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AUG 25 1981

Docket Nos.: STN 50-454
and STN 50-455

Mr. Louis O. DelGeorge
Director of Nuclear Licensing
Commonwealth Edison Company
Post Office Box 767
Chicago, Illinois 60690

Dear Mr. DelGeorge:

Subject: Request for Additional Information for the Review of the Byron Plant, Unit 1 & 2, Geotechnical Engineering

As a result of our continuing review of the Byron Plant, Unit 1 & 2 FSAR, we find that we need additional information to complete our evaluation. The specific information required is in the area of Geotechnical Engineering is presented in the Enclosure.

To maintain our licensing review schedule for the Byron Plant FSAR, we will need responses to the enclosed request by October 12, 1981. If you cannot meet this date, please inform us within seven days after receipt of this letter of the date you plan to submit your responses so that we may review our schedule for any necessary changes.

Please contact J. C. Snell, Byron Licensing Project Manager, if you desire any discussion or clarification of the enclosed request.

Sincerely,

Original signed by:
B. J. Youngblood

B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing

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Enclosure:
As stated

cc: See next page

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DATE	8/24/81	8/ /81				

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Geotechnical Engineering Questions
Byron Nuclear Station
Docket Numbers 50-454/455

241.1 (2.5.4.10.4) Sinkhole Design Basis

1. Sinkholes have been identified on Fig. 2.5-101. Describe the investigation program that was carried out to determine the locations and dimensions of the sinkholes and their current state of activity.

2. Provide the bases for your conclusion that (a) the maximum diameter of the post-pleistocene aged sinkholes is approximately 50 feet with the average being approximately 25 feet, and (b) no sinkhole greater than 50 foot diameter will occur along the makeup line.

3. Identify, and provide a brief description of other projects where the design-basis sinkhole was chosen according to the age of the sinkholes.

(App. 2.5.G) 4. Provide details about the solution enlarged joint identified as Area of Concern No. 3. These details should include the orientation, width, and depth of the joint.

5. Provide documentation which forms the basis for your conclusion that the Area of Concern No. 11 is not related to a sinkhole. Field exploratory borings or other methods should be used to verify that no significant cavity is present beneath the pipeline in Area of Concern No. 11.

(2.5.4.12) (2.5.1.2.6) 6. Explain why the foundation bedrock for the major plant structures was grouted. If the grouting is to retard the downward percolation of groundwater, thereby reducing the solution activity, provide the investigation results that were made to determine the existence of any significant cavities in the foundation rock.

(App 2.5.A.4) 7. Significant communication between grout holes was reported. In Area A shown on Fig. 2.5A-4, the communication between grout holes extended over 200 feet. What is the largest grout take for holes located in this area? Provide the bases for the conclusion that grout communication is related to solutioning along the joints and bedding planes. Provide a similar discussion for Area C.

(App 2.5.A.4) 8. The major grout communication pattern is reported to have a northwest-southeast trend. An extension of this trend northwestward will encounter Area of Concern No. 11 along the pipeline, and the 150-foot diameter sinkhole. Discuss the significance of this trend on the design of the pipeline. Actual field investigation data should be included in the discussion.

(App 2.5.G Appendix) 9. Groundwater is reported to vary from El. 740 feet to El. 840 feet depending upon the location and the season of the year. Discuss the groundwater fluctuation effects on the solutioning and sinkhole activities.

241.2 (2.5.4.4) 9. Low Seismic Velocity Zones

Seismic Refraction surveys have detected several low velocity zones which are stated to be related to weathering and solutioning of jointed, fractured bedrock. Discuss the relationship of two low velocity zones (Sta. 37+00 and 31+00 on Fig. 2.5-65) to the presence of sinkholes and the potential impact on pipeline design.

241.3 (2.5.4.5.1.4) Backfill

Fig. 2.5-78 shows that the backfill has about 5 percent material passing the No. 200 sieve. Discuss the applicability of the Modified Proctor Test (ASTM 1557-70) for this type material. Also provide maximum and minimum density values for similar material using ASTM D2049-69.

241.4 (2.5.4.8) Liquefaction Potential

1. The SSE for the Byron site is 0.2g. Explain why the artificial time-history conforming to R. G. 1.60 scaled to 0.12g rather than 0.2g was used in the evaluation of the liquefaction potential.

(2.5.3.8.3) 2. Describe the analytical model used in the one dimensional wave propagation analysis. Also, identify the soil layers and material properties used in the analysis.

(2.5.4.8.3.3) 3. Provide the basis for the failure criterion for the laboratory samples. Based on this criterion, what is the maximum seismically induced lateral movement along the river bank?

(Fig. 2.5-86) 4. Discuss the liquefaction potential of the soil at depths between 50 to 65 feet shown on Fig. 2.5-86, where the standard penetration resistances are within the zone where the liquefaction potential is described as depending on soil type and earthquake magnitude.

241.5
(2.5.4.10.5.1)

Static Lateral Pressure

Provide the value and the test results of the lateral earth coefficient for the compacted granular soils.

241.6
(App 2.5G &
2.5.4.13)

Pipeline Settlements & Seismic Responses

1. Provide the final ground surface profile along the pipeline on Plate 3.

2. Although the weight of the pipeline, as stated, is less than the weight of the excavated soil; settlement along the pipeline should be anticipated in areas where site grade has been raised by filling and the compressible soil underneath the pipeline has variable thickness and compression characteristics. Provide settlement estimates of the pipeline located in the areas identified as Areas of Concern No. 11 and 12. Actual testing data should be used in the analyses.

3. The pipeline as shown on Plate 1, is approximately 3 miles long and extends from the River Screen House on the Rock River to the Essential Service Cooling Tower in the plant site area. The soil supporting the pipeline has variable properties and has thicknesses varying from about three feet to about 100 feet over bedrock. The seismic amplification characteristics are affected by the thickness and properties of the soil deposit. Provide analytical results showing the seismic amplifications along the pipeline and discuss their impact on the pipeline design.

4. Poorly graded, loose, non-plastic soils were encountered at Areas of Concern No. 11 and 12. Provide an evaluation of the liquefaction potential and seismically induced settlements of these soils. Since surface water could percolate around the edges of the cohesive cover, the degree of saturation for the soil beneath the pipeline should be considered in the analysis.

241.7 Concrete Cracks

During our site visit of May 19, 1981, cracks were observed in the mat connecting the two essential cooling towers. Investigate and determine the cause of the cracks.