From: Schiller, Alina
Sent: Monday, October 4, 2021 2:31 PM
To: GEH-BWRX-300DocsPEm Resource
Cc: Shea, James
Subject: List of Talking Points for the October 6, 2021, Public Meeting with GEH
Attachments: List of talking points for the October 6 2021 public meeting with GEH.docx

Alina Schiller
Project Manager
Office of Nuclear Reactor Regulation
Division of New and Renewed Licenses
New Reactor Licensing Branch
O-13 C10
301-415-8177

Hearing Identifier: GEH_BWRX300_Docs_Public
Email Number: 12

Mail Envelope Properties (BLAPR09MB7153076E6DCB70E6A4EBC7FF96AE9)

Subject: List of Talking Points for the October 6, 2021, Public Meeting with GEH
Sent Date: 10/4/2021 2:31:11 PM
Received Date: 10/4/2021 2:31:13 PM
From: Schiller, Alina

Created By: Alina.Schiller@nrc.gov

Recipients:
"Shea, James" <James.Shea@nrc.gov>
Tracking Status: None
"GEH-BWRX-300DocsPEm Resource" <GEH-BWRX-300DocsPEm.Resource@usnrc.onmicrosoft.com>
Tracking Status: None

Post Office: BLAPR09MB7153.namprd09.prod.outlook.com

Files	**Size**	**Date & Time**	
MESSAGE	196	10/4/2021 2:31:13 PM	
List of talking points for the October 6 2021 public meeting with GEH.docx			32754

Options
Priority: Normal
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:

Talking Points for October 6, 2021, Public Meeting with GEH on

GEH BWRX-300 Construction Methodology LTR

1. RAI 02.05.04-01: The RAI response bases mostly on RG 1.132 and RG 1.138 to show adequacy of site characterization proposed in the TR. These RGs are geared toward partially embedded reactors generally in soil sites, not deeply embedded reactors at rock sites, such as GEH BWRX-300, as discussed in great detail in Section 1 of the TR.

2. RAI 02.05.04-01 response does not address any plan to determine the parameters of the interface model shown in Figure 4-2; instead, it mentions other models without describing them and discussing why they would be more appropriate to model the interfaces (rock and rock, rock and soil, rock and reactor wall, soil and reactor wall) of the proposed reactor facility.

3. RAI 02.05.04-02 asked for the plan to map the fractures at the site and at the shaft wall as the shaft advances, which was not addressed in the response. Rock mass ratings (RMR, GSI) would be used to estimate the rock mass modulus to be used in the FIA (Section 4 of the TR) and SSI (Section 5 of the TR) analyses. The results of the FIA and SSI analyses would be questionable as proper site-specific input parameters are not used (3 out of 5 RMR parameters are based on rock fracture network), or the parameters used in the rock mass classification have been redefined, as discussed later with respect to the response to RAI 02.05.04-07. It is not clear how GEH can determine these rock fracture network parameters from 1D vertical only borehole information (biased against vertical or semi-vertical fractures) and demonstrate the appropriateness of the rock mass rating values from a few boreholes at a site. Assumption of a 'massive' rock mass with a few isolated fractures eliminates most of the rock sites in the United States for siting the reactor and may introduce other complications in the project.

4. RAI 02.05.04-03: Discussion on the plan(s) or program(s) to monitor the response of the BWRX-300 and its surrounding media and comparing them with predictions using the FIA model for calibrating the numerical FIA model is vague and sometimes contradictory to what was said elsewhere or in the TR. Contrary to what is stated in TR Section 4.2.2, Rock Constitutive Models, the proposed approach using a finite element program is incapable of analyzing the nonlinear and discontinuum behavior of the rock fractures present in the rock mass surrounding the reactor because a finite element program unless specifically formulated cannot model the behavior of intersecting fractures present in a fracture network.

5. RAI 02.05.04-04 response related to properties of subgrade materials being isotropic and linearly elastic is confusing, because this may be acceptable only for massive rock mass and in a rock mass well fractured that response of the rock mass is more or less homogeneous. Both cases need to be demonstrated with field fracture mapping in conjunction with the analytical results. As fractures are generally weaker than the surrounding intact rock, a fractured rock mass behaves anisotropically (e.g., the results of the ubiquitous joint model).

6. RAI 02.05.04-05 response to an approach to identify the disadvantageous fracture zones, joints, bedding planes, discontinuities, and other zones of weakness at a site is confusing. It is not clear how GEH proposes to detect these zones beforehand, during, and after construction. It is not clear how GEH takes the results of the FIA model to determine the rock pressure when the model

parameters are uncertain, and the model is deficient by not considering the rock fractures. In addition, there is no clear discussion in the TR how the FIA model would be calibrated with the actual observations.

7. RAI 02.05.04-05 response states samples from potentially weak zones would be tested in the laboratory; however, without a clear plan to identify them in the first place (#6 above), it is not conceivable that samples are appropriately collected from the potentially weak zones in surrounding rock mass.

8. RAI 02.05.04-05: Designing against squeezing rock mass needs proof as it is extremely dangerous to construct and operate an excavation in squeezing rock mass. A squeezing rock mass gives tremendous pressure in certain directions and deforms the support system reducing the cross-sectional area nonuniformly. GEH should demonstrate that the reactor design is robust enough to withstand the non-uniform earth pressure and operate safely for the 40-year reactor life. Moreover, contrary to what is said in the RAI response, the pressure will be there for the entire life of the reactor.

9. RAI 02.05.04-06: Although stated in the response that TR Section 3.1.3 has a method to design the support system for an excavation in weak zones in rock mass, there is none.

10. RAI 02.05.04-07: It is not clear how GEH proposes to determine the deterioration of shear strength of rock joints in actual field conditions. Changing a value in the model needs justification whether it is at all realistic.

11. RAI 02.05.04-07 response wants to redefine the rock mass rating system developed in years by researchers. For example, the groundwater parameter in the RMR system has clear definition of what measurements are needed. Trying to circumvent the definition with a new one for one of the parameters would nullify the RMR value obtained. It may be appropriate for a new rock mass rating system, but it cannot be used to develop the rock mass modulus, etc., using the empirical equations specifically developed for the RMR system only.

12. RAI 02.05.04-08 response is vague. Without any knowledge of the horizontal stress fields, it is inconceivable how the results of the FIA analysis for a structure of height approximately 100 m placed beneath the surface would be acceptable.

13. RAI 02.05.04-09: It is not clear how GEH proposes to determine whether probabilistic calculations are required for a site or not, as stated in the RAI response.

14. To eliminate any vagueness and confusing statements made in the RAI response and TR, the staff recommends that GEH provide several example(s) to demonstrate the feasibility of the proposed methodology in different rock mass conditions at each step. The examples should list the input parameters and explain the plan to determine the input parameters using appropriate laboratory tests and field investigations. Any model that would be employed should be identified at each step. Potential outcome(s) at each step from each model should be explained in detail.