

July 14, 2006

Mr. P. C. Gregory, Manager  
Washington TRU Solutions, LLC  
P.O. Box 2078  
Carlsbad, NM 88221-2078

SUBJECT: SECOND REQUEST FOR ADDITIONAL INFORMATION ON ARROW-PAK  
EXEMPTION REQUEST

- References:
1. Letter from P. C. Gregory to M. Rahimi, dated January 31, 2005, Subject : Application for Revision of the TRUPACT-II Certificate of Compliance, NRC Docket No. 71-9218
  2. Letter from M. Rahimi to P. C. Gregory, dated July 8, 2005, Subject: Request for Additional Information on ARROW-PAK Exemption Request
  3. Letter from P. C. Gregory to M. Rahimi, dated February 17, 2006, Subject: Response to NRC Request for Additional Information on ARROW-PAK Exemption Request (Docket No. 71-9218, TAC No. L23811)

Dear Mr. Gregory:

By letter dated February 17, 2006 (Reference 3), Washington TRU Solutions (WTS) submitted responses to the staff's first round of Request for Additional Information (RAI) (Reference 2) on an exemption request (Reference 1), regarding the transport of the 55-gallon drum transuranic wastes in the ARROW-PAK containers placed in TRUPACT-II packages.

Upon the review of the responses and further clarifications of the responses by WTS in a number of telephone calls and meetings, the staff has determined that the responses to the first round RAI do not provide all the information requested by the staff. Therefore, the staff is issuing the enclosed second and final RAI in order to be able to make the final determination on the exemption request. It is important for the applicant to note that if adequate responses to the enclosed second round RAI are not provided, the staff will terminate its review.

Please reference Docket No. 71-9218 and TAC No. L23811 in future correspondence related to this request. The staff is available to meet to discuss your proposed responses. If you have any questions regarding this matter, you may contact me at 301-415-2947.

Sincerely,

**/RA/**

Meraj Rahimi, Senior Project Manager  
Licensing Section  
Spent Fuel Project Office  
Office of Nuclear Material Safety  
and Safeguards

Docket No: 71-9218  
TAC No: L23811  
Enclosure: Request for Additional Information  
Mr. P. C. Gregory, Manager

Washington TRU Solutions, LLC  
P.O. Box 2078  
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Meraj Rahimi, Senior Project Manager  
Licensing Section  
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Docket No.: 71-9218

TAC No.: L23811

Enclosure: Second Round Request for Additional Information

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**TRUPACT-II TRANSPORTATION SYSTEM  
DOCKET NO. 71-9218  
TAC NO. L23811  
SECOND ROUND REQUEST FOR ADDITIONAL INFORMATION**

By letter dated February 17, 2006 (Reference 3), Washington TRU Solutions (WTS) submitted responses to the staff's first round of Request for Additional Information (RAI) (Reference 2) on an exemption request (Reference 1), regarding the transport of the 55-gallon drum transuranic wastes in the ARROW-PAK containers placed in TRUPACT-II packages.

Upon the review of the responses and further clarifications of the responses by WTS in a number of telephone calls and meetings, the staff has determined that the responses to the first round RAI do not provide all the information requested by the staff. Therefore, the staff is issuing the following second and final RAI in order to be able to make the final determination on the exemption request. It is important for the applicant to note that if adequate responses to the enclosed second round RAI are not provided, the staff will terminate its review. The requested information is listed by chapter number and the title in the applicant's addendum to the safety analysis report. NUREG 1609, "Standard Review Plan for Transportation Packages for Spent Nuclear Fuel," was used by the staff in its review of the application.

Each individual RAI describes information needed by the staff to complete its review of the application and to determine whether that applicant has demonstrated compliance with the regulatory requirements.

**Chapter 1 - Introduction**

- 1-1     Revise Drawing 163-007, Rev. 1, to specify the type and capacity of the corrugated plastic spacers used to roughly center the 55-gallon drum along the length of the ARROW-PAK.

This information is required to ensure that the spacers will have sufficient capacity to keep the 55-gallon drum in place roughly at the center along the length of the ARROW-PAK.

Material information on the plastic corrugated spacers is required to evaluate structural performance of the TRUPACT-II package to meet 10 CFR 71.31 and 71.33 requirements.

- 1-2     Explain how the 55-gallon drum will remain in its position at the center during the transport and handling, when the plastic spacers are not restrained at the other end. Also, verify that the configurations for Hypothetical Accident Conditions tests are consistent with the configurations shown on the drawings.

Information on the use of the plastic corrugated spacers is required to evaluate structural performance of the TRUPACT-II package to meet 10 CFR 71.31 and 71.33 requirements.

Enclosure

- 1-3 Revise Drawing No. 163-007 to provide Codes for design and Inspection of the ARROW-PAK container, and provide the calculations referenced in the response to RAI 1-3, dated February 17, 2006, for the localized stresses in the ARROW-PAK container.

The response to RAI 1-3, dated February 17, 2006, is not complete because the referenced drawing submitted with the responses does not reflect the stated revision to delineate the codes for design and inspection of the ARROW-PAK container. Also, the staff needs to review the calculations for localized stresses performed to demonstrate compliance with the ASME Section VIII, Division 1, requirements. The contention that “the localized stresses in the saddle seal penetration are substantially reduced by the viscoelastic nature of the HDPE material...” is questionable for higher strain rates. Interpret the local stress in light of the strain-rate sensitivity of the HDPE material in order to better understand the importance of high-strain-rate conditions.

Response to RAI-3 indicates that the properties of the fused joint are at least as good as the parent pipe material itself. However, the fused joint area’s fracture toughness is not discussed, and impact test values are not provided. The fused joint impact properties should be compared to those of the parent pipe material in order to provide the technical bases for the assumption.

The requested information is required to evaluate the efficacy of the fusion process and the resulting properties under high-strain-rate conditions in compliance with 10 CFR 71.31, 71.33, and 71.33 requirements.

## **Chapter 2 - Structural**

- 2-1 Provide data to demonstrate that the EHMW-HDPE material has sufficient fracture toughness to preclude brittle fracture at all ranges of temperatures required by 10 CFR Part 71. Specify the size of the largest flaws in the EHMW-HDPE material including any that may be present in weldments (base material and material near the fused zone). Include data on fracture toughness measurements as a function of temperature of this material. Include your understanding of the highest local stress-intensity factors that you used to compute the likelihood of propagation of flaws.

This RAI is similar to the RAI 2-2 issued July 8, 2005, because the response is not acceptable. In the response, the applicant proposes to impose an administrative control limiting the temperatures down to 32°F during shipment. The issue needs to be addressed using a design approach instead of administrative approach when issuing a Certificate of Compliance for unlimited use.

SAR Section 2.6.2 indicates that the HDPE will resist crack propagation under high strain-rate conditions. Justify that this material will not undergo rapid crack propagation, under high impact loads. Provide the previously requested data of  $K_{Ic}$  measurements as a function of temperature at the strain rate of the standard precracked instrumented Charpy test. This can be provided using results of instrumented tests of Charpy specimens (machine notched followed by precracking or razor sharpening) or other high-strain-rate tests that furnish appropriate fracture toughness values. For the fracture toughness number that is quoted in this section, it appears that there is little resistance to

rapid crack extension at low temperatures and yet the argument presented in this section indicates that there is too little time to allow for flaw propagation. This argument seems incongruous. Data for the expected range of strain rates and temperatures of service (expressed in K units) are required to permit computation of allowable flaw sizes and allowable stresses.

In the response to the first round RAI 2-9, the applicant states that “there is no standardized test of “ultra-high” velocity tensile-testing of polymers.” This is not what is sought for consideration. Impact test values, such as those suggested above, with appropriate interpretation would address the concern regarding the HDPE adequate toughness for this application.

This information is required to verify compliance of the ARROW-PAK container with 10 CFR 71.71 and 71.73 requirements.

- 2-2 Provide the basis for testing the ARROW-PAK containers with ambient internal pressure and temperature (73 °F and 93 °F ) instead of the Maximum Normal Operating Pressure of 100 psig and the temperatures most unfavorable between -20 °F and 100 °F.

This RAI is the same as RAI 2-4 issued July 8, 2005. The February 17, 2006, response to the RAI 2-4 is not complete because the rationale provided in SAR section 2.7.1.2 and response to RAI 2-4 is not supported with adequate technical bases. Specifically, the rationale that the ARROW-PAK would experience only compressive stresses due to free drops is not reasonable and not supported by analyses. Also, the assumption that the conservatism in the test set-up counteracts sufficiently the adverse effects of temperatures on the material properties must be supported by analyses or tests.

This information is required to verify compliance of the ARROW-PAK container with 10 CFR 71.73(b) requirements.

- 2-3 Provide the basis for the assumption that the horizontal and vertical drop tests performed to meet 10 CFR 71.73(c)(1) Hypothetical Accident Conditions (HAC) *Free Drop* requirements represent the orientations for which maximum damage is expected.

This RAI is the same as RAI 2-6 issued July 8, 2005. The February 17, 2006, response to the RAI 2-6 is not complete because the rationale provided is not supported with adequate technical bases. The 30-foot drop tests are performed for two orientations of the test assemblies, one horizontal, the other vertical. The basis for selecting these two orientations as the most damaging to the ARROW-PAK container is not provided.

This information is required to verify compliance with 10 CFR 71.7(c)(1).

### **Chapter 3 - Thermal**

- 3-1 Demonstrate the integrity of ARROW-PAK container by full scale test using hydrogen deflagration at MNOP conditions and with its high-density polyethylene walls at the maximum temperature estimated in Section 3.5 of the SAR. In addition, provide Reference 16 [i.e., K. L. Kosanke and B. J. Kosanke, Repeat Firing of 10.2 cm (4 in.),

SDR-17, HDPE Mortars, Proceedings of the First International Fireworks Symposium (1992)].

Provided the nature of this request (i.e., exemption), the applicant needs to demonstrate convincingly that the ARROW-PAK container can prevent any damage to the cask containment system from deflagrations.

This information is required to verify that the package is safe and that there is adequate technical basis to grant an exemption from the requirements of 10 CFR 71.43(d).