APR 14 1976

Peter R. Taft, Esquire
Assistant Attorney General
Land and Natural Resources Division
Department of Justice
Washington, D.C. 20530

Re: ATG:PHK 90-5-1-7-220

Dear Mr. Taft:

In your letter of March 1, 1976 (by Mr. Alfred T. Ghiorzi) to Mr. Olmstead of my staff, you requested certain documents and additional information to supplement my letter to you dated December 19, 1975. Responses to your numbered questions and the requested documents are attached.

Please feel free to contact me if you need additional information or assistance in this matter.

Sincerely,

[illegible]
for Howard K. Shapar
Executive Legal Director

Enclosures:
52 Questions and Answers
with 16 Exhibits attached

Question 1: In regard to the settling problem at the North Anna pumphouse, it is our understanding that the FSAR was amended to allow a total anticipated settlement of 4.8 inches at the pumphouse center. Although previous settlements at the pumphouse corners had reached as much as 5.568 inches in the northwest corner, no measurements are indicated in material in our possession as to the subsidence presently occurring at the pumphouse center. Please supply us with a copy of the most recent measurements of settlements at the pumphouse center.

Answer 1: Settlement of the pumphouse center may be calculated from measurements of settlements at the pumphouse corners which are hereby provided. These measurements were supplied by VEPCO in a letter dated May 15, 1975, to NRC Region II. A copy of that letter is attached as Exhibit A. At that time VEPCO stated in part:

> "As of April, 1975 the following total settlements at the four corners of the SWPH and the alignment-settlement marker in the dike (marker no. 5) have been recorded:
>
> | | | | | |
> |---|---|---|---|---|
> | SE corner | - | 0.20 ft. | ≈ | 2.40 in. |
> | SW Corner | - | 0.36 ft. | ≈ | 4.30 in. |
> | NE Corner | - | 0.35 ft. | ≈ | 4.20 in. |
> | NW Corner | - | 0.56 ft. | ≈ | 6.72 in. |
> | No. 5 Marker | - | 0.14 ft. | ≈ | 1.68 in." |

Thus the most recent measurements of settlements at the pumphouse show average settlement at the pumphouse center to be 0.367 ft or approximately 4.4 in.

Question 2: Approximately what degree of settlement would be unacceptable for the pumphouse at the North Anna site?

Answer 2: An unacceptable degree of settlement for the Unit 1 and 2 pumphouse would be that which would cause an unacceptable risk to the supply of emergency service water to the plant. The water supply risks include failure of buried piping connected to the pumphouse, malfunction of pumps due to excessive pumphouse tilt, and rupture of the earthen liner for the pond as the pumphouse slowly punches into the liner. (See also Answer 3).

Question 3: In regard to the rubber connecting segments attached to relieve stress in the North Anna pumphouse piping, approximately how much additional differential settling would be required to rupture or otherwise render inoperative those rubber segments? Please provide any calculations or estimates now in your possession either generated by the Commission or by VEPCO.

Answer 3: According to VEPCO's letter of August 21, 1975 to A. Schwencer (NRC), their proposed expansion joint design will accommodate 3 inches of additional settlement without exceeding allowable pipe stresses. VEPCO's calculations supporting the proposed design are included in their letter of August 21, 1975 attached as Exhibit B.

Question 4: Please provide calculations submitted by VEPCO as to the anticipated future settling that may occur at the North Anna site.

Answer 4: VEPCO's calculations of the future settlement of the pumphouse for Units 1 and 2 are included in a document entitled, "Report on Geotechnical Investigations of Service Water Reservoir, North Anna Power Station, Units 1 and 2, December 23, 1975" attached as Exhibit C.

Question 5: Why were the measurement reference points changed from the corners of the pumphouse to its center?

Answer 5: The measurement reference points were not changed. The settlement at the center of the pumphouse can be computed from the tlement at the corners by assuming that the foundation is rigid. However, the degree of tilt of the pumphouse is not accounted for in a single settlement value at the center of the pumphouse. Since VEPCO based their design on average predicted settlement, it sought to use the center of the pumphouse for comparison of predicted to actual settlement.

Question 6: What fixed reference point will be used to measure future settling of the pumphouse center?

Answer 6: Presumably, the same reference will be used for the center as for the corners of the pumphouse. The settlement at the center of the pumphouse can be computed from the settlement at the corners by assuming that the foundation is rigid.

Question 7: In a letter from Mr. John G. Davis, Acting Director, Division of Field Operations, Office of Inspection and Enforcement directed to Mr. Stanley Ragone VEPCO senior vice-president and dated November 14, 1975, (Docket No. 50-338) the Commission notes that VEPCO consultants in April, 1975, indicated a maximum bending stress in the North Anna pumphouse piping of 2300 P.S.I. compared to the code-allowed 20,550. Furthermore, VEPCO representatives apparently concurred in this evaluation and reported to the Region II office on May 15 that no corrective action was planned. Upon inspection by NRC, however, on August 21, 1975, stresses were measured in the piping system as high as 28,000 P.S.I., approximately 7500 P.S.I. in excess of that allowed by the code. Does this unreported excess constitute a significant departure from permitted operation? Had the Commission known of this excess stress earlier, would it have ordered or requested some form of modification in the structure or operation of the North Anna facility?

Answer 7: The stresses on piping were not measured to the knowledge of NRC. The stresses in question were forecast as a result of questions raised at the site by a NRC inspector. Subsequent calculations verified that bending stresses on the pipe could be as high as 28,000 P.S.I. Obviously, actual measured stresses exceeding code requirements could require modifications in design or construction and NRC approval would be required.

Question 8: Please provide copies of any reports which you may have in your possession issued by VEPCO or by any of its consultants or subcontractors reporting stress figures on pumphouse piping at North Anna that contradicts those measured by the Commission.

Answer 8: There have not been any stress measurements on the pumphouse piping by either VEPCO or the NRC. NRC is not aware of any reports by VEPCO, its consultants or contractors which contradict stress calculations made by VEPCO and presented to the NRC.

Question 9: NRC headquarters concluded in its November 14, 1975 Notice of Violation (Docket No. 50-339) that VEPCO had failed to make a proper calculation of the stresses on the piping involved and was thus unaware that a reportable situation existed. Please describe briefly the stress measurement process. In particular, what is the likelihood that more negligence in calculating stresses would result in a reported figure that is too low by a factor of ten?

Answer 9: In April of 1975, VEPCO's consultants calculated (erroneously) pipe bending stresses of 2300 psi per inch of pumphouse settlement and concluded (erroneously) that 4 inches of settlement could be tolerated. Later, VEPCO's consultants recalculated (properly) 28,000 psi pipe bending stresses due to 3 inches of pumphouse settlement and concluded that remedial action and connection redesign was necessary to accommodate past and future settlement. We are unaware of any stress measurements. The calculated stress change was in error by a factor of four. The error was due to a lack of analytical competence rather than negligence.

Question 10: Please describe VEPCO's explanation as to how the erroneous stress measurement was made and why it was not considered suspect, given that in 1975 it was already known that settlement had occurred that was more than four times that previously predicted?

Answer 10: The stresses were not measured but were calculated. The calculations were intended to indicate the maximum stresses that the piping would experience over the lifetime of the facility. The model used for the calculations was that of a pipe supported at each end and apparently the model neglected the soil interaction forces which would cause increased stress levels. Since the pipe was not connected to the pumphouse until June 1974, it was only subjected to the movements which took place between June 1974 and February 1975, the time of reporting. These are tabulated as follows:

Answer 10 continued:

Pumphouse Settlement - June 1974 to February 1975

| | 6/74 | ?/75 | Δ Settlement | | |
|---|---|---|---|---|---|
| SE Corner | 0.102' | 0.20' | 0.098' | = | 1.416" |
| NE Corner | 0.28' | 0.42' | 0.14' | = | 1.68" |
| SW Corner | 0.242' | 0.363' | 0.121' | = | 1.452" |
| NW Corner | 0.424' | 0.56' | 0.136' | = | 1.632" |

Question 11: Please attach copies of any documents containing the explanation by VEPCO requested in the previous question.

Answer 11: The letter and report are attached as Exhibit D. This report was received as an enclosure to a letter dated August 1, 1975, from VEPCO (W. L. Proffitt) which was sent to NRC Region II in Atlanta (Director Norman C. Moseley).

Question 12: The Department is informed that in a letter from Mr. Schwencer of the Commission to Mr. Ragone of VEPCO, Mr. Schwencer concluded that the foundation engineering information reviewed as of July 24, 1975 was insufficient to conclude that the pumphouse would reliably perform its design function. Please attach a copy of Mr. Schwencer's letter dated July 24, 1975 and any response which VEPCO may have made to that letter.

Answer 12: Letters are attached as Exhibit E. VEPCO's response is dated August 15, 1975.

Question 13: In regard to the problem of reactor vessel supports, at what point in time were VEPCO subcontractors first aware of the existence of Neuschel's lineament?

Answer 13: As far as we know, VEPCO subcontractors became aware of Neuschel's lineament upon publication of the following paper in 1970: Neuschel, S.K., 1970, Correlation of Aeromagnetic and aeroradioactivity with lithology in the Spotsylvania area, Virginia: Geol. Soc. Amer. Bull. V. 81, p. 3575-3582.

Question 14: Were any VEPCO engineering personnel, as opposed to subcontractors or other individuals, aware that the Westinghouse design for reactor vessels supports failed to encompass asymmetric loading?

Answer 14: VEPCO engineering personnel with project management/liaison duties were made aware in late 1973 that the original design loads generated by Westinghouse did not include asymmetric loads and that it had been determined that asymmetric loads of some magnitude would be present under the required

Answer 14 continued: design basis pipe rupture postulate. However, these same individuals were assured by their design agent Stone & Webster (Stone & Webster is responsible for the actual design of the reactor vessel supports) that the vessel supports as designed were capable of sustaining much higher loads than originally specified by Westinghouse and that Stone & Webster's initial judgement was that the additional loads could be accommodated with no change in design. In fact, in the latest analyses performed by Stone & Webster using Westinghouse load data, with almost all simplifying assumptions removed, demonstrated that the supports as designed are found to be satisfactory for service. The staff is not scheduled to complete its review of these analyses until early 1977.

Question 15: Were any VEPCO personnel responsible for monitoring or checking the Westinghouse design? If so what are their names?

Answer 15: Mr. W. Bennett, the VEPCO project engineer, is responsible for maintaining general cognizance of the major subcontractors' efforts. Stone & Webster Co. (an architect engineering firm) was hired by the utility to act as their agent and to provide specialized engineering services. Stone & Webster was responsible for design of the pressure vessel supports to meet the loading conditions specified by Westinghouse.

Question 16: Mr. Shapar's letter of December 19, 1975, directed to this office, indicates that Westinghouse, as the designer of the supports, was fully aware in 1971-72 that the design did not account for asymmetric loading. Although Mr. Shapar indicated that these loads were then thought to be of relatively little significance, Mr. Shapar notes that detailed studies were initiated by Westinghouse. Did Westinghouse, at any time prior to April, 1974, indicate to VEPCO that such studies were taking place?

Answer 16: As indicated in Mr. Shapar's letter of December 19, 1975 Stone and Webster Company, not Westinghouse, is the party responsible for design of the VEPCO vessel supports. Westinghouse became aware in 1971-72 that asymmetric loads might occur under certain design basis pipe rupture postulates. Whether or not these highly transient loads were of significance to actual structural systems e.g. reactor vessel supports was considered quite debatable and further studies were instituted to resolve the matter. The conduct of these studies was published as technical papers and given in seminar format by Westinghouse and Westinghouse employees in 1973 and early 1974. Stone and Webster personnel on the VEPCO project and cognizant VEPCO personnel were aware that these studies were in progress but no definitive information was available to indicate the actual loads that might be expected to occur with any specific support design. Of interest is the fact that the actual load developed in a given support system depends on the interaction between the hydraulic forcing function and the structural response of the support members. Therefore, it is entirely possible that with a given forcing function one support system design will develop very high loads while another design will develop insignificant loads.

Question 17: Who are the individuals at Westinghouse and/or at VEPCO who indicated that VEPCO had no knowledge of the design problem prior to April, 1974?

Answer 17: In discussion with the staff, Mr. W. Bennett of VEPCO and Mr. N. Goldstein of Stone and Webster indicated that final results showing that the original design criteria for the North Anna pressure vessel supports had been exceeded were available in April 1974. Both of these individuals as well as others in the technical community were aware that studies were underway to more accurately characterize the design basis loadings for PWR coolant systems and that these studies were indicating that asymmetric loads may exist. Because of the transient nature of these loads however it was impossible to draw a definitive conclusion as to the significance of the loads until a complete dynamic characterization of the load forcing function (a time history) had been prepared for all loadings and a detailed dynamic model of the reactor coolant system had been prepared and analyzed using the time history forcing functions.

Question 18: Was VEPCO aware at any time prior to April 23, 1975 that a support design problem existed? On what evidence is the answer to the immediately preceding question based?

Answer 18: VEPCO engineering personnel, with project management/liaison duties, were made aware by Westinghouse in late 1973 that the original design loads generated by Westinghouse did not include asymmetric loads and that it had been determined that asymmetric loads of some magnitude would be present under the required design basis pipe rupture postulate. However, these same individuals were assured by their design agent Stone & Webster (Stone & Webster is responsible for the actual design of the reactor vessel supports) that the vessel supports as designed were capable of sustaining much higher loads than originally specified by Westinghouse and that Stone & Webster's initial judgement was that the additional loads could be accommodated with no change in design. In fact the latest analyses performed by Stone & Webster using Westinghouse load data, (with almost all simplifying assumptions removed) demonstrate that the supports as designed are held to be satisfactory. The NRC staff has not yet completed its review of these analyses. NRC staff expects to complete its review in early 1977.

This answer is based on statements made to the NRC staff by VEPCO and Stone and Webster personnel during the course of follow-up meetings on the North Anna docket.

Question 19: If any VEPCO, Stone and Webster, and/or Westinghouse employees, agents, officers or directors stated that VEPCO had no knowledge of the design problem prior to April 23, 1975, please give their names.

Answer 19: No such statements were made to the NRC technical staff.

Question 20: Did Mr. Ragone from VEPCO write a letter to Mr. Moseley of the Commission dated May 15, 1975, or there about, indicating that external piping to the pumphouse had not been overstressed, that the structure was not expected to become overstressed and that the structure was fully capable of service as a "safety grade" system?

Answer 20: NRC received a letter dated May 15, 1975 from VEPCO signed by Mr. Ragone.

Question 21: If so, please attach a copy of that letter.

Answer 21: A copy of that letter is attached at Exhibit A. In this connection note page 4 of the referenced letter which states in part:

> "Monitoring indicates that, since the lines were connected to this SWPH, the SWPH and the dike are settling at the same rate ( See Figure 1). Thus, there would be no differential settlement between the pipe and the SWPH, and therefore no sheer stresses at the penetration. After leaving the SWPH, the service water lines travel down the slope toward the power station. The settlement of the SWPH and the dike will result in minor stresses in the pipe. Calculations indicate that one inch of deflection at the SWPH and dike will result in at most 2300 psi of bending stress in the pipe if deflection is considered limited to only the first one hundred ft. Two inches of settlement have occurred since the attachment of the pipe. Conservatively, at least three additional inches (figure 0.25 ft.) of settlement could occur before stresses in the pipe reached the point that additional investigation would be required."
>
> "The settlement of the SWPH is not considered significant with regard to safety of operation of the North Anna power station, nor are the settlements enough to require extensive evaluation, redesign, or repair. The structure is adequately designed to preclude structural damage due to the settlement, and the external piping has not been overstressed due to rotational movement."

Question 22: Did Mr. Ragone write to Mr. Knuth of the NRC on or about May 16, 1975, indicating that settlement at North Anna at that time was not considered to be a reportable event pursuant to paragraph 50.55(e)(1)? If so, please attach a copy of that letter.

Answer 22: Dr. Knuth, Director, Office of Inspection and Enforcement, Nuclear Regulatory Commission, received a letter dated May 16, 1975, from VEPCO signed by Mr. Ragone discussing the reportability of the North Anna pumphouse settlement. A copy of this letter is attached as Exhibit F.

Question 23: On or about July 24, 1975, did Mr. Schwencer write a letter to Mr. Ragone at VEPCO to the effect that foundation engineering information reviewed as of that date would not support a conclusion that the reservoir, dike, and pumphouse would reliably perform their design function? If so, please attach a copy of that letter.

Answer 23: Yes. A copy of the letter is attached as Exhibit F-1.

Question 24: On or about August 1, 1975, did Mr. Proffitt from VEPCO write a letter to Mr. Schwencer indicating that VEPCO could not locate the original calculations for the estimated 1.44-inch settlement at North Anna? If so, please attach a copy of that letter.

Answer 24: A copy of the referenced letter is attached as Exhibit G.

Question 25: On what date did VEPCO employees or personnel first become aware of the existence of Neuschel's lineament?

Answer 25: Although NRC does not known when VEPCO employees or personnel first became aware of Neuschel's lineament, the company knew of the publication of the following paper in 1970: Neuschel, S.K., 1970, Correlation of Aeromagnetic and Aeroradioactivity with Lithology in Spotsylvania area, Virginia: Geol. Soc. Amer. Bull., v. 81, p. 3575-3582.

Question 26: At any time prior to August 15, 1975, was VEPCO asked to provide information to substantiate the stability of the North Anna pumphouse? If so, when were they so asked? If they complied, please attach a copy of their response.

Answer 26: On April 29, 1975, NRC inspectors requested VEPCO to submit a letter describing the events and actions that VEPCO proposed to take relative to the pumphouse settlement. This request is documented in IE Inspection Report Nos. 50-338/75-5 and 50-339/75-5, which were transmitted to VEPCO on May 20, 1975. (Exhibit H) VEPCO responded by letter dated May 22, 1975. (Exhibit I) Also see a letter from Stanley Ragone dated May 15, 1975 to the NRC Region II discussing the pumphouse settlement. (Refer to Question 1) A copy of this report was also sent to NRC Headquarters by Mr. Ragone as an attachment to a letter dated May 16, 1975 (see Question 22).

Question 27: Please describe in full the technique Stone and Webster used to evaluate the soil under the pumphouse and dike prior to August 15, 1975. Please indicate the name of the civil engineer primarily responsible for the soils analysis.

Answer 27: NRC is uncertain whether or not a certified civil engineer was responsible for soils analysis at the North Anna pumphouse site. J. M. Audibert

Answer 27 continued: represented Stone and Webster as soils engineer during an NRC inspection on April 29, 1975. We understand that several engineers have been designated responsibility for the soils analysis during the design and construction of the dike and pumphouse.

Question 28: If no certified civil engineer was responsible for soil analysis at the North Anna pumphouse site, please give the name and position of the VEPCO employee or any other person primarily responsible for soils analysis at the North Anna pumphouse site prior to August 15, 1975.

Answer 28: Responsibility for soils analyses rests with the Head of the Geotechnical Department, Stone and Webster Engineering Corporation. Presently, this position is held by Stan Rossier.

Question 29: On or about August 15, 1975, did Mr. Ragone or another employee of VEPCO write to Mr. Schwencer indicating that the soils under the pumphouse were complex, irratic and anisotropic? If so, please attach a copy of that letter.

Answer 29. A copy of that letter is attached as Exhibit I-1.

Question 30: In regard to the settling problem at the Surry nuclear power station, by whom and on what date was NRC first made aware that settling had occurred at the Surry site?

Answer 30. (Deleted - contains reference to Exhibit J)

Question 31: On what date was differential settling first observed at the site?

Answer 31: The letter referenced in response to question 30 above indicates that the measurements of settlement were made on February 2, 1971. Subsequent measurements were made on April 20, 1972. Whether early measurements were made which also revealed settling is not known to NRC.

Question 32: Who first observed it, and by whom and in what form was it first reported to NRC?

Answer 32: See answers to questions 30 and 31 above.

Question 33: When did VEPCO first report differential settling at the Surry site?

Answer 33: Following NRC initiated an investigation on May 8, 1975. At that time VEPCO provided the inspectors with information confirming Mr. Waite's allegations.

Question 34: In what document was it reported? Please attach a copy.

Answer 34: The results of the NRC investigation are reported in Investigation Report Nos. 50-280/75-1 and 50-281/75-1. Copies of these reports are attached (Exhibit K). Inspection report has protected the identity of specific individuals. A code identifying these individuals is given in response to question 35.

Question 35: In a document entitled Regulatory Investigation Report Office of Inspection and Enforcement, Region II of VEPCO, Surry I and II Site, Reports No. 50-280/75-1 and 50-281/75-1, a copy of which was made available to our office, we note that page 2 thereof indicates that VEPCO management was aware of reactor building settlement in excess of those estimates shown in the FSAR three years prior to discovery by NRC. Please attach a copy of any document in your possession which indicate such knowledge on VEPCO's part.

Answer 35: Investigation Report Nos. 50-280/75-1 and 50-281/75-1 (referenced above in answer 34) and related correspondence indicate that certain individuals in the VEPCO organization were aware of the settlement at the Surry nuclear station. The names and titles of individuals identified in the foregoing reports have been kept confidential. A code which identifies these individuals is attached as Exhibit L.

Question 36: At page 3 of the aforementioned report, the writer states VEPCO "Was not in a position to determine what additional settlement had taken place or what the differential settlement was, up to the time of the investigation or what may have taken place since the 1972 survey." Please explain that statement.

Was it because VEPCO had not taken any measurements or sufficient measurements after it was aware of the excessive settlement that the above conclusion was drawn?

Answer 36: The NRC investigation revealed no settlement measurements taken during the period April 20, 1972 through May 8, 1975, the date on which the NRC investigation commenced.

The Stone and Webster findings in the structural settlement study dated September 25, 1974 (refer to answer 34 and Exhibit 9 of the referenced investigation report) are used to support the position that the settlement indicated by the April 20, 1972, survey did not represent actual settlements but rather that the reference benchmark had heaved. This hypothesis was not, to NRC's knowledge, verified, nor were additional settlement readings taken for the study. Consequently, it was not possible at the time of the NRC investigation to determine what total structural settlements had occurred.

Question 37: What were the original FSAR settlement estimates allowed for the Surry 1 and 2 plants respectively?

Answer 37: There were none. NRC has not considered settlement at the Surry site to be a problem.

Question 38: In the NRC's view, is there a reliable method for projecting future settlements at Surry?

Answer 38: NRC believes that there are reliable methods for predicting future settlements at the Surry site.

Question 39: What total level of settlement would the agency now consider unacceptable at the Surry Site?

Answer 39: If total settlement at Surry 1 and 2 should increase from present values of about 1 1/2 inches to a future value of 2 1/2 inches, we would consider this unacceptable.

Question 40: Was any Surry FSAR amended to account for excessive settling?

Answer 40: No. NRC is not in possession of evidence of excessive settlement at Surry.

Question 41: On or about May 6, 1975, did NRC Region II receive a phone call from a "confidential informant" regarding abnormal settling at Surry?

Answer 41: Yes. (See answer 30.)

Question 42: If there was such a phone call from a "confidential informant", was this the first knowledge that NRC had received regarding settling at Surry?

Answer 42: Yes.

Question 43: Please describe the Richmond Fall Line and explain how it is related to the problem of settling at Surry.

Answer 43: The Richmond Fall Line is an unfamiliar term. The Fall Line is the boundary between the ancient and sesistent crystalline rocks of the Piedmont Plateau and younger and softer sediments of the Atlantic Coastal Plain in the eastern United States. The Fall Line would have no relation to the problem of settling at Surry.

Question 44: Can the Richmond Fall Line be properly described as a "hinge line"?

Answer 44: No, the Fall Line cannot be geologically described as a "hinge line."

Question 45: Please define the term "hinge line."

Answer 45: A hinge line (struc geol) is defined as a line or boundary between a stable region and a region undergoing upward or downward movement. In Pleistocene geology, it is the boundary between regions undergoing post glacial uplift and those of no uplift.

Question 46: In regard to the North Anna site, are there any mining activities contemplated?

Answer 46: The Piedmont Mineral Associate is interested in an area near Route 522 and Contrary Creek approximately 4 miles from the site. The Associate is prospecting for zinc.

Question 47: Do you have a copy of a Stone & Webster report entitled POTENTIAL RESERVOIR LEAKAGE DUE TO MINING EXCAVATION AND DEEP WELLS -- NAPS/VEPCO? If so please forward a copy of that report.

Answer 47: A copy of the requested report is attached as Exhibit M.

Question 48: If mining and/or excavation is contemplated at the site, what geological analyses and precautions have been taken to establish that no adverse effect will accure to any North Anna reactors?

Answer 48: The exclusion area of the North Anna site is "4,427 feet to the east of the center of the Unit 1 containment structure and 5,000 feet to the west of the center of containment of a Unit 4", and "The applicant owns in fee simple all the land in the exclusion area." (FSAR, Units 1 and 2). Thus, the applicant can prevent any mining activity from being performed within the exclusion area.

Question 49: Do you have documentation in the form of an AEC compliance report dated June 1970 describing unstable strata at the North Anna Unit 1 excavation site? If so, please forward a copy of that report.

Answer 49: A search of NRC files does not reveal any compliance report regarding unstable strata in June of 1970. A reference to unstable strata was made in Compliance Report Nos. 50-338, 339/70-1 which was forwarded to headquarters on March 26, 1970. That report is attached as Exhibit N.

Question 50: Please describe in detail the factual basis, including any geological testing and results, upon which a conclusion may have been reached by NRC or its predecessor that mining in the area would not be hazardous.

Answer 50: The seismologist contacted Piedmont to determine the maximum charge to be used during blasting activities. This turned out to be 400 lbs of charge. Calculation of the ground motions at the site resulting from this charge located four miles from the site were made. The results indicated that the resulting ground motion at the reactor site would be several orders of magnitude smaller than those for which the units are designed.

Question 51: Was there a hearing of the Atomic Safety and Licensing Board in November of 1970 regarding North Anna or Surry?

Answer 51: A Prehearing Conference was held In the Matter of Virginia Electric and Power Company (North Anna Power Station, Units 1 & 2) on November 4, 1970 followed by hearings on November 23-25, 1970.

Question 52: If so, please attach a transcript of that hearing.

Answer 52: Pursuant to agreement between Alfred T. Ghiorzi, Chief, Pollution Control Section, Land and Natural Resources Division, Department of Justice and William J. Olmstead, Office of the Executive Legal Director, Nuclear Regulatory Commission on April 12, 1975, the transcript will be made available for inspection on request. However, due to the bulk of the transcript, it will not be reproduced for transmittal as an attachment to these responses.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

APR 26 1978

Docket No. 50-338

MEMORANDUM FOR: J. Carl Stepp, Chief
Geosciences Branch, DSE

FROM: L. W. Heller, Leader
Geotechnical Engineering Section
Geosciences Branch, DSE

SUBJECT: VISIT TO NORTH ANNA - GEOTECHNICAL ENGINEERING

On April 13, 1978, Mr. Daniel M. Gillen and the undersigned visited the subject plant to check on reported (1) settlements of the Unit 1 and 2 service water pond pumphouse, (2) silt clogged dewatering pumps, and to get an up-date on (3) piezometer readings (4) performance of horizontal drains (5) settlement of spray pond piping, and (6) rock anchor on units 3 and 4. An attendance list is attached.

VEPCO's technical specifications for settlement monitoring require remedial plans whenever actual settlement becomes 75 percent of the allowable settlement. (License Authority, License and Technical Specifications, File 1, Volume 1, pages 3/4 7-70, -71, -72, and pages B 3/4 7-7, -8). The pumphouse settlement has now reached 75 percent of the value predicted in December of 1975 and VEPCO is beginning to prepare remedial plans. The total settlement, however, is less than half the limit of the flexible connection (3 inches), and the differential settlement is much less than half this limit. The pumphouse continues to tilt in the northwest direction.

The reasons for the silt clogged reactor mat dewatering pumps remains indeterminant at this time. VEPCO expects their investigations will take another month or so before conclusive evidence of the source of the silt can be gathered.

Piezometer readings on 4/4/78 are as follows: No. 11 - less than 275.4 ft, No. 12 - 272.8 ft, No. 13 - 275.3 ft, and No. 14 - 271.6 ft. Although exact groundwater elevations from these piezometers are doubtful, they appear consistent and reliable enough to detect any malfunction of the pumphouse drain system. The horizontal drains have been in place for nearly 8 months and are performing satisfactorily; some routine chemical cleaning may be scheduled in the future.

307 31

Attachment #3

Duff

7907110445

Settlement of piping in the spray pond due to loads imposed by filling the pond varied from -0.02 (a rise or rebound) to 0.14 ft. as of February 15, 1978. The maximum settlement gradient appears to be on the order of 0.004 ft/ft.

The rock anchors for units 3 and 4 are used to tie foundations to the underlying rock. The anchors prevent hammering of one building on another during an earthquake. The anchors are not needed or designed to resist uplift on structures caused by groundwater beneath the mats.

Lyman W. Heller

Lyman W. Heller, Leader
Geotechnical Engineering Section
Geosciences Branch
Division of Site Safety and
Environmental Analysis

cc: H. Denton
R. Boyd
W. Cammill
J. Knight
J. Stepp
R. Boznak
K. Desi
L. Heller
D. Gillen
O. Parr
D. Vassallo
A. Dromerick
PDR

ATTENDANCE LIST

VEPCO MEETING 4/13/78 AT NORTH ANNA

| NAME | AFFILIATION | DISCIPLINE | TELEPHONE NO. |
|---|---|---|---|
| Lyman Heller | U.S. NRC | Geotech. Engr. | 301-492-7973 |
| Daniel M. Gillen | U.S. NRC | Geotech. Engr. | 301-492-7972 |
| Carroll G. Chewning | VEPCO | Asst. Project Engr. | 804-771-3374 |
| Surendra N. Purohit | S&W | Lead Engineer (Engineering Mechanics) | |
| R. B. Bradbury | S&W | Project Engr. | |
| C. M. Robinson, Jr. | VEPCO | Civil Engineer | 804-771-3894 |
| Robert M. Neil | VEPCO | Licensing Engineer | 804-771-4494 |
| E. L. Brown | VEPCO | Civil Engineer | 804-771-3736 |
| A. S. Lucks | S&W | Chief Geotech. Engr. | |
| B. N. MacIver | S&W | Senior Soils Engineer | |
| W. B. Dodson | S&W | Project Engr. | |