



Duquesne Light

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August 1, 1984

United States Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Mr. George W. Knighton, Chief
Licensing Branch 3
Office of Nuclear Reactor Regulation

SUBJECT: Beaver Valley Power Station - Unit No. 2
Docket No. 50-412
Responses to Draft SER Open Items

Gentlemen:

This letter forwards the attached responses to the NRC Geotechnical Engineering Section's Draft SER Open Item Nos. 180 and 181.

DUQUESNE LIGHT COMPANY

By

E. J. Woolever
Vice President

JDO/wjs
Attachments

cc: Ms. M. Ley, Project Manager (w/a)
Mr. E. A. Licitra, Project Manager (w/a)
Mr. G. Walton, NRC Resident Inspector (w/a)

SUBSCRIBED AND SWORN TO BEFORE ME THIS
3rd DAY OF July, 1984.

Anita Elaine Reiter
Notary Public

ANITA ELAINE REITER, NOTARY PUBLIC
ROBINSON TOWNSHIP, ALLEGHENY COUNTY
MY COMMISSION EXPIRES OCTOBER 20, 1986

Boo!

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF ALLEGHENY)

On this 31st day of July, 1984, before me, a Notary Public in and for said Commonwealth and County, personally appeared E. J. Woolever, who being duly sworn, deposed and said that (1) he is Vice President of Duquesne Light, (2) he is duly authorized to execute and file the foregoing Submittal on behalf of said Company, and (3) the statements set forth in the Submittal are true and correct to the best of his knowledge.

Anita Elaine Reiter
Notary Public

ANITA ELAINE REITER, NOTARY PUBLIC
ROBINSON TOWNSHIP, ALLEGHENY COUNTY
MY COMMISSION EXPIRES OCTOBER 20, 1986

Draft SER Open Item No. 180 (Section 2.5.5.3) - Soils Effective Strength Parameters:

The applicant must justify the use of effective strength parameters (i.e., effective friction angle, $\bar{\phi}$, and effective cohesion, \bar{c}) in the dynamic stability analysis where permanent slope displacements are anticipated.

Response:

The stability of the colluvial slope was analyzed for static and dynamic conditions. Soil properties under static conditions are drained, or effective stress, properties and under dynamic conditions are undrained, or total stress, properties. Pore pressure changes will cause variations in strength properties based on the type of soil and groundwater conditions present. For the colluvial slope south of the Emergency Outfall Structure (EOS), groundwater is not present and the colluvial and alluvial soils in this area are not fully saturated. In general, the site groundwater level follows the level of the Ohio River (mean water level at elevation 665'). Since the EOS colluvial slope is well above the groundwater, the in situ shear strength properties will be the same for the static and dynamic conditions. The strength properties of the fine colluvial soil were conservatively taken to be the residual friction angle with zero cohesion. The properties were measured by laboratory tests that are described in the SWEC report entitled "Stability of Slopes at the Emergency Outfall Structure," June 1983.

Draft SER Open Item No. 181 (Section 2.5.5.3) - Accuracy of SIDES Program:

The dynamic stability analysis of the colluvial slope indicated a minimum factor of safety of 0.8 for a circular arc within the fine grained colluvium. Therefore, the applicant assumed that some movement of the slope would occur in the event of the SSE, and estimated the plastic (permanent) displacement of the slope using a computer program SIDES based on the Newmark model (Reference 6). The acceleration time histories from the El Centro 1940 earthquake (N-S component) and the 1952 Kern County earthquake (S69E component of the Taft record) were used in this analysis. The cumulative displacement of the slope predicted by the SIDES program (Reference 10) was less than an inch. Although the magnitude of this movement is small, the applicant has been requested to document the accuracy of the analysis by furnishing an independent verification of the SIDES program since it is a SWEC in-house program.

Response:

The computer program SIDES (Seismically Induced Displacements of Embankments and Slopes) is described in the report prepared by Stone & Webster Engineering Corp. (SWEC) for BVPS-2 entitled "Stability of Slopes at the Emergency Outfall Structure," 1983. This program has previously been used in the design of the Millstone Nuclear Power Station - Unit 3 (Northeast Nuclear Energy Co. 1982) and the Shoreham Nuclear Power Station - Unit 1 (Long Island Lighting Co. 1976). This program has been fully qualified and documented in accordance with SWEC engineering assurance procedures. The qualification of the SIDES program involved checking the program's results against results obtained by direct integration of the equations of motion.

References for Open Item 181

Long Island Lighting Company 1976, Shoreham Nuclear Power Station - Unit 1, Final Safety Analysis Report, Docket 50-322, Appendix 2L, revised July 1977.

Northeast Nuclear Energy Company 1982, Millstone Nuclear Power Station -Unit 3, Final Safety Analysis Report, Docket 50-423, Section 2.5.5.