Henry Jones

From: Eric L. Geist [egeist@usgs.gov]
Sent: Monday, June 09, 2008 7:44 PM
To: Henry Jones
Cc: David C Twichell; Lynett, Patrick
Subject: Re: CALVERT CLIFFS INFORMATION NEEDS (USGS DRAFT)
Attachments: %CC_Info_Needs-Hydrology_Safety_Audit(USGS).doc; % CCC_InfoNeeds_tsunami(060608eg).doc

Dear Henry,
Attached please find the revision to the Calvert Cliffs information needs table that includes our additional items for Section 2.4.6 (shown in blue text). Some of these items may be combined with the existing items already included in DRAFT #1. I have also attached the latest version of the narrative form for the information needs that we have been working with internally. The items listed on both of these documents are the same.
Please let me know if there are any questions regarding our information needs.
Best wishes...Eric

All:

I have attached a first draft of the information needs. Jill and Nebiyu, please verify that I have correctly captured your input.

PNNL & USGS: Please insert your input (in blue) directly into the attachment and return as soon as possible (By COB Tuesday, 10 June) so that I can provide the list to the PM via my Branch Chief. Thanks.

Henry

Henry Jones, Ph.D.
Hydrologist
Hydrologic Engineering Branch, Office of New Reactors
U.S. Nuclear Regulatory Commission
Mail Stop: T-7E18
11545 Rockville Pike, Rockville, MD 20852
Tel: (301) 415-1463
E-mail: Henry.Jones@nrc.gov (NEW)

Content-Type: application/msword;
name="CC_Info_Needs-Hydrology_Safety_Audit(draft).doc"
Content-Disposition: attachment;
filename="CC_Info_Needs-Hydrology_Safety_Audit(draft).doc";

B-10

creation-date="Mon, 02 Jun 2008 10:58:56 GMT";
modification-date="Mon, 09 Jun 2008 12:17:10 GMT"
Content-Description: CC_Info_Needs-Hydrology_Safety_Audit(draft).doc

Attachment converted: Geist HD:CC_Info_Needs-Hydro#5AED3F0.doc (WDBN/«IC») (05AED3F0)

JCN No. Q-4151
Task Order No. 7
UniStar Nuclear Operating Services
Calvert Cliffs COL

Title: Hydrology Section 2.4.6 Information Needs
USGS Draft #: 060608eg

Provided below are draft information needs for the upcoming Calvert Cliffs Site Safety Audit scheduled for the week of June 23, 2008, with regard to Section 2.4.6 "Probable Maximum Tsunami".

A general question for this section is whether the applicant needs to consider 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.)

Section 2.4.6.1 (Probable Maximum Tsunami):
Subaerial landslides

- Please provide additional information and references on the occurrence of Chesapeake Bay subaerial landslides. What are the volumes of material involved in the failures? What is the frequency of failures or are there age-dates for the failures? How is it determined that these failures did not cause tsunami-like waves?

Section 2.4.6.2 (Historical Tsunami Record):
Table

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

Tsunami deposits

- What criteria were used to determine that there are no tsunami deposits preserved around the Calvert Cliffs Reactor site? Are there geologically conducive locations for the deposition and preservation of tsunami deposits at the Calvert Cliffs site or nearby regions?

1929 Grand Banks tsunami

- What are the references or sources of information for the magnitude of the 1929 Grand Banks earthquake and the local runup height of the ensuing tsunami?

Section 2.4.6.3 (Tsunami Source Generator Characteristics):
Norfolk Canyon landslide

- How were the source parameters (i.e., sliding scenario) specifically determined, in terms of the volume of failure, duration and landslide speed?

- Which tsunami hydrodynamic model was used to determine the 4 m maximum amplitude at the Chesapeake Bay entrance?

La Palma landslide

- How were the source parameters (i.e., sliding scenario) specifically determined, in terms of the volume of failure, duration and landslide speed?
- Which tsunami hydrodynamic model was used to determine the 3 m maximum amplitude at the Chesapeake Bay entrance?

Haiti earthquake

- Please provide the NRC (1979) reference: NUREG CR-1106 (Bransma et al.).
- There is no explanation of source parameters as with the other two scenarios. How were the source parameters specifically determined? Does displacement refer to average or maximum slip along the fault or to maximum positive vertical displacement of the sea floor? What is assumed shear modulus and corresponding seismic moment (or moment magnitude) for this scenario earthquake?
- It appears that this scenario is associated with the 1918 Puerto Rico tsunami (Section 2.4.6.2). However, indicate 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).
- Which tsunami hydrodynamic model was used to determine the 0.9 m maximum amplitude at the Chesapeake Bay entrance?

Section 2.4.6.4 (Tsunami Analysis):

Equations/Model

- The first term in equation 2.4.6.-2 appears to be incorrect. Please verify that this term should be $\frac{\partial P}{\partial t}$ and that it is correctly implemented in the hydrodynamic model.
- Was the hydrodynamic program used coded in house or was it an already developed program? If an already developed program was used, was it modified in house? If an unmodified program was used, please provide the developer, version number, and reference. If the program was developed or modified in house, please provide 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. What does "validation of the NLSWE and TSU models was performed separately from the section narrative" mean?
- Does the phrasing "waves quickly dispersed" in this and other sections (pg. 2-759, 2-760, 2-764), actually mean amplitude attenuation or modeled physical dispersion?

Tsunami Runup

- How is tsunami runup on land estimated from nearshore tsunami amplitude?

Bathymetric Grid

- Was the bathymetric grid used for tsunami modeling derived from the precompiled NOAA Estuarine Bathymetric database (1998 version) which is gridded and heavily interpolated to a resolution of 30 m? What procedure was used to extract the 360 x 360 m resolution grid from the NOAA database?
- In the sensitivity analysis, what was the highest resolution grid tested?

Section 2.4.6.5 (Tsunami Water Levels):

Figures

- Please verify whether Figures 2.4-37 and 2.4-40 are switched.

Maximum amplitude and drawdown

- 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. Was the 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)?

Margin of Error

- How is 20% margin error in simulated water level determined?

10% exceedance high tide

- Why is the value for 10% exceedance high tide stated here slightly different than stated in Section 2.4.5.2.2?

Sea-level rise

- Was long-term sea level rise included in the water level analysis for the PMT?

Section 2.4.6.6 (Hydrography and Harbor or Breakwater Influences on Tsunami

- No information needs

Section 2.4.6.7 (Effects on Safety-Related Facilities)

- No information needs

Section 2.4.6.8 (Hydrostatic and Hydrodynamic Forces)

- No information needs

Section 2.4.6.9 (Debris and Water-Borne Projectiles)

- No information needs

Section 2.4.6.10 (Effects of Sediment Erosion and Deposition)

Scouring

- What is 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?

Section 2.4.6.11 (Consideration of Other Site-Related Evaluation Criteria)

- No information needs

TVA Bellefonte Nuclear Plant

Information Needs for Hydrology Safety Audit - May 13-16, 2008

Serial #	FSAR Section	Discipline	Information Needs	Reviewer
1	General	Surface Water Hydrology	Provide a subject matter expert (SME) to discuss the availability of the input/output files associated with the HEC-HMS and HEC-RAS model simulations.	J. Caverly
2	2.4.3	Surface Water Hydrology	Provide a SME to discuss the approach used to develop the PMP calculations and the PMP estimation and model input/output.	J. Caverly
3	2.4.4	Surface Water Hydrology	Provide a SME to discuss inputs to HEC-HMS and HEC-RAS models used for flooding analyses and water level determinations.	J. Caverly
4	2.4.5	Surface Water Hydrology	Provide a SME to discuss how the 10% exceedance high tide was estimated based on the procedures described in ANSI/ANS 2.8-1992 (ANS, 1992).	H. Jones
5	2.4.5	Surface Water Hydrology	Provide a SME to discuss the availability of the input/output files used during simulation of the hurricane scenarios with the SURGE model.	H. Jones
6	2.4.5	Surface Water Hydrology	Provide a SME to discuss the availability of the SLOSH input/output files used to compute the maximum storm surge heights.	H. Jones
7	2.4.5	Surface Water Hydrology	Provide a SME to discuss any effort made to adjust PMH parameters in light of more recent hurricanes that have occurred since (30 years) the NOAA NWS charts were published.	H. Jones
8	2.4.5	Surface Water Hydrology	Provide a SME to discuss any effort made to adjust long-term sea level rises due to climate change in addition to trends reported in the Chesapeake Bay region based on recorded tidal levels at various NOAA tide gauges.	H. Jones
9	2.4.5	Surface Water Hydrology	Provide a SME to discuss the references and calculations used in the determination of resonance in the Chesapeake Bay.	H. Jones
10	2.4.6	Surface Water Hydrology	Provide a SME to discuss the availability of the geological maps, topographic maps, and CCNPP site reconnaissance data used in the assessment of potential subaerial landslides near the site.	H. Jones
11	2.4.6	Surface Water Hydrology	Provide an SME to discuss the findings regarding potential hill-slope failure of cliffs along the eastern shore of the Chesapeake Bay, opposite the CCNPP site, and the findings in Section 2.5 of the FSAR.	H. Jones
12	2.4.6	Surface Water Hydrology	Provide a SME to discuss the availability of the models and model input/output files used in the Tsunami simulations.	H. Jones
13	2.4.6	Surface Water Hydrology	Provide a SME to discuss the validation method(s) of the NLSWE and TSU models.	H. Jones
	2.4.6	Surface Water Hydrology	A general question for this section is whether the applicant needs to consider 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.)	D. Twichell

	2.4.6.1	Surface Water Hydrology	Please provide additional information and references on the occurrence of Chesapeake Bay subaerial landslides. What are the volumes of material involved in the failures? What is the frequency of failures or are there age-dates for the failures? How is it determined that these failures did not cause tsunami-like waves?	D. Twichell
	2.4.6.2	Surface Water Hydrology	The NOAA tsunami event database is primarily a secondary compilation of other sources of information. Please provide primary sources of information, particularly as it relates to establishing the tsunami source generator characteristics in Section 2.4.6.3.	D. Twichell
	2.4.6.2	Surface Water Hydrology	What criteria were used to determine that there are no tsunami deposits preserved around the Calvert Cliffs Reactor site? Are there geologically conducive locations for the deposition and preservation of tsunami deposits at the Calvert Cliffs site or nearby regions?	D. Twichell
	2.4.6.2	Surface Water Hydrology	What are the references or sources of information for the magnitude of the 1929 Grand Banks earthquake and the local runup height of the ensuing tsunami?	D. Twichell
	2.4.6.3	Surface Water Hydrology	How were the source parameters (i.e., sliding scenario) specifically determined for the Norfolk Canyon landslide, in terms of the volume of failure, duration and landslide speed?	D. Twichell
	2.4.6.3	Surface Water Hydrology	Which tsunami hydrodynamic model was used to determine the 4 m maximum amplitude at the Chesapeake Bay entrance for the Norfolk Canyon landslide?	P. Lynett
	2.4.6.3	Surface Water Hydrology	How were the source parameters (i.e., sliding scenario) specifically determined for the La Palma landslide, in terms of the volume of failure, duration and landslide speed?	D. Twichell
	2.4.6.3	Surface Water Hydrology	Which tsunami hydrodynamic model was used to determine the 3 m maximum amplitude at the Chesapeake Bay entrance for the La Palma landslide?	P. Lynett
	2.4.6.3	Surface Water Hydrology	Please provide the NRC (1979) reference: NUREG CR-1106 (Bransma et al., 1979).	D. Twichell
	2.4.6.3	Surface Water Hydrology	There is no explanation of source parameters for the Haiti earthquake as with the other two scenarios. How were the source parameters specifically determined? Does displacement refer to average or maximum slip along the fault or to maximum positive vertical displacement of the sea floor? What is assumed shear modulus and corresponding seismic moment (or moment magnitude) for this scenario earthquake?	D. Twichell

	2.4.6.3	Surface Water Hydrology	It appears that the Haiti earthquake scenario is associated with the 1918 Puerto Rico tsunami (Section 2.4.6.2). However, indicate 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).	D. Twichell
	2.4.6.3	Surface Water Hydrology	Which tsunami hydrodynamic model was used to determine the 0.9 m maximum amplitude at the Chesapeake Bay entrance for the Haiti earthquake?	P. Lynett
	2.4.6.4	Surface Water Hydrology	The first term in equation 2.4.6.-2 appears to be incorrect. Please verify that this term should be $\frac{\partial P}{\partial t}$ and that it is correctly implemented in the hydrodynamic model.	P. Lynett
	2.4.6.4	Surface Water Hydrology	Was the hydrodynamic program used coded in house or was it an already developed program? If an already developed program was used, was it modified in house? If an unmodified program was used, please provide the developer, version number, and reference. If the program was developed or modified in house, please provide 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. What does "validation of the NLSWE and TSU models was performed separately from the section narrative" mean?	P. Lynett
	2.4.6.4	Surface Water Hydrology	Does the phrasing "waves quickly dispersed" in this and other sections (pg. 2-759, 2-760, 2-764), actually mean amplitude attenuation or modeled physical dispersion?	P. Lynett
	2.4.6.4	Surface Water Hydrology	How is tsunami runup on land estimated from nearshore tsunami amplitude?	P. Lynett
	2.4.6.4	Surface Water Hydrology	Was the bathymetric grid used for tsunami modeling derived from the precompiled NOAA Estuarine Bathymetric database (1998 version) which is gridded and heavily interpolated to a resolution of 30 m? What procedure was used to extract the 360 x 360 m resolution grid from the NOAA database?	D. Twichell
	2.4.6.4	Surface Water Hydrology	In the sensitivity analysis, what was the highest resolution grid tested?	D. Twichell
	2.4.6.5	Surface Water Hydrology	Please verify whether Figures 2.4-37 and 2.4-40 are switched.	P. Lynett

	2.4.6.5	Surface Water Hydrology	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. Was the 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)?	P. Lynett
	2.4.6.5	Surface Water Hydrology	How is 20% margin error in simulated water level determined?	P. Lynett
	2.4.6.5	Surface Water Hydrology	Why is the value for 10% exceedance high tide stated here slightly different than stated in Section 2.4.5.2.2?	P. Lynett
	2.4.6.5	Surface Water Hydrology	Was long-term sea level rise included in the water level analysis for the PMT?	P. Lynett
	2.4.6.10	Surface Water Hydrology	What is 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?	D. Twichell
14	2.4.12	Groundwater Hydrology	Provide a SME to discuss the drainage divide described in 2.4.12.1.3.	N. Tiruneh
15	2.4.12	Groundwater Hydrology	Provide a SME to discuss the "proper management "referenced in section 2.4.12.1.4".	N. Tiruneh
16	2.4.12	Groundwater Hydrology	Provide a SME to discuss the established groundwater permits mentioned in section 2.4.12.1.4.	N. Tiruneh
17	2.4.12	Groundwater Hydrology	Provide a SME to discuss Table 2.4-42 which summarizes the water withdrawal rates for a five year interval (July 2001 through June 2006) as presented in section 2.4.12.2.5.	N. Tiruneh
18	2.4.12	Groundwater Hydrology	Provide a SME to discuss the observation drawn from well OW-744 presented in section 2.4.12.3.1.	N. Tiruneh
19	2.4.12	Groundwater Hydrology	Provide a SME to discuss the representation of the groundwater divide presented in section 2.4.12.3.1 with reference to the groundwater contour.	N. Tiruneh
20	2.4.12	Groundwater Hydrology	Provide a SME to discuss the nearest water body/dies that could be affected with reference to the travel time as described in section 2.4.12.3.3.1.	N. Tiruneh
21	2.4.12	Groundwater Hydrology	Provide a SME to discuss the monitoring plan described in section 2.4.12.4.	N. Tiruneh
22	2.4.12	Groundwater Hydrology	Provide a SME to discuss the groundwater elevation described in section 2.4.12.5.	N. Tiruneh
23	2.4.12	Groundwater Hydrology	Provide a SME to discuss the water level described in section 2.4.12.5 with reference to the design requirements.	N. Tiruneh
24	2.4.12	Groundwater Hydrology	Provide a SME to discuss the conceptual development of the model described in section 2.4.12.5.	N. Tiruneh

25	2.4.12	Groundwater Hydrology	Provide a SME to discuss the seepage control measures anticipated during the construction phase and not during operational phase as presented in section 2.4.12.5.	N. Tiruneh
26	2.4.12	Groundwater Hydrology	Provide a SME to discuss the possibility of ponding as a result of the swales described in section 2.4.12.5.	N. Tiruneh
27	2.4.12	Groundwater Hydrology	Provide a SME to discuss the availability of the reference Wolman, 2004. Advisory Committee on the Management and Protection of the State's Water Resources, Final Report, Appendix E, G. Wolman, May 2004.	N. Tiruneh
28	2.4.13	Accidental Release	Provide a SME to discuss alternate conceptual models that were analyzed as required in SRP 2.4.	N. Tiruneh
29	2.4.13	Accidental Release	Provide a SME to discuss the considerations given to the post-construction conditions and their effect on groundwater pathways of radionuclides as described in section 2.4.13.1.2.	N. Tiruneh
30	2.4.13	Accidental Release	Provide a SME to discuss any springs, seeps, and other groundwater outflows that need to be considered in the analysis of groundwater pathways of radionuclides.	N. Tiruneh
31	2.4.13	Accidental Release	Provide a SME to discuss the site groundwater system that could potentially be impacted as described in section 2.4.13.1.3.	N. Tiruneh
32	2.4.13	Accidental Release	Provide a SME to discuss the basis for determining the radionuclides expected to be present as described in section 2.4.13.1.4.	N. Tiruneh
33	2.4.13	Accidental Release	Provide a SME to discuss the possible pathways of radionuclides that could be altered as a result of the land grading activities as described in section 2.4.13.2.1.	N. Tiruneh
34	2.4.13	Accidental Release	Provide a SME to discuss the details of the code used in the analysis of radionuclide transport.	N. Tiruneh

35	2.4.13	Accidental Release	Provide a subject matter expert to discuss the availability of the following references: (1) CFR, 2007. Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations, Concentrations for Release to Sewerage, Title 10, Code of Federal Regulation, Part 20, Appendix B, 2007. (2) Schnabel, 2007. Geotechnical Subsurface Investigation Data Report (Revision No. 1), CGG Combined Operating License Application (COLA) Project, Calvert Cliffs Nuclear Power Plant (CCNPP), Report by Schnabel Engineering North LLC, April 2007. (3) TtNUS, 2007. Final Wetland Delineation Report for Proposed UniStar Nuclear Project Area, Calvert Cliffs Nuclear Power Plant Site, Tetra Tech NUS Inc, May 2007.	N. Tiruneh
36	2.4.13	Accidental Release	Please provide a subject matter expert to discuss the general model input/output, data reduction, and availability in the groundwater flow and radionuclide pathway analysis.	N. Tiruneh