Henry Jones

From: Eric L. Geist [egeist@usgs.gov]
Sent: Wednesday, June 11, 2008 11:08 AM
To: Lynett, Patrick
Cc: David C Twichell; Henry Jones
Subject: Notes from kickoff meeting
Attachments: %1023_Samad.pdf

Dear Pat,

Here are the notes from today's kickoff meeting, specifically related to Section 2.4.6. I'm cc'ing this to Dave and Henry in case I missed anything critical.

Teleconference was hosted by UniStar and discussion was lead by John Rycyna (NRC Project Manager) and covered the agenda for the safety audit and the information needs in general terms.

The agenda was already distributed by Henry, but here are a few additional notes:
-Please bring a picture ID to enter the site each day.
-For the site tour (Tuesday), there is an emphasis on safety. Please bring appropriate footwear (no tennis shoes). UniStar will provide other safety gear (hard hats, safety glasses) if needed, as well as insect spray. There are ticks, so jeans are recommended.
-Cameras must be permitted by UniStar. They can provide already-permitted cameras, with digital photos cleared for security before being distributed to us.
-Bechtel will provide a geologist for the site tour (?) and audit for any questions related to tsunami deposits, cliff failures, etc. Dave will be checking out the sub-aerial cliffs during the site tour.
-Discussion of Section 2.4.6 will begin on Wednesday morning (hopefully finished that day?) -For each day, we need to pay for our own lunch (have cash handy).

With regard to the information needs, these were only discussed generally with UniStar since the info needs are being reviewed at NRC.
-Primarily, Sections 2.4.5, 2.4.6, and 2.4.12 of the FSAR will be discussed.
-General categories of items include: input/output files, modeling documentation, references, basis for conclusions.
-NRC indicated that the general nature of information needs will be similar to South Texas, which Bechtel was also at.
-Dr. Mustafa Samad from Bechtel's Frederick, MD office will be on hand to discuss tsunami modeling--I recall he was also at the South Texas safety audit. Attached is a one-pager describing Chesapeake modeling--similar to what's in the FSAR.

That's pretty much it. Just let me know if there are any questions...Eric

--

Eric L. Geist Desk: (650)329-5457
Research Geophysicist Fax: (650)329-5411
U.S. Geological Survey Email: egeist@usgs.gov
345 Middlefield Rd., MS 999
Menlo Park, Ca 94025
Internet: http://walrus.wr.usgs.gov/staff/egeist/

B-12

TSUNAMI PROPAGATION IN THE CHESAPEAKE BAY, USA

Mustafa Samad, Bechtel Power Corporation, USA masamad@bechtel.com
Sung-Meyon Yi, Korea Power Engineering Company, Inc., South Korea, hydroyi@kopec.co.kr
Yifan Zheng, Bechtel Power Corporation, USA yzheng@becktel.com

INTRODUCTION

The present paper investigates the propagation of potential tsunamis within the Chesapeake Bay. The Chesapeake Bay, located on the US East Coast, is one of the largest estuaries in the world (Figure 1). The US East Coast traditionally is believed to be an area nearly free from tsunami impacts. However, historical data and recent research has indicated that the threats of large tsunamis affecting the area cannot be completely discounted. In this study, a summary of tsunamigenic source mechanisms that may affect the Chesapeake Bay region is presented along with simulations of tsunami propagation within the Bay. The simulations are performed based on a description of incoming tsunami amplitude at the Bay entrance and using a 2-dimensional depth-averaged numerical model. The model considers both linear and nonlinear shallow water equations and investigates the effects of bottom friction.

POTENTIAL TSUNAMIS AT THE BAY ENTRANCE

Three potential tsunami sources are identified based on historical tsunami records and published studies that are considered most sever for the Chesapeake Bay region. The first is the Currituck submarine landslide zone off the coast of Virginia near the Bay entrance. Ward (2001) estimated maximum tsunami amplitude of 4 m at the Bay entrance based on postulated slide scenarios. The second source is for trans-Atlantic tsunami caused by submarine landslide due to Cumbre Vieja volcanic flank failure on Canary Island. Mader (2001) estimated 3 m maximum tsunami amplitude at the Bay entrance from this source. The third source is the Caribbean subduction zone, from which maximum tsunami amplitude of 1 m at the bay entrance is estimated (USNRC, 1979).

TSUNAMI ANALYSIS

The tsunami model uses finite difference leapfrog scheme for numerical solution. Because of shallow water depth in the bay, wave nonlinearity and bottom friction effects considerably contribute in wave dissipation. The bottom friction term is taken as a function of the Manning's roughness coefficient along with the fluxes in the two horizontal directions. Numerical dispersion in the discretized governing equations in finite difference form is eliminated by selecting computational time step and grid spacing based on an accuracy criterion. Results from the 'hidden grid' are then converted to model grid following the procedure proposed by Yoon (2002).

The Chesapeake Bay model domain extends approximately 290 km from near Plume Tree Point, VA to the Susquehanna River mouth. Freshwater flow through the rivers and tidal variation from the Atlantic Ocean are ignored. A zero-flux condition is applied across the fixed land boundary. Flooding and drying of grids are not considered in the model. Incoming tsunami amplitudes and periods for different cases are applied as regular sinusoidal waves at an internal boundary. The external model boundaries are based on implementing a radiation boundary, as proposed by Larsen & Dancy (1983).

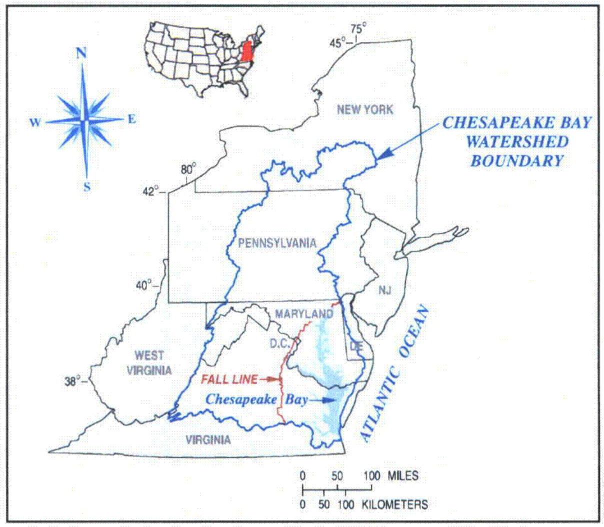

Figure 1 - The Chesapeake Bay Watershed.

RESULTS AND DISCUSSIONS

Incoming tsunami water level at the model boundary shows that the generated boundary condition is satisfactory. Simulated water levels at the mouth of the Potomac River, and near Annapolis and Baltimore show that the large incoming tsunami waves are quickly dispersed inside the Chesapeake Bay. Wave nonlinearity and bottom friction effects contribute in wave dissipation and therefore tsunami wave amplification within the bay is unlikely. The first wave in the wave train reaches the mouth of the Potomac River (about 90 km from the model boundary) in about 2.5 hours. Simulation results also show that the maximum tsunami amplitude at this location would be considerably reduced with maximum amplitude remaining close to approximately 0.5 m when bottom friction effects are neglected.

REFERENCES

Ward (2001): Landslide Tsunami, J. Geophys. Res., 106(6).
Mader (2001): Modeling the La Palma Landslide Tsunami, Sc. Tsunami Hazards, 19: 50-170.
Yoon (2002): Propagation of Distant Tsunamis over Slowly Varying Topography, J. Geophys. Res., 107(C10).
USNRC (1979): Tsunami Atlas for the Coasts of the United States, USNRC, NUREG/CR-1106, USA.
Larsen & Dancy (1983): Open boundaries in short wave simulations - A new approach, Coastal Eng., 7:285-297.