PMTurkeyCOLPEm Resource

From: Franzone, Steve <Steve.Franzone@fpl.com>
Sent: Thursday, September 29, 2016 8:42 AM
To: Comar, Manny
Cc: TurkeyCOL Resource
Subject: [External_Sender] FSAR & Sea Level Rise
Attachments: SeaLevelRise_fromFSAR_SEC02_04_05.pdf

Manny
I have attached an excerpt from our FSAR which discusses sea level rise. In addition, below are the words from my presentation (At least what I had prepared in advance) at the ACRS full committee as an FYI for you.

"In addition to the 10 percent exceedance high spring tide and initial rise, FPL considered the long-term trend observed in tide gage measurements to account for the expected sea level rise for a period consistent with the AP1000 DCD Tier 2 Section 1.2.1.1.2 plant design objective of 60 years without replacement of the reactor vessel.

The NOAA station nearest to Units 6 & 7 where long-term trend in sea level rise is available is the Miami Beach, Florida (8723170), station. The station is located close to the Virginia Key, Florida station and is no longer active. The long-term sea level rise trend at Miami Beach, Florida, as estimated based on data from 1931 to 1981, is 0.78 foot per century (FSAR Reference 206). Accordingly, a nominal long-term sea level adjustment of 1 foot is applied to the 10 percent high tide level resulting in an antecedent water level of 3.6 feet NAVD 88 (2.6 feet NAVD 88 + 1 foot), which represents the initial water level condition in the SLOSH model simulations.

In response to a request for additional information from the NRC Staff, FPL also investigated the Key West station located farther away with more recent data (January 1941 to November 2010). Linear trend model on the historical monthly mean sea levels from January 1941 to November 2010 at Key West, Florida tide gage station (Station 8724580). The linear trend leads to a projected increase of 0.69 ft in 100 years. It should be noted that the Key West station is approximately 110 miles southwest of the site."

I am free to 1 pm if you want to discuss.

Thanks
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2.4.5.2.2.1 Antecedent Water Level

According to RG 1.59, the 10 percent exceedance high spring tide including initial rise should be used to represent the PMSS antecedent water level. RG 1.59 defines the 10 percent exceedance high spring tide as the high tide level that is equaled or exceeded by 10 percent of the maximum monthly tides over a continuous 21-year period. For locations where the 10 percent exceedance high spring tide is estimated from observed tide data, RG 1.59 indicates that a separate estimate of initial rise (or sea level anomaly) is not necessary.

RG 1.59 also provides estimates of 10 percent exceedance high spring tide and initial rise at the Miami Harbor Entrance on the Atlantic Ocean, which is located close to the NOAA tide gage station at Virginia Key, Florida, north-northeast of Units 6 & 7. The 10 percent exceedance high spring tide and the initial rise at Miami Harbor Entrance are given as 3.6 feet above mean low water and 0.9 foot, respectively. The water level including the 10 percent exceedance high spring tide and initial rise, therefore, is ([3.6 + 0.9] feet =) 4.5 feet above mean low water. Using the datum conversion relation given in Subsection 2.4.1, the water level at the Miami Harbor Entrance is approximately 2.6 feet NAVD 88.

NOAA maintains tide gage stations along the Atlantic Ocean shoreline near Units 6 & 7. Long-term records of measured tidal levels are available at Virginia Key, Florida (station number 8723214); Vaca Key, Florida (8723970); and Key West, Florida (8724580). The tidal range at these currently active stations is provided in Table 2.4.1-211. However, only the station at Key West has data records longer than a 21-year period that can be used to estimate the 10 percent exceedance high spring tide consistent with the definition in RG 1.59. The combined 10 percent exceedance high spring tide and initial rise at the Miami Harbor Entrance from RG 1.59 of 2.6 feet NAVD 88 is higher than the estimated 10 percent exceedance high spring tides at the Virginia Key, Florida station at 1.43 feet NAVD 88 and Key West, Florida station at 0.97 foot NAVD 88 based on available data records (15 years of record for Virginia Key station and 38 years of record for Key West station). Consequently, the combined 10 percent exceedance high spring tide and initial rise at the Miami Harbor Entrance as obtained from RG 1.59 is conservatively used in the PMSS estimate.

In addition to the 10 percent exceedance high spring tide and initial rise, the long-term trend observed in tide gage measurements is also considered to account for the expected sea level rise for a period consistent with the DCD Tier 2 Section 1.2.1.1.2 plant design objective of 60 years without replacement of the reactor vessel. The NOAA station nearest to Units 6 & 7 where long-term trend in sea level rise is available is the Miami Beach, Florida (8723170), station. The station is located close to the Virginia Key, Florida, station and is no longer active. The long-term sea level rise trend at Miami Beach, Florida, as estimated based on data from 1931 to 1981, is 0.78 foot per century (Reference 206). Accordingly, a nominal long-term sea level adjustment of 1 foot is applied to the 10 percent high tide level resulting in an antecedent water level of 3.6 feet NAVD 88 (2.6 feet NAVD 88 + 1 foot), which represents the initial water level condition in the SLOSH model simulations.

2.4.5.2.2.2 SLOSH Biscayne Bay Basin Model

The NOAA SLOSH model requires the hurricane pressure difference (Δp), hurricane track description including landfall location, forward speed, and size, given as the radius of maximum wind, as input to define the physical attributes of a hurricane in performing a surge simulation (Reference 207). The SLOSH Biscayne Bay basin model includes Units 6 & 7. The model is setup using a curvilinear hyperbolic-type grid system (Reference 207). The corresponding bathymetry data are obtained from the NOAA NWS. The basin bathymetry and water levels in the model input and output are referenced to NGVD 29. The datum conversion relationship at the NOAA Virginia Key, Florida, station, as given in Subsection 2.4.1, is adopted for converting elevation data from NGVD 29 to NAVD 88 or vice-versa.

The time sequence of the movement of a hurricane or the hurricane track is a required input to the SLOSH model. It is represented in the model by a series of successive locations of the center of hurricane derived as a function of the hurricane direction (angle), forward speed, and landfall location (defined as the location where the hurricane crosses the shoreline). The hurricane direction defined in SLOSH is different from the hurricane direction given in NOAA Technical Report NWS 23 (Table 2.4.5-201). While NWS 23 provides the angle of incoming hurricane from the north as the hurricane direction, SLOSH defines the hurricane direction as the angle between north and the direction of hurricane propagation (References 201 and 207). As a result, SLOSH hurricane directions are 180 degrees ahead of hurricane directions in NWS 23.

Model simulations are performed for different combinations of the PMH parameters to obtain the maximum surge water level at Units 6 & 7. The model results are processed using the NOAA SLOSH Display Program (Reference 208). The centerline of Units 6 & 7 (25.425° N, 80.333° W) is located in the SLOSH model grid cell (63, 40) and the simulated time histories of water levels are extracted from this grid cell for the PMSS evaluation. The model grid for the