PMTurkeyCOLPEm Resource

From: Comar, Manny
Sent: Tuesday, July 05, 2011 10:00 AM
To: orthen, Richard; Raymond Burski; Steve Franzone; STEVEN.HAMRICK; TurkeyCOL Resource; William Maher
Cc: Jones, Henry
Subject: Draft RAI 5818 related to SRP Section 02.04.06 - Probable Maximum Tsunami Flooding for the Turkey Point Units 6 and 7 combined license application.
Attachments: draft RAI 5818_TPN.doc

To All,

Attached is the Draft RAI 5818 related to SRP Section 02.04.06 - Probable Maximum Tsunami Flooding for the Turkey Point Units 6 and 7 combined license application.

If you need a conference call to discuss the question(s) of the draft RAIs please contact me at 301-415-3863. Unless you request additional clarification we will normally issue the RAI as final within 3 to 5 days, from today.

Thanks

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Request for Additional Information No. 5818

Turkey Point Units 6 and 7
Florida P and L
Docket No. 52-040 and 52-041
SRP Section: 02.04.06 - Probable Maximum Tsunami Flooding
Application Section: 2.4.6

QUESTIONS from Hydrologic Engineering Branch (RHEB)

02.04.06-***

Section C.I.2.4.6.3 of Regulatory Guide 1.206 (RG 1.206) provides specific guidance with respect to the source characteristics needed to determine the PMT. These characteristics include detailed geologic descriptions of the controlling tsunami generators, including location, source dimensions, and maximum displacement.

In FPL's response to NRC RAI 2.04.06-1 (Question 18184), FPL acknowledges evidence of Miocene debris flows in the Florida Straits region. However, they justify omission of Florida Straits debris flows as potential tsunami sources for PMT determination on the basis of (1) absence of evidence for any correlated tsunami deposit along the southern Florida coast and (2) the unlikelihood of debris flows similar to those that occurred in the Miocene under present-day sea-level-rise conditions. With regard to the first point, Miocene tsunami deposits would probably not be preserved over such a long period and in areas that are near sea level now, given the changes in paleogeography since Miocene time. With regard to the second point, additional justification (e.g., past scientific studies) is needed to support this assertion. Note that cross-referenced Subsection 2.5.1.1.5 does not exist in the FSAR version published on the NRC Web site. FPL may be referring in part to Subsection 2.5.1.1.1.5 with regard to Cuban geology.

Provide justification for the assertion that debris flows in the Florida Straits region, similar to those observed in the Miocene from drill-hole records, would not occur under present-day sea-level conditions. Correct cross-reference to Subsection 2.4.1.1.5, which does not exist in the FSAR.

02.04.06-***

Section C.I.2.4.6.4 of Regulatory Guide 1.206 (RG 1.206) provides specific guidance with respect to tsunami analysis. This includes providing a complete description of the analysis procedure used to calculate tsunami wave height and period at the site, including the theoretical bases of the models, their verification and the conservatism of all input parameters.
In response to NRC RAI 2.04.06-2 (Question 18185), FPL provided a reasonable description of the site-specific numerical modeling they performed to determine water levels related to an offshore Lisbon earthquake tsunami source which they determine is the PMT source. This modeling takes into account the regional and local bathymetry/topography. However, there are some unresolved issues listed below that

relate to the theoretical basis of the model, its verification and the conservatism of all input parameters:

1) In terms of setting up the model, FPL did not specify what type of offshore boundary condition is used. The applicant should verify that artificial reflections off this boundary do not influence their predictions (note there is a way to create a non-reflective boundary condition for sinusoidal waves but they do not mention using it).

2) It is unclear as to the effect of having a closed southwest boundary. There may be spurious reflections off this closed boundary. Please perform another simulation (in the nature of sensitivity study) where the southwest boundary is extended a bit further into the Gulf of Mexico to show that shifting this boundary does not affect the model results, especially since the boundary is still fairly close to the site.

3) FPL indicates that the water level at the site is higher when they used a Manning's *n* value of 0.02 instead of 0.025 which they prefer (pg. 14 of the FPL response to NRC RAI 2.04.06-2). For conservatism, the applicant should use the lower *n*-value unless it can demonstrate that the water-level difference is negligible.

4) In FPL's description of DEFLT3D on pg. 7 of the FPL response to NRC 2.04.06-2 RAI, FPL indicates that the model does not include a wave breaking mechanism. This statement needs should be verified. Please discuss the general conservatism of DELFT3D under the assumption listed in Section 2.4.6.4.1 of the FSAR revision.

5) It is unclear that the sinusoidal wave that the applicant uses is the most conservative waveform. While they tune it to the wave amplitude and period obtained by Mader (2001) for the 1755 Lisbon tsunami at 783 feet water depth, it is possible that a steeper non-sinusoidal wave would have larger run-up.

With regard to the numerical modeling provided in response to NRC RAI 2.04.06-2: (1) Specify what type of offshore boundary condition is used and verify that any artificial reflections off this boundary do not influence water level predictions; (2) Verify that shifting the southwest boundary of the model does not affect water level predictions at the site; (3) Clarify whether use of a Manning's *n* value of 0.02 yields more conservative water level predictions at the site, compared to a Manning's *n* value of 0.025; (4) Clarify whether DELFT 3D includes the effects of wave breaking as used to determine PMT water levels; (5) Determine whether alternate boundary conditions yield higher runup values compared to the sinusoid waveforms used for the model boundary conditions in the deep Atlantic Ocean.

02.04.06-***

Section C.I.2.4.6.3 of Regulatory Guide 1.206 (RG 1.206) provides specific guidance with respect to the historical tsunami record, including paleo-tsunami evidence, source characteristics needed to determine the PMT, and orientation of the site relative to the generating mechanism, shape of the coastline, offshore land areas, and hydrography.

1) The cross-referenced Subsection 2.5.1.1.5 FPL refers to in their response to NRC RAI 2.04.06-3 (Question 18186) does not exist in the FSAR version published on the NRC Web site; the last subsection in Section 2.5.1.1 is 2.5.1.1.4. It is unclear what

subsection the applicant is referring to. No reference to tsunami deposits can be found in Section 2.5.1. Clarification is needed.

2) The assertion in FPL's response to NRC RAI 2.04.06-3 (Question 18186) that the site is sheltered by the Bahamas Islands from landslide-generated tsunamis north of Puerto Rico depends on FPL's response to NRC RAI 2.04.06-2 (Question 18185). In response to NRC RAI 2.04.06-2 (Question 18185), FPL did not specifically model tsunamis from landslides north of Puerto Rico. Further evidence is needed to verify this assertion.

3) The assertion in FPL's response to NRC RAI 2.04.06-3 (Question 18186) that the impact of a submarine landslide to the north (offshore of the Carolinas) would be considerably reduced depends on FPL's response to NRC RAI 2.04.06-2 (Question 18185). In FPL's response to NRC RAI 2.4.6-2 (Question 18185), FPL did not specifically model tsunamis from landslides offshore of the Carolinas. Further evidence is needed to verify this assertion.

Provide the correct FSAR cross-reference for paleotsunami deposits. Subsection 2.4.1.1.5 does not exist in the FSAR. Justify the assertion that the Bahamas Islands shelter the site from landslide-generated tsunamis north of Puerto Rico. Justify the assertion that tsunami water levels from submarine landslides to the north (offshore of the Carolinas) would be negligible at the site.