CCNPP3COLA PEmails

From: John Rycyna
Sent: Monday, July 14, 2008 2:49 PM
To: CCNPP3COL Resource
Subject: FW: STP Site Audit Trip Report
Attachments: %CCNPP_Site_Rept(070208dct).pdf

-----Original Message-----
From: Henry Jones
Sent: Monday, July 14, 2008 2:22 PM
To: John Rycyna
Cc: Vail, Lance W; Mark Thaggard
Subject: FW: STP Site Audit Trip Report

FYI.

Henry

-----Original Message-----
From: Eric L. Geist [mailto:egeist@usgs.gov]
Sent: Friday, July 11, 2008 1:01 PM
To: Henry Jones
Cc: David C Twichell; Lynett, Patrick; Jill McCarthy
Subject: STP Site Audit Trip Report

RE: JCN Q-4151, Task Order No. 7, Calvert Cliffs Site

Dear Henry,
Attached please find the Calvert Cliffs site audit trip report for review of Section 2.4.6, prepared by Dave Twichell and Pat Lynett.
This report has been internally reviewed and will be issued as a USGS Administrative Report to the NRC (Director's Approval forthcoming).
Please let me know if there are any questions related to this report.
Sincerely...Eric Geist
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Hearing Identifier: CalvertCliffs_Unit3Cola_Public_EX
Email Number: 180

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Subject: FW: STP Site Audit Trip Report
Sent Date: 7/14/2008 2:49:04 PM
Received Date: 7/14/2008 2:49:05 PM
From: John Rycyna

Created By: John.Rycyna@nrc.gov

Recipients:
"CCNPP3COL Resource" <CCNPP3COL.Resource@nrc.gov>
Tracking Status: None

Post Office: HQCLSTR02.nrc.gov

Files	**Size**	**Date & Time**
MESSAGE	1368	7/14/2008 2:49:05 PM
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Options
Priority: Standard
Return Notification: No
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Sensitivity: Normal
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Technical Letter Report
to the U.S. Nuclear Regulatory Commission
JCN Q-4151, Task Order No. 7

Trip Report for the Hydrology Site Audit of the Calvert Cliffs Site

By
David C. Twichell (USGS, Woods Hole) and Patrick J. Lynett (Texas A&M University)

Administrative Report, 2008

Attendees Reviewing Section 2.4.6 of FSAR:

David Twichell, USGS, Woods Hole
Patrick Lynett, Texas A&M University

Schedule:

June 23, 2008, 8pm: Pre-site audit briefing by NRC
June 24, 2008, 8am: On-site orientation by NRC and UniStar, the Operating Company for the Calvert Cliffs Nuclear Power Plant.
June 24, 2008, 9am-12 noon: Tour of the facility and site of the proposed Unit 3
June 24, 2008, 1pm-5pm: Site audit of hydrology sections 2.4.1-2.4.6 (Surface Water Hydrology, Floods, Storm Surge and Seiche, and Tsunami Hazards)
June 25, 2008, 8am-10am: Tour of cliffs along the Chesapeake shoreline on the plant property
June 25, 2008, 10am-12:30am: Continue site audit – wrap up review of section 2.4.6 and start review of 2.4.7, 2.4.9. and 2.4.12.

Pre-site audit briefing

NRC explained the general schedule and procedure of the site audit. In addition to the USGS and Texas A&M scientists, staff scientists from NRC Rockland and Pacific Northwest National Laboratory (PNNL) were in attendance to review other hydrology sections. No major issues were raised.

On-site orientation

Applicant distributed the agenda, explained the history of the project, and provided an overview of the setting and plan for the proposed project. In addition to UniStar representatives, engineers and scientists from Bechtel Corp represented the applicant. NRC explained the overall goals of the site audit.

Tour of the facility

The tour of the facility was limited to the grounds outside of the present electric generating structures. Stops included an overlook of the present plant, which provided an overall orientation as to the location of the new switch yard, proposed reactor, and intake water facility, a walk down the haul road to the dock and barge slip where components will be delivered to the site, the site of the proposed pumping station where Chesapeake Bay water will be pumped to a desalination plant, the water-intake bay, the site for the new reactor, and an overlook from the top of the cliffs.

Site audit

Several sections of the hydrology chapter 2.4 of the applicant's FSAR were reviewed during the afternoon of June 24 including section 2.4.6 (tsunami hazards). Remaining sections of chapter 2.4 that were not reviewed on June 24 were reviewed on June 25-26. We were only present for the parts that were reviewed during the morning of June 25.

Mustafa Samad of Bechtel Corp. represented the applicant for Section 2.4.6. There were 25 discussion items in section 2.4.6. A brief summary of these discussion items is provided below:

Discussion item # 23

Provide a SME to discuss seismically-generated seiches (e.g., in Chesapeake Bay) in Section 2.4.6 (Currently there is no mention of seismic seiches—atmospheric seiches are discussed in Section 2.4.5.).

Action: A review of the literature had revealed no record of seismically generated seiches. Our understanding is that an RAI will be requested that summarized the literature review and discusses the resonance frequency of the bay and how it compares with earthquake frequencies.

Discussion item # 24

Provide a SME to discuss the availability of additional information and references on the following: occurrence of Chesapeake Bay subaerial landslides; volumes of material involved in the failures; frequency of failures and/or age-dates for the failures; criteria for determining that these failures did not cause tsunami-like waves.

Action: Our understanding is that a RAI will be requested for the report to to expand on the references and clarify determination of the size of cliff failures. The detailed topography of the power plant property shows no evidence of older failure scarps. Perhaps USGS topo sheets should be checked to see if other scarps are preserved outside the site.

Discussion item # 25

Given that the NOAA tsunami event database is primarily a secondary compilation of other sources of information, provide a SME to discuss the primary sources of information, particularly as it relates to establishing the tsunami source generator characteristics in Section 2.4.6.3.

Action: It was deemed that the NOAA tsunami database is a sufficient reference because the primary sources can be accessed from this website. Therefore, no further action is needed.

Discussion item # 26

Provide a SME to discuss the criteria used to determine the non-existence of tsunami deposits preserved around the Calvert Cliffs Reactor site and potential geologically conducive locations for the deposition and preservation of tsunami deposits at the Calvert Cliffs site or nearby regions.

Action: The geologist reported that no record of tsunami deposits in the Clavert Cliffs have been reported in the literature, that the drill cores are too disturbed to resolve tsunami deposits, and that the Pleistocene protion of the steep cliffs is too high to be analyzed closely. An RAI is requested to describe the research and literature that addresses this question.

Discussion item # 27

Provide a SME to discuss the references or sources of information for the magnitude of the 1929 Grand Banks earthquake and the local runup height of the ensuing tsunami.

Action: This item was resolved at the site audit. The Maine Geological Survey website provides references to the 27 m runup height.

Discussion item # 28

Provide a SME to discuss how the source parameters (i.e., sliding scenario) were specifically determined for the Norfolk Canyon landslide, in terms of the volume of failure, duration and landslide speed.

Action: Our understanding is that an RAI will be requested to describe the derivation of source parameters that were used.

Discussion item # 29

Provide a SME to discuss the tsunami hydrodynamic model used to determine the 4 m maximum amplitude at the Chesapeake Bay entrance for the Norfolk Canyon landslide.

Action: The 4-m wave height was taken from the paper by Ward (2001a).

Discussion item # 30

Provide a SME to discuss how the source parameters (i.e., sliding scenario) were specifically determined for the La Palma landslide, in terms of the volume of failure, duration and landslide speed.

Action: Source parameters for the La Palma landslide were taken from the Ward paper (Ward, 2000b in the report) because they provide the most extreme case available in the literature. This response was viewed as reasonable, and it is unlikely this will result in an RAI.

Discussion item # 31

Provide a SME to discuss how the tsunami hydrodynamic model was used to determine the 3 m maximum amplitude at the Chesapeake Bay entrance for the La Palma landslide.

Action: The 3-m wave height was taken from the paper by Mader (2001a).

Discussion item # 32

Provide a SME to discuss the NRC (1979) reference: NUREG CR-1106 (Bransma et al., 1979).

Action: NRC provided us with a copy of the report. This item was resolved at the site audit.

Discussion item # 33

Provide a SME to discuss the following: explanation of source parameters for the Haiti earthquake as with the other two scenarios; the specific determination of the source parameters; the word "displacement" in reference to average or maximum slip along the fault or to maximum positive vertical displacement of the sea floor; and the assumed shear modulus and corresponding seismic moment (or moment magnitude) for this scenario earthquake.

Action: Our understanding is that an RAI may be requested to further clarify the location of the source earthquake and the nature of the sea floor displacement (ie. vertical or lateral).

Discussion item # 34

It appears that the Haiti earthquake scenario is associated with the 1918 Puerto Rico tsunami (Section 2.4.6.2). Provide a SME to discuss whether the mechanism for this scenario is that of an earthquake on the North American-Caribbean interplate thrust or that of the 1918 Puerto Rico earthquake (intraplate normal faulting).

Action: This question was resolved at the site review and no further action is needed.

Discussion item # 35

Provide a SME to discuss the tsunami hydrodynamic model used to determine the 0.9 m maximum amplitude at the Chesapeake Bay entrance for the Haiti earthquake.

Action: A sentence needs to be added stating that the model used is a linear model. This is a clarification that needs to be made, but is unlikely to result in an RAI.

Discussion item # 36

Provide a SME to discuss whether the first term in equation 2.4.6.-2 is correct, should be $\frac{\partial P}{\partial t}$, and that it is correctly implemented in the hydrodynamic model.

Action: This was a typographical error that will be corrected and should not result in an RAI. It was also noted during the site visit that the "h" in the equations should represent the total water depth (from free surface to bottom, i.e. including the tsunami wave elevation), not the still water depth.

Discussion item # 37

Provide a SME to discuss the following: the coding of the hydrodynamic program (in-house/already developed); if an already developed program was used, its modification in house or non-modification; if an unmodified program was used, the availability of documentation regarding the developer, version number, and reference; if the program was developed or modified in house, the availability of documentation and validation and benchmark results (i.e., in reference to laboratory studies or field measurements) in addition to Carrier (2003) to determine whether the program is operating correctly; and the meaning of "validation of the NLSWE and TSU models was performed separately from the section narrative".

Action: The NLSWE model was coded and run by a former student of the original developed, S.B. Yoon from South Korea. The TSU model is an in-house re-coding of the TUNAMI-N2 model out of Japan. Through an RIA, the applicant will supply reports (validation and calculation packages) to clarify the majority of the issues above, which are still unresolved. In addition, it was requested of the applicant to provide a model benchmark with field data from a recent tsunami.

Discussion item # 38

Provide a SME to discuss the phrasing "waves quickly dispersed" in this and other sections (pg. 2-759, 2-760, 2-764) and its relationship to amplitude attenuation or modeled physical dispersion.

Action: The phrase "waves quickly dispersed" needs clarification. It was suggested a series of contoured maps of wave height showing the attenuation of the modelled wave would help clarify this question. An RAI will be requested.

Discussion item # 39

Provide a SME to discuss how tsunami runup on land is estimated from nearshore tsunami amplitude.

Action: The applicant stated that a "cut-off" depth was used, at which a vertical wall was placed. The maximum water elevation at this wall is considered to be the runup height. This is a common approach in numerical models that do not contain the ability to move a shoreline position in time. Specifics about this procedure will be included in the packages provided through Discussion Item #37.

Discussion item # 40

Provide a SME to discuss the derivation/non-derivation of the bathymetric grid used for tsunami modeling from the precompiled NOAA Estuarine Bathymetric database (1998 version - which is gridded and heavily interpolated to a resolution of 30 m) and the procedure that was used to extract the 360 x 360 m resolution grid from the NOAA database.

Action: The applicant described the decision and process by which the NOAA bathymetric grid was subsampled to the 360 x 360 m resolution. The procedure will be described in the revised version of the FSAR. This may require an RAI depending on when it is completed.

Discussion item # 41

Provide a SME to discuss the highest resolution grid tested in the sensitivity analysis.

Action: A description of the sensitivity analysis of the bathymetric grid was provided, and our understanding is that it will be included in the revised version of the safety report.

Discussion item # 42

Provide a SME to discuss whether Figures 2.4-37 and 2.4-40 are switched.

Action: The figures are not switched, and are correct as is. No further action is needed.

Discussion item # 43

The statements (1st paragraph) that the maximum tsunami amplitude and drawdown at the CCNPP site are from the Norfolk Canyon landslides and Haiti earthquake, respectively, are based on the NLSWE model. Provide a SME to discuss the availability of a TSU model run for the La Palma landslide and Haiti earthquake to confirm this comparison for the limiting case (linear momentum equation and no bottom friction).

Action: The applicant stated that numerous combinations of the simulations (with/without bottom friction, linear/nonlinear) were run for all sources. Only the limiting cases (largest runup) were presented in the report. Details about these other simulations will be included in the packages related to Discussion Item #37, and additional descriptions of these other runs will be included in future versions of the FSAR.

Discussion item # 44

Provide a SME to discuss the calculation of the 20% margin error in the simulated water level.

Action: This 20% was entirely arbitrary. It was recommended that the applicant perform an uncertainty analysis, where the uncertainty in the wave height at the Bay entrance (estimated from published sources) is propagated through the Bay to the site. An RAI will be requested.

Discussion item # 45

Provide a SME to discuss the slight difference in the 10% exceedance high tide between Section 2.4.6 and Section 2.4.5.2.2.

Action: There is apparently no discrepancy in the stated tide levels in the two sections of the report.

Discussion item # 46

Provide a SME to discuss the inclusion/non-inclusion of long-term sea level rise in the water level analysis for the PMT.

Action: Long-term sea level rise was included in the analysis, and the question was resolved at the site audit.

Discussion item # 47

Provide a SME to discuss the grain size or grain size distribution of the sediment surrounding the UHS intake structure and the estimated strength of the currents that would be generated.

Action: This information was provided during discussions while on the site tour, and no further action is needed.

Discussion item # 48

Provide a SME to discuss: information on the size of material that the baffle screens; the effect on the intake structure of the material that passes through the baffle; the determination that blockage of the forebay will be unlikely.

Action: The means by which the baffle screens are cleared of debris was described, and no further action is needed.

Tour of Calvert Cliffs

A group of the meeting attendees took a 2-hour field trip to view some of the cliffs on the power plant property. The Choptank Formation was exposed at the base of the section of the cliff we visited. This formation is Miocene in age and consists of semi-lithified gray sandy clay. The St. Mary Formation is tan colored silty sand with prominent shell beds. At the top of the cliff some Pliocene and Pleistocene beds may be present, but the cliff was too steep (70°) to climb. Groundwater was seeping out along the top of the Choptank Formation. Slump deposits were common along the base of the cliff, but most were small (volume less than a few cubic meters). The largest slump deposit observed along this section of the cliff was approximately 15 m high x 5 m deep x 100 m long, and it was confined entirely to the beach.