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February 10, 2011
U7-C-NINA-NRC-110013

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 Request for Additional Information

Reference: Letter, Scott Head to Document Control Desk, "Response to Requests for Additional Information" for the South Texas Combined License Application dated August 30, 2010, U7-C-STP-NRC-100195 (ML102450252).

Attached is the revised response to an NRC staff question in Request for Additional Information (RAI) letter number 333, related to Combined License Application (COLA) Part 2, Tier 2, Sections 2.4S.12, "Groundwater." The original response to this RAI was submitted in the referenced letter. An attachment to this letter contains the revised response to the following RAI question:

RAI 02.04.12-49

When a change to the COLA is required, it 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, please contact Scott Head at (361) 972-7136 or Bill Mookhoek at (361) 972-7274.

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STI 32821805 NRO

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

Executed on 2/10/2011

Mark McBurnett
Senior Vice President, Oversight & Regulatory Affairs
Nuclear Innovation North America LLC

rhb

Attachment: RAI 02.04.12-49, Revision 1

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

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RAI 02.04.12-49, Revision 1:

QUESTION:

To meet the requirements of 52.79(a) and assist staff in its analysis, additional information concerning the groundwater modeling is required. The NRC notes that revisions to FSAR, Rev. 3, Section 2.4S.12.5 Site Characteristics for Subsurface Hydrostatic Loading submitted on September 21, 2009 (U7-C-STP-NRC-090146), state that "In summary, based on measured groundwater levels in observations wells and modeled post-construction groundwater levels, the maximum post-construction groundwater elevation at the STP Units 3 and 4 site is estimated to be 28 ft MSL, ...". While the summary statement is made, the specifics are not provided in the section. Provide a list of the specific conclusions made regarding the measured pre-construction groundwater levels and a list of specific post-construction model results that support the maximum post-construction groundwater elevation of 28 ft MSL.

RESPONSE:

The response to RAI 02.04.12-49 was submitted to NRC by STPNOC Letter U7-C-STP-NRC-100195 (ML102450252), dated August 30, 2010. This revision addresses information discussed with NRC staff in conference calls December 8, 2010 and January 19, 2011.

Conclusions embodied in the summary statement made in the response to RAI 02.04.12-35 (U7-C-STP-NRC-090146, September 21, 2009) are drawn from observed groundwater levels at the STP site and from groundwater model results of expected post-construction conditions. Specific conclusions regarding measured pre-construction groundwater levels are as follows:

1. During a 34-year monitoring period from 1973 to 2007, groundwater levels in the Upper Shallow Aquifer for the large northern portion of the STP site, which also includes the STP Units 3 & 4 power block area, were below an elevation of approximately 27.5 ft MSL as described in the responses to RAI 02.04.12-1 (Reference 1) and RAI 02.04.12-26 (Reference 2).

2. FSAR Figure 2.4S.12-23, which was submitted with the response to RAI 02.04.12-27 (U7-C-STP-NRC-090146, September 21, 2009), includes a hydrograph showing water levels in Piezometer 602A during the period 1995 through 2006. Water levels in this piezometer are below an elevation of approximately 26 ft MSL during this period. This Upper Shallow Aquifer piezometer is located just to the north of the STP Units 3 & 4 power block area.

3. The maximum groundwater elevation measured within the footprint of STP Units 3 & 4 in 2007 and 2008 at power block observation wells (OW-300 & OW-400 well series) is 25.94 ft MSL. This value was recorded at OW-348U on July 30, 2007 and can be determined from FSAR Figure 2.4S.12-24 and FSAR Table 2.4S.12-7. (Note that higher elevations of 27.47 ft at OW-408U and 27.59 ft MSL at OW-420U are included in FSAR Table 2.4S.12-7 for August 30, 2007; however, it has been determined that these two values are anomalous

and not representative of Upper Shallow Aquifer water levels as described in footnote 2 of FSAR Table 2.4S.12-7 and as discussed in FSAR Section 2.4S.12.2.3. The use of these anomalous values for establishing maximum pre-construction groundwater levels is therefore inappropriate.)

Specific post-construction model results that support the maximum post-construction groundwater elevation of 28 ft MSL are summarized below:

1. The simulated post-construction groundwater level in Stratum C (Upper Shallow Aquifer) in the vicinity of the safety-related facilities for Units 3 & 4 is about 21.0 ft MSL as indicated on Figure 62 of Reference 3. The same information is presented in Figure 2-14 of the response to RAI 02.04.12-48 (Reference 4).

2. As shown on Figure 68 of Reference 3 as well as Figure 2-14 of the response to RAI 02.04.12-48 (Reference 4), the simulated post-construction groundwater level in Stratum C in the vicinity of the safety-related facilities for Units 3 & 4 is 1 to 3 ft lower than for pre-construction conditions. (Note that in both Reference 3 and the RAI response a positive change denotes a relative decrease in water surface elevation for post-construction conditions). These results indicate that groundwater levels within the power block are expected to decrease with site development.

The conclusion that the maximum post-construction groundwater levels at STP Units 3 & 4 are expected to be lower than pre-construction groundwater levels are explained in Section 7 of the Groundwater Modeling Report (Reference 3):

> "In the post-construction scenario, simulated groundwater levels are lower in the Upper Shallow Aquifer at the Units 3 & 4 site relative to levels simulated in the calibrated model of existing preconstruction conditions (Run 301). Simulated water levels in the Lower Shallow Aquifer are higher at Units 3 & 4 relative to levels simulated in the pre-construction scenario. These water level changes occur because the simulation of the Unit 3 & 4 excavation requires the portion of the confining layer that separates the Upper and Lower Shallow Aquifers to be removed and replaced with structural fill that is relatively permeable. The fill material creates a greater degree of hydraulic connection between the Upper and Lower Shallow Aquifers. This allows the Upper Shallow Aquifer to contribute water to the Lower Shallow Aquifer and generates the water level changes noted above."

It should also be noted that pre-construction groundwater levels are based on an observed MCR water level of 42 ft MSL, while simulated post-construction groundwater levels are based on a bounding MCR water level of 49.5 ft MSL. Because groundwater levels in the Units 3 & 4 power block area are influenced by the MCR water level, generally increasing with increasing MCR level, the decrease in post-construction groundwater levels is underestimated (i.e., greater decreases in groundwater levels with site development would have been more likely had the MCR water levels been equal for pre- and post-construction simulations).

Additional groundwater model sensitivity analyses were performed to support the conclusions made regarding the measured pre-construction groundwater levels and postulated failure of the MCR relief well system on post-construction groundwater levels. The results of these sensitivity analyses are documented in the responses to RAI 02.04.12-40 (Reference 4) and RAI 02.04.12-48 (Reference 4). In all cases, and even in the highly improbable event of simultaneous failure of all relief wells, the maximum simulated water level in the Units 3 & 4 power block area does not exceed 28 ft MSL.

It is recognized that the groundwater modeling results discussed above are based on a pre-construction model calibrated to groundwater levels observed in September 2008, which represents relatively dry conditions based on the period of observation (see FSAR Figure 2.4S.12-24). (Note that September 2008 data were used for calibration because additional observation wells were installed that increased the number of observations in the Units 3 & 4 area from 28 to 54; see FSAR Table 2.4S.12-7.) To account for higher pre-construction groundwater levels associated with wetter conditions, two sensitivity cases were examined to further bound the maximum groundwater level estimate:

1. In the first case, the simulated change in groundwater level as a result of site development is superimposed on the maximum observed groundwater level. As described above, the maximum observed groundwater level within the Units 3 & 4 power block area is 25.94 ft MSL. Groundwater modeling of pre- and post-construction conditions indicates that site development decreases the groundwater levels by 1 to 3 ft in the power block area. Using the lower end of the range for conservatism, superimposing a 1 ft decrease in groundwater level due to site development onto the historical maximum gives an elevation of 25.94 ft - 1 ft $\approx$ 25 ft MSL, which is less than the 28 ft MSL site characteristic given in the FSAR.

2. In the second case, the observed range in groundwater level is superimposed on the simulated post-construction result. The post-construction model predicts an Upper Shallow Aquifer head value of 21.0 ft MSL in the area encompassing the safety-related facilities for Units 3 & 4 based on the discussion above. The range in observed groundwater levels for the Units 3 & 4 power block area is the difference between the maximum water level of 25.94 ft recorded at OW-348U on July 30, 2007 and the minimum water level of 21.23 ft recorded at OW-332U on September 22, 2008, yielding a range of 25.94 ft - 21.23 ft = 4.71 ft (values from FSAR Table 2.4S.12-7). Superimposing this range onto the post-construction water level predictions yields 21.0 ft + 4.7 ft = 25.7 ft MSL, which again is less than the 28 ft MSL site characteristic given in the FSAR.

In summary, measured pre-construction groundwater levels, post-construction groundwater model results, and various sensitivity analyses support the conclusion that the maximum post-construction groundwater level within the STP Units 3 & 4 power block area, including the areas occupied by safety-related facilities, will not exceed an elevation of 28 ft MSL.

The sixth paragraph of FSAR Subsection 2.4S.12.2.3 will be revised as follows and two paragraphs will be added after the sixth paragraph:

Figure 2.4S.12-24 presents the hydrographs for these wells, which includes wells located within the STP 3 & 4 power block, upgradient and sidegradient of the power block, downgradient of the power block, and north of the MCR. The temporal variation for this entire set of wells is approximately 6 ft for the Upper Shallow Aquifer wells and approximately 4 ft for the Lower Shallow Aquifer wells. These hydrographs suggest short-term temporal variations in the Upper Shallow Aquifer on the order of 1 ft to 2 ft. The Upper Shallow Aquifer wells show consistently higher groundwater elevations than the adjacent Lower Shallow Aquifer wells. ~~Within the STP 3 & 4 power block area, depth to groundwater in the Upper Shallow Aquifer is approximately 5 ft below ground surface.~~ The ~~2007 monthly~~ groundwater levels recorded from the Upper Shallow Aquifer ~~exhibit A~~are generally steady ~~trend that decreases slightly after~~ from January 2007 to August 2007. Groundwater levels then decline from August 2007 to September 2008, increasing somewhat in December 2008. Over the same period, ~~the monthly~~ water levels recorded in the Lower Shallow Aquifer ~~at the power block area~~ exhibit an increasing trend from January 2007 to August 2007, then a decreasing trend to December 2008, similar to the Upper Shallow Aquifer. These temporal trends are common to the power block and surrounding areas as well as ~~is general pattern is also evident for both aquifers downgradient of the power block area,~~ north of the MCR.~~, and upgradient of the power block area. An anomalously high reading was obtained from observation wells OW-408U and OW-420U during August 2007. Considering that the water level in both aquifers across the power block area during this time exhibited similar trends with the exception of these two data points, the two measurements are considered anomalous, and are not considered in the analysis discussed in Subsection 2.4S.12.5.~~

Within the STP 3 & 4 power block area, the hydrographs for the OW-300 and OW-400 series wells are of interest, which are shown on Sheet 1 of Figure 2.4S.12-24. The maximum groundwater level observed in the Upper Shallow Aquifer within the STP 3 & 4 power block area is 25.94 ft MSL, which was recorded at OW-348U on July 30, 2007. In determining the maximum value, the two anomalous data points highlighted in Table 2.4S.12-7 and identified on Figure 2.4S.12-24 were excluded from consideration. The minimum groundwater level observed in the Upper Shallow Aquifer is 21.23 ft MSL recorded at OW-332U on September 22, 2008. The temporal range in the Upper Shallow Aquifer, the difference between the maximum and minimum values, is therefore 4.71 ft. For the Lower Shallow Aquifer within the STP 3 & 4 power block area, the maximum groundwater level of 18.98 ft MSL was recorded at OW-349L on July 30, 2007, while the minimum groundwater level of 15.28 ft MSL was recorded at OW-348L on December 15, 2008, yielding a temporal range of 3.70 ft.

Note that groundwater levels for the Upper Shallow Aquifer recorded at OW-408U and OW-420U on August 30, 2007 have been highlighted in Table 2.4S.12-7. Considering that the water levels in both aquifers across the power block area during this time all exhibited similar trends, with the exception of these two data points, the two measurements are considered anomalous and are not considered in the analysis discussed in Subsection 2.4S.12.5.

References:

1. STPNOC Letter ABR-AE-08000047, "Response to Requests for Additional Information," Attachment 6 (RAI 02.04.12-1), July 2, 2008.

2. STPNOC Letter ABR-AE-08000055, "Response to Requests for Additional Information," Attachment 6 (RAI 02.04.12-26), July 24, 2008.

3. STPNOC Letter U7-C-STP-NRC-110005, "Supplemental Response to Requests for Additional Information," Attachment 2, "Groundwater Model Development and Analysis for STP Units 3 & 4," January 11, 2011.

4. STPNOC Letter U7-C-STP-NRC-100195, "Response to Request for Additional Information," Attachment 3 (RAI 02.04.12-40) and Attachment 10 (RAI 02.04.12-48), August 30, 2010.