D. Ashley - Fwd: Some comments on predecisional Oyster Creek ACRS information

From: D. Ashley
To: Ashar, Hansraj; Dudley, Noel; Samaddar, Sujit
Date: 01/30/2007 9:11:38 AM
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Sujit and Hans-

This is just in.... Comments from ACRS staff on slides provided by AmerGen

We need to discuss further as this is directly related to the Sandia/GE comparison.

-Donnie

>>> Michael Junge 01/30/2007 >>>
Comparison of GE and Sandia analyses on Slide 21 is sort of apples & oranges. It is between Sandia's best estimate analysis of current thickness and GE's uniform thickness model.

A fairer comparison is between uniform thickness models with the same capacity factor. In the GE model if no credit is taken for tensile hoop stress, then the capacity factor is 0.207 as in the Sandia case instead of 0.326. Then the GE safety factor for a uniform thickness of 0.736 in is

FS=2.00*.207/.327=1.27

Extrapolating the Sandia results in Fig 5-2 for different uniform thicknesses of the sand bed gives a FS for a uniform thickness of 0.736 of 1.5.

So apples to apples the GE analysis gives a buckling load 1.27/1.5=0.85 of the Sandia result.

This difference could be due to differences in mesh refinement or modeling of the attached piping or some other modeling differences. FEM analyses give upper bounds to the buckling load. Typically as meshes are refined, buckling loads will decrease. However, my eyeball inspection of the meshes suggests the Sandia mesh is more refined, suggesting the difference is due to modeling of the attached piping or some other modleing of the structure. Since GE has more detailed knowledge of the structures, we might guess their result is a better upper bound than the Sandia model.

If we also assume the Sandia best estimate model overestimates buckling loads by the same factor, we get

FS=2.15*0.85=1.83

Using the capacity factor of 0.326 (or a slightly modified value for the Sandia analysis eliminates the problem. The revised slides do give additional support for the OY position.

There was a fair amount of discussion at the subcommittee meeting over mode shapes. The so-called buckling modes shapes in the GE report are misleading. The buckling mode is a vertical buckling mode. The symmetric circumferential displacments shown in the GE report corresponds to the 1st vertical buckling mode in which there is an outward displacement at the node. The asymmetric circumferential displacements correspond to the 2nd vertical buckling mode in which there is no displacement at the node. For the uniform thinning case, the use of a 36 degree slice is "exact". The problem really does have that symmetry. They are looking at the first two buckling modes, not the 9th or the 10th.

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