April 27, 2010

Mr. Mark Whittaker
Energy*Solutions*
140 Stoneridge Drive
Columbia, SC 29210

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE MODEL NO. 3-60B PACKAGE

Dear Mr. Whittaker:

By letter dated February 26, 2010, Energy*Solutions* submitted both its responses to the NRC staff's Request for Additional Information letter dated November 17, 2009, and a new revision of the application for approval of the Model No. 3-60B package as a Type B(U) package.

In connection with the staff's review of the package application, Revision No. 1, dated February 26, 2010, we need the information identified in the enclosure to this letter. We request that you provide this information by June 25, 2010. If you are unable to meet this deadline, you must notify us in writing no later than May 14, 2010, of your submittal date and the reasons for the delay. The staff will then assess the impact of the new submittal date and notify you of a revised schedule.

Please reference Docket No. 71-9321 and TAC No. L24354 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, I may be contacted at (301) 492-3408.

Sincerely,

/RA/
Pierre Saverot, Project Manager
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-9321
TAC No. L24354

Enclosure: Request For Additional Information

April 27, 2010

Mr. Mark Whittaker
Energy*Solutions*
140 Stoneridge Drive
Columbia, SC 29210

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE MODEL NO. 3-60B PACKAGE

Dear Mr. Whittaker:

By letter dated February 26, 2010, Energy*Solutions* submitted both its responses to the NRC staff's Request for Additional Information letter dated November 17, 2009, and a new revision of the application for approval of the Model No. 3-60B package as a Type B(U) package.

In connection with the staff's review of the package application, Revision No. 1, dated February, 2010, we need the information identified in the enclosure to this letter. We request that you provide this information by June 25, 2010. If you are unable to meet this deadline, you must notify us in writing no later than May 14, 2010, of your submittal date and the reasons for the delay. The staff will then assess the impact of the new submittal date and notify you of a revised schedule.

Please reference Docket No. 71-9321 and TAC No. L24354 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, I may be contacted at (301) 492-3408.

Sincerely,

/RA/
Pierre Saverot, Project Manager
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-9321
TAC No. L24354

Enclosure: Request For Additional Information

Distribution:
via email: Daniel Forsyth, Haile Lindsay, Jimmy Chang, David Tarantino, Ata Istar, Neil Day

G :\SFST\Saverot\71-9321 ES 3-60B\Second RAI letter.doc

OFC	SFST	E	SFST		SFST		SFST		SFST		SFST	
NAME	PSaverot		JChang		AIstar		MRahimi		CRegan		MdeBose	
DATE	4/21/2010		4/26/2010		4/21/2010		4/26/2010		4/21/2010		4/27/2010	
OFC	SFST		SFST		SFST		SFST		SFST		SFST	
NAME	EJBenner											
DATE	4/27/2010											

C = COVER E = COVER & ENCLOSURE N = NO COPY OFFICIAL RECORD COPY

Request for Additional Information
for the
Model No. 3-60B Package
Docket No. 71-9321

By application dated June 30, 2009, Energy*Solutions* submitted an application for approval of the Model No. 3-60B package. By letter dated November 17, 2009, the NRC staff transmitted a Request for Additional Information (RAI) to the applicant who responded on February 26, 2010, and submitted also Revision No. 1 of the package application.

This second RAI letter identifies information needed by the staff in connection with its review of the "Safety Analysis Report for the Model No. 3-60B Type B Shipping Cask," Revision No. 1, dated February 26, 2010. The requested information is listed by chapter number and title in the applicant's Safety Analysis Report. The staff reviewed the application using the guidance in NUREG 1609, "Standard Review Plan for Transportation Packages for Radioactive Material."

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

Chapter 2 – Structural Evaluation

2.1 Provide a detailed justification for the use of static properties of the foam material in the following reports: (1) ST-551, Rev. 2, the validation of the ANSYS/LS-DYNA analysis technique using the prototype tests data from Sandia and BAM, and (2) ST-557, Rev. 1, drop analyses of the package for Normal Conditions of Transport (NCT) and Hypothetical Accident Conditions (HAC).

The General Plastics "LAST-A-FOAM© FR-3700" foam material is referenced to be used for this application and is stated to meet the regulatory requirements of drop conditions. The crush strength of the "LAST-A-FOAM© FR-3700" material, like any other material, is sensitive to strain rate.

The dynamic adjustments based on the significant testing program at strain rates in the range of 30 sec^{-1} and 100 sec^{-1} was determined by General Plastics. However, the stiffer dynamic crush strength properties, suggested by the General Plastics design guide publication for radioactive material shipping container, were not used in the analyses. If the suggested dynamic properties were to be used in the finite element analyses, the structural members of the Model No. 3-60B package would be subjected to higher resultant impact forces, and consequently to higher stress intensity levels.

Note also that the Safety Analysis Report (SAR) must be revised to reflect the applicant's position on this matter.

This information is required by the staff to determine compliance with 10 CFR 71.71 and 71.73.

2.2 Provide minimum and maximum (variability) foam material properties based on the density that will be used in the fabrication of the Model No. 3-60B package.

The foam properties in the principal directions are expected to be varying as some percentage of the median value. Therefore, the applicant needs to ensure that, through the selected foam properties, the worst resultant forces could be transferred under NCT and HAC.

This information is required by the staff to determine compliance with 10 CFR 71.71 and 71.73.

2.3 Correct the lid bolt shear stress calculations in ST-609, Rev. 0.

The tensile-area of 1.41 in^2 for the cross section of 1-1/2 inch lid-bolt was considered for the shear stress calculations. However, the root-area of 1.29 in^2 for the cross section of lid bolt needs to be used to determine the shear stress levels.

This information is required by the staff to determine compliance with 10 CFR 71.73.

2.4 Provide a justification for not considering all the surface forces (FX, FY, FZ) at the skirt tip in ST-609, Rev. 0.

The staff believes that the resultant force from all combined surface forces (FX, FY, FZ) at the skirt tip needs to be considered for the skirt-lid interaction under HAC.

This information is required by the staff to determine compliance with 10 CFR 71.73.

2.5 Provide a justification for the assumption that two lid bolts near the 6 o'clock location could equally carry the entire impact force, as stated in ST-609, Rev. 0, for both the side and corner drop cases.

The staff believes that the maximum resultant force may be carried by two lid bolts, but may not be equally carried by two lid bolts under HAC cases. Based on the local deformation of the skirt, for both the side and corner drop cases, the applicant should determine the worst resultant force, and recalculate the shear stress on a lid bolt.

This information is required by the staff to determine compliance with 10 CFR 71.73.

2.6 Provide weld qualification calculations for "trunnion (item 18)" to "trunnion back-up plate (item 19)," and "trunnion back-up plate (item 19)" to the "outer cask shell (item 7)" for the load conditions covered in ST-503, Rev. 1.

The cross sectional properties of the welds appear to be smaller than the cross sectional properties of the structural members at weld joints, and the allowable stress intensity limit of the welds is lower than the allowable stress intensity of the materials; thus, the weld qualification calculations must be provided to justify the structural integrity of the containment boundary under the loading conditions addressed in 10 CFR 71.45.

Item numbers listed above were taken from the "Bill of Materials" list in Drawing No. C-002-165024-001, Rev. 0, "3-60B Cask General Arrangement and Details."

This information is required by the staff to determine compliance with 10 CFR 71.45.

Chapter 3 – Thermal Evaluation

3.1 Revise the calculations for the maximum pressure within the 3-60B containment vessel under NCT.

The maximum pressure within the 3-60B containment vessel under NCT is attributed to the radiolytic gas generation, the thermal expansion of initial gases, and the pressure of the water vapor within the package. Therefore, the applicant should calculate a maximum NCT pressure attributed to these three sources, i.e., the pressure induced by the radiolysis and the subsequent thermal expansion, the pressure increase from the initial gas/air due to thermal expansion, and the pressure due to the water vapor.

The application should include the equations, the related parameters and values, and the calculations, including the pressure due to the water vapor.

This information is required by the staff to determine compliance with 10 CFR 71.35, 71.43(d), and 71.71.

3.2 Provide the allowable temperature limits, the melting points, and the ignition temperatures of the package contents under NCT and HAC.

The applicant modeled the package contents with air and displayed the calculated temperatures of the package cavity and the waste container (waste contents) in Table No. 3-3 of the application, without providing the maximum allowable temperature limits of the package contents under NCT and HAC. The applicant should:

(1) Explain or verify that, instead of modeling the package contents in the cavity, as specified in Section No. 1.2.2 of the package application, the simulation of the air in the cavity is the bounding case for the thermal analyses, and

(2) Provide the melting points, the auto-ignition temperatures, and the allowable temperature limits of the package contents under NCT and HAC. The applicant should ensure that the package contents will not be melted or ignited under NCT and HAC.

This information is required by the staff to determine compliance with 10 CFR 71.35, 71.43(d), 71.71, and 71.73.