## PMSTPCOL PEmails

**From:** Eudy, Michael
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**Cc:** STPCOL
**Subject:** STP Chap 19 Draft RAIs 3124
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**Importance:** High

Bill,

Here are advanced draft RAIs for your review. If you want to set up a telecon to discuss these with our technical staff before we issue them, then please advise me as soon as possible. If I do not hear from you by C.O.B. Thursday 7/30/09, then I will begin our RAI issuance process on Friday 7/31/09. Thank you.

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Request for Additional Information No. 3124 Revision 2

South Texas Project Units 3 and 4
South Texas Project Nuclear Operating Co
Docket No. 52-012 and 52-013
SRP Section: 19 - Probabilistic Risk Assessment and Severe Accident Evaluation
Application Section: 19.1.3

QUESTIONS for Structural Engineering Branch 2 (ESBWR/ABWR Projects) (SEB2)

19-***

**RAI 19F-1**:

The reconstitution study was performed only for the nonlinear analysis of RCCV. What is the basis for selecting only this aspect of the containment ultimate strength evaluation? It is noted that the model does not include the drywell head which was identified in ABWR DCD as the critical element in the determination of the ultimate strength of the containment. Provide the rationale for excluding the drywell head from the reconstitution study.

19-***

**RAI 19F-2**:

As an extension of RAI 19F-1, confirm that the other aspects of ABWR DCD 19F such as the evaluation of drywell head, liner plate, penetrations and top slab over the drywell are still applicable to STP 3&4 containment.

19-***

**RAI 19F-3:**

Two pressure load cases are considered in the Ares Corporation Report 08042801.01-S-001 Rev.0 “Reconstitution of Ultimate Strength Analysis of ABWR Reactor Containment Building.”

Case -1 does not include the temperature effect while Case-2 includes the effect of maximum containment temperature of 500◦F.

Case -1: A pressure of 180 psi is applied to the inside surface walls of the containment at 60 F.
1.0* Dead Weight + 1.0 * Pressure Loads + 1.0 * Wetwell Hydrostatic Pressure Load

Case -2: A pressure of 135 psi is applied to the inside surface walls of the containment at 500°F inside containment temperature.
1.0* Dead Weight + 1.0* Pressure Loads + 1.0* Wetwell Hydrostatic Pressure Load + 1.0* Thermal Loads.

The report states that case 1 above corresponds to Case 3 analyzed in ABWR DCD (Table 19F-2). Provide the basis for the selection of these pressure/temperature load cases.

19-***

**RAI 19F-4**:

It is assumed that the pressure of 135 psi in the load Case 2 relates to the drywell yielding capacity as found in ABWR DCD. However, this corresponds to the maximum temperature of 700˚F. Provide the rationale for using a temperature of 500˚F.

19-***

**RAI 19F-5**

In the ABWR DCD, it is argued that the effect of temperature as high as 700°F is to reduce the pressure capacity by a maximum of 11% (DCD 19F.3.1.1.last paragraph). The FINEL analysis showed that the maximum stress in the wetwell wall reinforcement was about 20% less than the allowable stress of yielding of the reinforcement. Since the ANYSYS analysis in the Ares Corporation Report 08042801.01-S-001 Rev.0 "Reconstitution of Ultimate Strength Analysis of ABWR Reactor Containment Building," showed the stress in the wetwell wall to be close to the allowable stress, provide the analysis results assuming the containment inside temperature of 700˚F.

19-***

**RAI 19F-6**:

Please provide the basis for Figure 1 Temperature Profile in Containment during Pressurization Accident ("Reconstitution of Ultimate Strength Analysis of ABWR Reactor Containment Building," Ares Corporation Report 08042801.01-S-001 Rev.0.).

19-***

**RAI 19F-7:**

The nonlinear analysis of RCCV was stated to have been conducted using bilinear properties of materials. Provide these properties and confirm that they are identical to those in ABWR DCD 19F. Also, describe how the property variation with temperature was modeled.

19-***

**RAI 19F-8:**

The 3D analysis provided in the Ares Corporation Report 08042801.01-S-001 Rev.0 “Reconstitution of Ultimate Strength Analysis of ABWR Reactor Containment Building,” represents an 18-degree slice of the containment aimed at replicating the axi-symmetrical FINEL model, and it does not represent the 3D geometry of the whole RCCV. In that sense, if the “quality” of the finite elements were the same, with same boundary conditions, similar meshing, similar material properties including bi-linear and temperature behavior, similar external and temperature loading, etc., structural response should be very similar. The assumed force-deflection relationships used to develop the finite elements tend to be more elaborate for 3D elements. Generally the 3D analysis results converge faster and are more realistic. Although deviations on the order of ±10 % are usually accepted in engineering practice, the claim that the 3D analysis is conservative cannot be justified. Please explain the basis for the assertion that the results in the Ares Corporation Report conservative.

19-***

**RAI 19F-9:**

The containment is modeled in the Ares Corporation Report 08042801.01-S-001 Rev.0 “Reconstitution of Ultimate Strength Analysis of ABWR Reactor Containment Building” by a 18-degree slice presumed to be representing an axi-symmetric condition. Justify the basis for this assumption explaining the boundary conditions used.

19-***

**RAI 19F-10:**

In the Ares Corporation Report 08042801.01-S-001 Rev.0 “Reconstitution of Ultimate Strength Analysis of ABWR Reactor Containment Building,” details regarding the geometry of the upper portion of the model are missing. A description should be provided to identify the physical condition that is being modeled, e. g., the upper pool, the radial walls or similar