Nuclear Operating Company

South Texas Project Electric Generating Station 4000 Avenue F – Suite A Bay City, Texas 77414

September 10, 2008
ABR-AE-08000072

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville MD 20852-2738

South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Response to Requests for Additional Information

Attached are responses to NRC staff questions included in Request for Additional Information (RAI) letter numbers 34, 39, and 52, related to COLA Part 2 Tier 2 Sections 2.4S and 2.5S. This submittal includes responses to the following RAI questions:

02.04.05-4 02.04.12-23 02.05.04-12

When a change to the STP 3&4 COLA is indicated, the change will be incorporated into the next routine revision of the COLA following NRC acceptance of the RAI response.

There are no commitments in this letter.

If you have any questions regarding the attached responses, please contact me at (361) 972-4626, or Bill Mookhoek at (361) 972-7274.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on September 10, 2008

Greg Gibson
Manager, Regulatory Affairs
South Texas Project Units 3 & 4

ccc

Attachments:
1. Question 02.04.05-4
2. Question 02.04.12-23
3. Question 02.05.04-12

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STI# 32358100 NRO

cc: w/o attachment except*
(paper copy)

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RAI 02.04.05-4:

QUESTION:

(a) Explain how SLOSH MOM water level predictions were extrapolated to account for PMH conditions. (b) Is the PMH used in this extrapolation the same as the one used in the SURGE analysis to estimate PMSS at the coast near Matagorda, Texas? (c) How was it verified that the extrapolation is valid and conservative? (d) Discuss the conservatism in choosing the PMH forward speed listed in Table 2.4S.5-2.

RESPONSE:

In response to item (a), SLOSH water level predictions were based on the following approximation:

$$z = -1.3542E\text{-}05*(\Delta P)^3 + 1.1875E\text{-}03*(\Delta P)^2 + 3.1417E\text{-}01*(\Delta P) - 3.7 \quad (1)$$

where z is the Maximum of Maximum (MOM) water surface elevation due to storm surge and ΔP is the difference between peripheral pressure and central pressure. This approximation is based on a least-squares polynomial fit of the predicted water surface elevations at node {21,62} in the 2007 SLOSH Display CD-Rom (Reference 1). The approximation was developed using SLOSH output for basin psx ("Matagorda") for hurricanes of Category 1 through Category 5 (Table 1). Node {21,62} is a cell in the Lower Colorado River to the east of the STP 3 & 4 site. This node was chosen since the STP 3 & 4 site was dry for all modeled hurricanes.

The data used for developing Eq. (1) is shown in Table 1. The MOM water surface elevations for cell node {21,62} in basin psx (Reference 1) is based on the maximum of the Maximum Envelope of Water (MEOW) data and a pressure difference of 20 millibars (mbar) multiplied by the hurricane category (i.e., ΔP=20 mbar x hurricane category). The MEOW data is derived from a composite of SLOSH runs developed for the 2007 SLOSH Display CD-Rom.

Table 1. MOM water surface elevations and corresponding MEOW scenarios from Reference 1.

Hurricane Category	ΔP (mbar)	Forward Speed (mph)	Wind Direction	Water Surface Elev. (ft)
1	20	5	N and NNE	3.1
2	40	15	NNW	9.3
3	60	15	NNW	17.4
4	80	15	NNW	21.5
5	100	15	NNW and NW	26.2

In response to item (b), the PMSS estimate for SURGE was based on PMH conditions described in Subsection 2.4S.5.1 and Table 2.4S.5-2. As discussed in item (a), the SLOSH extrapolation is based on the approximation between the MOM water surface elevation and the difference between peripheral pressure and central pressure of the hurricane (ΔP) (Table 1). The SLOSH

approximation was not adjusted to match the upper limit of PMH forward speed of 20 knots described in Subsection 2.4S.5.1. In addition, the radius of maximum wind is not an input parameter of the SLOSH model and the SLOSH model extrapolation.

In response to item (c), validation of the extrapolation requires testing the results against another, more conservative method. As stated in Rev 0 of Subsection 2.4S.5.2.4, "the PMSS at STP 3 & 4 predicted by SLOSH, with the sea level adjustments, is 31.1 feet MSL. This value is more conservative than the SURGE estimate of 24.29 feet MSL at STP 3 & 4." For coastal locations, the SURGE model is considered conservative as discussed in NUREG-0933 (Reference 2).

In response to item (d), the forward speeds for the PMH that are shown in Table 2.4S.5-2 are based on data from Reference 2.4S.5-1 (p. 196). The selection of the upper limit of the forward speed is based on a comparison of the Standard Project Hurricane (SPH) and the Probable Maximum Hurricane (PMH), which are defined in Sections 1.2.1 and 1.2.2 of Reference 2.4S.5-1 (p. 2). Substituting "forward speed" for the variable "T" in Reference 2.4S.5-1 (p. 200), "the [Standard Project Hurricane] (SPH), although an intense hurricane, is substantially weaker than the PMH. Weaker hurricanes in general are known to travel within a broader range of forward speed. Therefore, the SPH should have a larger overall range in forward speed than the PMH. Thus, we are justified in setting the upper limit of forward speed for the SPH higher than the upper limit of forward speed for the PMH. We recommend a value of 25 kt (46 km/hr) for the SPH upper limit of forward speed for the Gulf coast. This is 5 kt (9 km/hr) faster than the upper limit of PMH forward speed along the Gulf coast."

In addition, a list of major hurricanes impacting the Texas Coast from 1900 to 2005 is provided in Table 2.4S.5-1. Hurricane tracks and locations in six-hour intervals are provided in Reference 2.4S.5-6. For the ten major hurricanes that have impacted the Texas Coast since the publication of Reference 2.4S.5-1 in 1979, none of these hurricanes has had a forward speed over 20 knots in the Gulf of Mexico (Reference 2.4S.5-6). Therefore, for assessing the PMH at inland locations such as STP 3 & 4, the upper limit of the forward speed of 20 knots as defined by NWS 23 (Reference 2.4S.5-1) is considered conservative.

No COLA revision is required as a result of this RAI response.

References:

1. "SLOSH Display CD-Rom," 2007, SLOSH: Sea, Lake, and Overland Surge from Hurricanes, Version 1.42 released on March 21, 2007, National Oceanic and Atmospheric Administration.

2. NUREG-0933, "A Prioritization of Generic Safety Issues - Item C-14: Storm Surge Model for Coastal Sites (Rev. 1)," Nuclear Regulatory Commission, 2007. Available at http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0933/sec2/c14r1.html, accessed July 31, 2008.

RAI 02.04.12-23:

QUESTION:

In FSAR Section 2.4S.12.3.3, Plant Groundwater Use and Effects, the statement "Based on these estimates, additional groundwater wells will be required to satisfy site demands." appears to conflict with statements in the ER where adherence with the existing groundwater use permit and use of existing wells is stressed (e.g., see ER Sections 2.3.2.2.1, 4.2.2, and 5.2.2.2). Will there be new additional wells or not? The statement "As part of the detailed engineering for the STP 3 and 4, the impact of groundwater pumping in the Deep Aquifer will be evaluated ..." makes it appear the future use of a greater groundwater resource is undecided and will remain undecided during the COL review process. The last sentence of FSAR Section 2.4S.12.5 begins "The groundwater supply wells to be installed for STP 3 and 4 ..." and implies a decision has been made. Please clarify. Also, if new wells are to be installed, provide the estimated number, location, and pumping rates so that effects can be estimated.

RESPONSE:

As stated in ER section 4.2.2, STPNOC has determined that STP 3 & 4 under normal conditions can be constructed using the approximate 1060 gpm remaining under the site's existing groundwater permit. However, preliminary estimates indicate that additional well water capacity will be required to meet peak operational demand with sufficient operating margin. Operationally, the projected combined groundwater consumption listed in the ER and FSAR tables represents continuous usage at maximum consumption, and is, therefore, a conservative upper bound. The well water system will be sized to accommodate an anticipated peak usage in consideration with available and planned storage capacity. STPNOC's groundwater usage permit with the Coastal Plains Groundwater Conservation District will be amended prior to plant startup to support the additional wells.

Table 2.4S.12-2 from the STP Units 3 & 4 FSAR lists a total capacity from the five existing STP production wells. Three of the existing production wells yield 500 gpm each. The remaining two wells yield 200 and 250 gpm. Assuming a new well yields 500 gpm, preliminary estimates indicate that two additional wells are needed to meet anticipated peak demand while also insuring an adequate margin for well water system maintenance activities. These wells would pump from the Deep Aquifer within the Beaumont Formation. To minimize the potential for subsidence in the area of safety-related structures at Units 3 & 4, as well as Units 1 & 2, no sustained pumping will be permitted within 4000 feet of these structures. Based on this requirement, groundwater wells can be located within the STP property boundary in areas west and northwest of Units 3 & 4, and northeast of Units 1 & 2 while maintaining the required separation distances between wells. Alternatively, additional wells could be drilled on the east or west sides of the MCR, at locations a mile or more south of existing Production Wells 6 and 7. Test wells and a detailed evaluation of the existing groundwater distribution system will be required to determine the best locations and the number of additional production wells required at STP to support operations.

Paragraph 4 of FSAR Section 2.4S.12.3.3 will be revised as follows:

Based on these estimates, additional groundwater wells will be required to satisfy site demands. Three of the existing site production wells yield 500 gpm each. The remaining two wells yield 200 and 250 gpm. Assuming a new well yields 500 gpm, two wells will be required in order to meet the anticipated peak plant demand while also insuring an adequate margin for well water system maintenance activities. Specific details will be established during the detailed engineering for STP Units 3 & 4. These wells would pump from the Deep Aquifer within the Beaumont Formation. As with STP 1 & 2, it is expected that no sustained pumping will be permitted within 4000 ft of the plant safety-related facility areas in order to minimize the potential for regional subsidence resulting from lowering of the Deep Aquifer zone potentiometric head. Based on this requirement, the location of the additional groundwater wells required for expanded plant operations would most likely be located in the west, northwestern ~~and~~ or northeastern sections of the STP site ~~and/or~~ alternately in the southeastern and southwestern site areas adjacent to the MCR.

RAI 02.05.04-12:

QUESTION:

According to the ABWR DCD (Chapter 2, "Site Characters"), the MINIMUM shear wave velocity requirement for subsurface soil is 305 m/sec (1,000 ft/sec). Based on Section 2.5.4, Figure 2.5 S. 4 - 39-44, shear wave velocities at multiple depths in the soil profiles are less than 1000 ft/sec below the foundation of seismic category 1 structures. Please discuss the shear wave velocities for the site with respect to the ABWR DCD Tier 1 criteria.

RESPONSE:

The shear wave velocity at the site varies both horizontally, within a soil stratum, and vertically with depth. Since the measured shear wave velocities do not meet the minimum value of 305 m/sec (1000 ft./sec.) required in the DCD, a Tier 1 departure is being prepared for NRC's approval. A site-specific soil-structure interaction analysis will be performed to confirm that the standard plant seismic responses for the Reactor and Control Buildings bound the results of site-specific analysis. Site-specific soil parameters will be used for liquefaction analysis, settlement calculations, bearing capacity calculations, lateral soil pressures, foundation springs for the mat design, and any other analyses or calculations related to the foundation design.