

October 21, 2009

MEMORANDUM TO: Eric Benner, Acting Deputy Director  
Licensing and Inspection Directorate  
Division of Spent Fuel Storage and Transportation, NMSS

FROM: Pierre Saverot, Project Manager **/RA/**  
Licensing Branch  
Division of Spent Fuel Storage and Transportation, NMSS

SUBJECT: SUMMARY OF OCTOBER 13, 2009, MEETING WITH  
ENERGYSOLUTIONS REGARDING THE 3-60B PACKAGE

### Background

By letter dated June 30, 2009, EnergySolutions (ES) submitted a revised application for approval of the Model No. 3-60B package. This package will be used to ship by-product, source or SNMM in Type B quantities, up to 3,000 A2 or 30,000 Ci, including expended targets from the Spallation Neutron Source Facility. The NRC staff had previously suspended its review of the initial application on October 30, 2008, because of significant issues with the finite element validation analyses as well as discrepancies in the containment analysis release calculations and the description of hydrogen generation from the proposed contents.

ES requested this meeting to obtain a complete understanding of the staff's concerns resulting from the technical review and provide clarifications to some of the issues. Staff will submit a Request for Additional Information on schedule in November 2009.

### Discussion

Regarding structural topics, staff said that the maximum stress intensity of 29,000 psi for a 1-ft end drop – load combination No. 3 – cannot be right. Staff said that ANSYS is averaging the nodal stress values, with each value being extrapolated to the integration points and then averaged at the node. Staff indicated that one issue that ES needs to deal with (and resolve for all drops) is the selection of elements and the nodal stress averaging with results being underestimated by 25% to 50%. Staff requested ES to perform a “conversion study” to find out if the mesh is accurate and predictable, i.e., by calculating the linearized bending stress and converting it to a moment prior to plotting results. Staff also cautioned ES on the use of constrained equations in a component because of the need to have coincident nodes in order to do nodal stress averaging. Another potential problem raised by staff was related to the 30-ft side drop where stresses in the flange lip are 6 times greater than the yield strength for that material. That additional load will be transferred to the bolts and this behavior must be captured in the analysis. Staff said that ES needs to ensure that the bolt remains elastic and is not yielding so that the leaktight integrity is maintained.

Regarding Section 5.0 of the structural analyses under drop conditions (Calculation Package No. ST-504) which shows allowable peak stresses of 50,100 psi, 74,700 psi, and 150,000 psi, staff said that those peak stresses come from the stress concentrations and that no stress

concentration factors have been applied to the results. Staff requested ES to describe properly the normal conditions on the membrane, bending, and secondary stresses because the stress concentration factor has not been included.

ES agreed with staff's observations on nodal stresses being averaged out but said that their calculations are in compliance with RG 7.6 and are also conservative by including thermal effects on the stresses. Staff disagreed with ES statements and responded that ES needs to show in the calculations that (i) the linearized stresses are below the allowable values, and (ii) the calculated values are properly calculated. Staff also said that (i) the finite element analysis must show the relaxation in the lip moment (i.e., when the boundary rotates and relieves the moment) so that the bolts can be properly evaluated, and (ii) peak stresses are not to be used for elastic analyses when stress concentrations are not considered. Staff reiterated its position that a "conversion" study needs to be performed, that the use of peak stresses causes confusion and should be removed from the SAR, and that ES shall better explain its methodology.

Staff also noted other structural topics that may cause concerns, including the fact that (i) the displacement/history plots show a lot of deformation, and (ii) the benchmarking analysis does not have any end drop. Staff also indicated that there is no discussion on foam properties being different according to the directions and that Report No. ST-557 should include such discussion and indicate which properties/directions are more realistic. Staff also mentioned that ES should (i) explain why a contact/friction value of 0.3 was chosen, and (ii) incorporate weld symbols and indicate on the drawings where full penetration welds are located.

Regarding thermal topics, staff indicated that (i) ES referenced 49 CFR 173.428 for compliance with closure requirements for an empty package but not 49 CFR 173.443 which appears to be more appropriate and that additional requirements were needed, (ii) a reference to the NRC approved QA program could not be located in the SAR, and (iii) that periodic tests and maintenance schedules would need to be developed in Chapter 8. ES responded that Section 8.2.2 discussed the pre-shipment leak test and that this section had been "extracted" from a previously approved SAR.

Regarding containment topics, staff said that it will request (i) a more detailed description of the material characteristics of R-134a to prove its suitability as a tracer gas in leak test, (ii) a detailed description of the cavity filler material suitable to be used in a leak test, (iii) detailed information of the type of materials that can be used as a filler material, (iv) information to identify the dewatered swarf as a powdered solid, (v) an appropriate reference for the 4 g/cc density of dewatered swarf, and (vi) a statement on the radiolysis being the only mechanism for hydrogen generation.

Regarding materials topics, staff said that the description of a number of items in the General Arrangement Drawing will have to be revised and clarified. For example, staff mentioned Items No. 25, 30, 31, 38 and 39. Staff also said that it will request a copy of the specifications for the elastomer. Staff said that it was not clear if the plate (Item No. 16) was in one piece and how it was attached to the bolt ring (Item No. 6). The same remark stands for Item No. 53 which shows as two pieces but may be just in one piece. Staff asked how all the voids could be filled with lead and ES responded that a gamma scan will ensure that this is the case. Staff also commented on the material for the socket head cap screw groove (Item No. 36) and on the

specifications for the seal ring (Item No. 33). Staff indicated that one of the references in Chapter 8 includes withdrawn specifications, e.g., ASTM 501-93. Staff said that the term “or equivalent” found in multiple sections of the application was not acceptable and that reference must be made to a national standard. Staff also said that ES will need to address the specifications for the lubrication on the bolts and the seal rings as well as the vacuum grease on the seal material.

The enclosure is the list of meeting attendees. No slides were presented by ES at the meeting. The staff did not make any regulatory commitments at the meeting.

Docket No. 71-9321  
TAC No. L24354

Enclosure: As stated

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Distribution: NRC Attendees: Ata Istar, Neil Day, Gordon Bjorkman, Haile Lindsay, Jimmy Chang, David Tarantino

<b>OFC</b>	SFST	E	SFST	C	SFST			
<b>NAME</b>	PSaverot		MDeBose		SBaggett			
<b>DATE</b>	10/20/2009		10/21/09		10/21/09			

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

**Meeting Between EnergySolutions and the  
Nuclear Regulatory Commission  
October 13, 2009  
Meeting Attendees**

**NRC/NMSS/SFST**

Gordon Bjorkman	301-493-3298
Jimmy Chang	301-492-3272
Neil Day	301-492-3335
Ata Istar	301-492-3409
Haile Lindsay	301-492-3280
Michele Sampson	301-492-3292
Pierre Saverot	301-492-3408
David Tarantino	301-492-3413

**ENERGYSOLUTIONS**

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Enclosure