific activity. The specific activity of a particular package's GTCC waste contents may, when averaged over the entire contents, meet the proposed specific activity limit; however, dose rates may be significantly higher than those calculated in the application due to the variations described in this RAI. Therefore, the application should specify the method for a package user to demonstrate compliance with the proposed specific activity limit for a package containing GTCC waste contents and should demonstrate that variations in the contents' specific activity that would be acceptable with that method will not result in dose rates that exceed the regulatory limits. The method should apply the specific activity limit to sufficiently small volumes of waste and sufficiently small volumes of items/components that make up the waste. Loose contamination should also be addressed in applying the limit properly.

This information is needed to confirm compliance with 10 CFR 71.33 and 71.47.

4. Provide the updated drawings (both the proprietary and non-proprietary versions of Drawing No. 71160-502) described in the response to NRC RAI letter dated June 2, 2015, question 1-1f.

The applicant responded to the specified question by stating that the requested neutron shield specifications were added to the drawings in the RAI. However, the applicant did not include these updated drawings with the response. The updated drawings are needed since they will be referenced in the certificate of compliance.

This information is needed to confirm compliance with 10 CFR 71.33 and 71.47.

5. Confirm and, as applicable, provide information to support the following:
 - a. The proposed cooling time for Westinghouse (WE) 15x15 fuel assemblies with 60 GWd/MTU burnup and a minimum enrichment of 3.1% and the added cooling time for damaged fuel of this fuel type, burnup and enrichment (in Tables 5.8-16 and 5.8-49 of the application). The revision of the calculation package submitted during the review (with MAGNATRAN® Safety Analysis Report (SAR) Version 14A which was submitted with supplement dated December 1, 2014) does not support loading of this fuel type at this burnup, enrichment and decay time nor the added cooling time for damaged fuel with these specifications. If a later version of the calculation package does support this, it should be provided.

- b. The added cooling time for WE 14x14 fuel assemblies with 55 GWd/MTU burnup and a minimum enrichment of 3.1% in Table 5.8-49 of the application. It is not clear that the added cooling time is correct; it seems the added time should be at least as long as or longer than the added time for enrichments at 3.3%.
- c. The staff's understanding that the added cool time in Table 5.8-49 applies to all fuel in the basket. That would mean that the table should be read as: 'For TSCs that include damaged fuel, the added cooling time shown in the table for a specific fuel type, burnup and enrichment applies to all the fuel in the TSC, the damaged and the undamaged fuel. Since high burnup fuel is always treated as damaged fuel, the added cooling times shown for damaged high burnup fuel always apply to TSCs containing high burnup fuel.'

This information is needed to confirm compliance with 10 CFR 71.33, 71.47 and 71.51(a).

Chapter 6 – Criticality Evaluation

1. Revise the application to provide isotopic depletion (SCALE/TRITON) and criticality (MCNP) input and output files for the calculations performed to support the response to NRC RAI 6-3 (RAI letter dated June 2, 2015), contained in the NAC letter dated October 15, 2015.

The applicant updated the SAR for the Model No. MAGNATRAN® package in response to NRC RAI 6-3, which asked for additional information regarding the depletion calculation methodology used for the PWR burnup credit criticality analysis. Staff requests that the applicant provide the SCALE/TRITON depletion and MCNP criticality code input and output files supporting this update, specifically the files that support the calculations summarized in Tables 6.10.1-43 and 6.10.1-44 of the SAR.

This information is required in order for the staff to ensure that the package will meet the criticality safety requirements of §71.55 and §71.59 when loaded with the contents described in the application.

Chapter 7 – Operating Procedures Evaluation

1. Modify the following in Chapter 7 of the application:
 - a. Section 7.1.2 Step 9 to address loading of TSCs into the MAGNATRAN® overpack that have not been previously in storage. This applies to both spent fuel TSCs and GTCC waste TSCs (note that while GTCC may have been in storage in TSCs prior to transport, that storage was not done under the MAGNASTOR® CoC).
 - b. Section 7.2.1 Step 11, which appears that it should refer to Steps 8 thru 10. The current reference in Section 7.2.1 appears to be incomplete or out of synch with the current numbering of operations.

This information is needed to confirm compliance with 10 CFR 71.87.

Chapter 8 - Acceptance and Maintenance Tests Evaluation

1. Modify the shielding acceptance test in Section 8.1.6.3 and the maintenance test in Section 8.2.3 of the application to:

- a. Clarify that the acceptance criteria (estimated/calculated dose rates) for the maintenance test are not the same as the acceptance criteria for the acceptance test. In other words, it should be clear that the dose rates that are used for acceptance criteria for the respective test are unique to the loaded contents for which dose rates are measured for the respective test. The loaded contents for the maintenance test will not be the same as the loaded contents for the acceptance test; so, the dose rates that are the acceptance criteria for the one test will not be the same as the dose rates for the other test.
- b. Clarify that the characteristics of the contents, such as assembly type, MTU/assembly, and enrichment(s), (and not just burnup and cool time) are used in the calculations to estimate the radiation source terms for the dose rate estimates/calculations for both tests.
- c. Clarify that the package configuration in the analyses for estimating/calculating dose rates is the configuration that represents the minimum shielding effectiveness of the package shielding (including material and geometric tolerances) specified in the package drawings.
- d. Clarify the intended meaning of the language 'will be' in the new text in Sections 8.1.6.3 and 8.2.3, as compared to the rest of the test description text. This language is not consistent with the rest of the language in these sections that specific actions 'are' done.

This information is needed to confirm compliance with 10 CFR 71.85 and to ensure the package maintenance activities are performed in a way that assures continued compliance with the requirements in 10 CFR Part 71, Subparts E and F during its service life.