PMSTPCOL PEmails

From: Tonacci, Mark
Sent: Monday, February 28, 2011 8:52 AM
To: Govan, Tekia
Cc: Flanders, Scott; STPCOL
Subject: FW: Groundwater, Floodlevel and Scour Holes
Attachments: DB flood does not affect design groundwater level.doc

Tekia,

Please find attached a position paper from STP on the groundwater issue. Please distribute this to all of the technical staff that this affects so that we can get the full benefit of their perspective at the meeting today that Scott F has called. Though this is coming in at the last minute - it would be good if the staff had an opportunity to review and provide feedback to their BCs prior to or at the meeting today.

Thank you,

Mark

-----Original Message-----
From: Head, Scott [mailto:smhead@STPEGS.COM]
Sent: Monday, February 28, 2011 8:44 AM
To: Tonacci, Mark
Subject: Groundwater, Floodlevel and Scour Holes

Hearing Identifier: SouthTexas34Public_EX
Email Number: 2636

Mail Envelope Properties (E09C30551FD42442BA284ECF9858105F950E09B32A)

Subject: FW: Groundwater, Floodlevel and Scour Holes
Sent Date: 2/28/2011 8:51:53 AM
Received Date: 2/28/2011 8:52:01 AM
From: Tonacci, Mark

Created By: Mark.Tonacci@nrc.gov

Recipients:
"Flanders, Scott" <Scott.Flanders@nrc.gov>
Tracking Status: None
"STPCOL" <STP.COL@nrc.gov>
Tracking Status: None
"Govan, Tekia" <Tekia.Govan@nrc.gov>
Tracking Status: None

Post Office: HQCLSTR02.nrc.gov

Files	**Size**	**Date & Time**
MESSAGE	650	2/28/2011 8:52:01 AM
DB flood does not affect design groundwater level.doc	34882	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
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Issue:

The NRC Staff has tentatively stated that STP must either: a) develop a departure allowing groundwater level to exceed the STP site parameter (28 feet MSL) during a flood; or b) demonstrate that scour holes would not allow flood water to enter the upper shallow aquifer and cause the groundwater level to exceed 28 feet. NINA believes that the effects of a design basis flood are not relevant to the groundwater level.

Background:

- The ABWR DCD site parameters include a maximum groundwater level of 2 feet (61 cm) below grade and a maximum flood level of 1 foot (30.5 cm) below grade. The DCD also refers to this groundwater level as the "water table" and the "normal ground water table."[1] The site groundwater level is determined by studies of the site and the local area to measure actual groundwater levels[2]. The maximum flood level is based on the probable maximum precipitation and other potential events, such as seismically-induced dam failures, tsunamis, and hurricane storm surge.[3]

- The groundwater level affects various geotechnical properties, such a soil weight, cohesion and angle of internal friction, and dynamic soil properties.[4] Groundwater and flood level are both considered in determining loads that must be considered in building designs.[5] The various loads are considered in a number of specified load combinations. For example, DCD section 3.8.1.3 says:

  > The containment is analyzed and designed for all credible conditions of loading, including normal loads, preoperational testing loads, loads during severe environmental conditions, loads during extreme environmental conditions and loads during abnormal plant conditions.[6]

- In foundation design, the load due to the buoyant force of maximum groundwater is considered in most required load-combinations, including normal loads and the combinations with earthquake loads, the combination with severe winds, and the combination with tornado winds. The load due to the buoyant force of maximum flood is only considered in one separate combination (combined with dead load, which appears in

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1 "Ground water able" is used in numerous places in appendix 3A, including 3A.3.3 "Ground Water Table." "Normal ground water table" is used in Figures 3H.3-1 and 3H.3-2.

2 See SRP 2.4.12.

3 See RG 1.59.

4 See DCD COL Item 2.32.

5 See Section 3.8.1.4.1.1.2 "Axisymmetrical Loads," Table 3.8-7 "Load Combinations for Foundation Design,"

6 Section 3.8.1.3.

each combination).[7] Groundwater level is a significant consideration for soil-structure interaction (SSI) analysis, while design flood level is not considered for that purpose.[8]

Issue:

- The response to RAI 02.04.12-51, which was about the potential for the MCR breach flood water to cause scour, concluded that no significant scour would occur at the power block because of the relatively low velocity when the water reaches the power block area, which is about 1500 ft from the breach, and any resulting increase in groundwater level would be trivial. The Staff has questions about the adequacy of that analysis. The Staff did not identify any safety issue that could be caused by such an increase in groundwater level, but indicated that this potential would result in the need for a new departure.

NINA's position:

- The maximum groundwater level and the maximum flood level are related to normal site conditions, and extreme site conditions, respectively. The maximum groundwater level does not apply to a postulated MCR breach, which is a highly unlikely event. The DCD's discussion of the groundwater and flood levels clearly reflects this in numerous places. The DCD's Maximum flood level is below grade, but above the maximum groundwater level. If the flood level is to be considered to determine compliance with the groundwater level, there would be no reason to specify both levels separately. Moreover, the required load combinations clearly reflect that the loads due to groundwater and flood are never considered in combination with each other. In addition the loads due to the effects of groundwater occur in combination with various abnormal events, while the load due to flood does not.

Conclusion:

- The maximum groundwater level does not apply to the design basis flood. The MCR breach is considered to determine the design basis flood level, and is not considered to assess compliance with the maximum groundwater level. As a result, a concern about potential scour due to the MCR breach could not result in the need for a departure from the maximum groundwater level.

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[7] Table 3.8-7. Other similar load combination provisions are in Section 3H.1.4.5, Table 3H.1-23, and Sections 3H.2.4.5 and 3H.3.5.1.

[8] See Section 3A.3