

## ClinchRiverESPEnvRAIPEm Resource

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**From:** Fetter, Allen  
**Sent:** Tuesday, August 01, 2017 2:34 PM  
**To:** Schiele, Raymond Joseph  
**Cc:** Sutton, Mallecia; pshastings (pshastings@tva.gov); ClinchRiverESPEnvRAIPEm Resource; Colaccino, Joseph; Dudek, Michael; Rodriguez, Ricardo; Wang, Weijun; Stirewalt, Gerry; Heeszal, David; Bauer, Laurel  
**Subject:** Issuance of RAI pertaining to Section 2.5.4, Stability of Subsurface Materials and Foundations (RAI Number 6, eRAI-9035)  
**Attachments:** CRNS ESP Final RAI GE-06 9035.pdf

Good Afternoon,

This email is a formal issuance of an RAI pertaining to Section 2.5.4, Stability of Subsurface Materials and Foundations, for the Clinch River Nuclear Site ESP application review. The draft version of the RAI was provided to TVA on 7/19/2017, and a clarification call on the draft RAI was requested by TVA. The clarification call took place on 7/24/2017, and TVA asked NRC staff to consider taking an additional look at the TVA letter CNL-17-082 and enclosures (ADAMS Accession number: ML17186A113) provided to NRC on July 3, 2017. TVA noted that the information contained in that submission merited changing parts of the questions in the draft RAI. Based on NRC staff's additional review of the information submitted with TVA letter CNL-17-082, NRC staff revised the draft RAI and provided it to TVA on 7/26/2017. A clarification on the revised draft RAI call took place 7/31/2017, and the meaning of the language in the questions were clarified by NRC staff order to help ensure that an effective RAI response is provided by TVA.

This is the fifth safety RAI prepared (Number 6) for the Clinch River Nuclear Site ESP application review, and it has a unique e-RAI identifying number of eRAI-9035.

The schedule we have established for the review of the application assumes technically correct and complete responses within 30 calendar days of receipt of RAIs. However, based on the level of effort required to respond the RAI questions, TVA has identified the following schedule for responding to the RAI questions:

45 days – Questions 1 & 2

Please contact me if you have any questions.

Thanks,

Allen H. Fetter, Senior Project Manager  
U.S. Nuclear Regulatory Commission  
Office of New Reactors  
Division of New Reactor Licensing  
Licensing Branch 3  
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## **Request for Additional Information, Number 6, eRAI-9035**

Issue Date: 08/01/2017

Application Title: Clinch River Nuclear Site, ESP

Operating Company: Tennessee Valley Authority

Docket No. 52-047

Review Section: 02.05.04 - Stability of Subsurface Materials and Foundations

Application Section: 2.5.4

### QUESTIONS

02.05.04-01

#### Rock mass properties determination

In SSAR (Rev 0) Section 2.5.4.2.4.4, it states that the rock mass properties are developed using the Geological Strength Index (GSI) classifications of the stratigraphic units. The site investigation data indicates the presence of rock discontinuities and fractures in the stratigraphic units, and the weathered or fracture zones typically occur along bedding planes at the CRN sites (SSAR 2.5.1.2.6.3 "Fracture Zones"). The rock mass discontinuities and fracture zones may result in pre-determined shear failure surfaces. Because the GSI chart may not be applicable when structural planes of the rock control the failure of rock mass [Ref.1], and the rock mass property is a key input for the evaluations of foundation stability, please discuss how the inclined rock formation interfaces were taken into account when determining the rock mass properties to ensure the proper evaluations of subsurface material and foundation stability to meet the requirements of 10 CFR 100.23 (d)(4).

Reference 1: Hoek, E. and Marinos, P. (2000): Predicting Tunnel Squeezing. Tunnels and Tunnelling International. Part 1 – November 2000, Part 2 – December, 2000.

02.05.04-02

#### Bearing capacity and settlement determination

In SSAR (Rev 0) 2.5.4.10 it states that for evaluations of bearing capacity and settlement of rock at the CRN site, each stratigraphic unit within the depth of influence of a respective foundation is considered separately as a single infinite rock layer below the foundation. The basic assumption for the bearing capacity and settlement evaluations simplified the site geologic condition because the actual subsurface of the CRN site consists of multiple inclined layers of different rock formations having some shear and fracture zones. Although the bearing capacity was evaluated using a finite element model (FEM) that takes the site specific geologic characteristics into consideration, and the results are summarized in proposed SSAR markup in Section 2.5.4.13 "Foundation Assessment Model" (TVA CNL-17-082, July 3, 2017), it is not clear whether the FEM results is part of the basis for bearing capacity determination as presented in SSAR Section 2.5.4.10.1 "Bearing Capacity."

To ensure the suitability of the site for future new reactor construction, and stability of subsurface materials and foundations to meet the requirements of 10 CFR 100.23 (d)(4),

please (1) discuss all methods used in determination of recommended allowable bearing capacities values in SSAR Section 2.5.4.10.1; (2) justify why the simplified assumptions for site geologic condition and associated methods can be used in evaluation of bearing capacity for the CRN site; and (3) justify why the simplified assumptions and associated methods can be used in evaluation of settlement.