NORTH ANNA ENVIRONMENTAL COALITION

P.O. BOX 3951
CHARLOTTESVILLE, VIRGINIA 22903
(804)293-6039

April 20, 1977

Mr. Ernst Volgenau
Director
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Re: May 2, 1977
OL Hearing

Dear Mr. Volgenau:

It is our understanding that no nuclear plant in the United States can be licensed to operate until you and your staff of the Office of Inspection and Enforcement have cleared any outstanding safety issues.

The following safety issues are of particular concern to the Coalition and developed after the 1974 fault hearing:

a. Remedial drainage required for excessive groundwater

b. Abnormal and differential settling of key structures into water-filled clays (saprolite/halloysite)

c. Micro-earthquake indications

d. Earthquake design deficiencies

e. Severe leakage problems in Westinghouse steam generators

Supporting reasons for the Coalition's concern regarding VEPCO's North Anna nuclear station are stated briefly below, accompanied by questions which we would respectfully ask you to answer at your earliest convenience.

a. Remedial drainage required for excessive groundwater

Groundwater control is listed as a problem on page 2-19 of NRC's SAFETY EVALUATION REPORT (SER) of June 1976 and remains a problem or "outstanding item" through the six SER Supplements issued to date.

Although the latest supplement (#6--2/77) lists a "system of well points for groundwater control" as one of the outstanding items, our interpretation of recent documents is that well points have been abandoned as an unsuccessful technique in favor of a system of drains.

NRC questions to VEPCO on drain design (11/24/76)give the impression of an experimental approach, and raise

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Remedial drainage (cont.)

doubts as to whether "the dewatering system will protect the pumphouse." If VEPCO consultants made a "groundwater level prediction error" of 14', it would seem prudent to be skeptical of their engineering solutions for that error.

Q. 1-a: Has any other nuclear plant been required to install a comparable system of remedial drainage? If so, where is it located, and what has been its experience to date?

Q. 2-a: What length of time have you specified as an adequate pre-operational testing period for the drainage system at North Anna?

Q. 3-a: If the drainage system fails after the North Anna operating license is granted, what specific measure will NRC take at that time?

b. Abnormal and differential settling of key structures into water-filled clays (saprolite/halloysite)

It would appear that the clay in the now famous fault at North Anna was only the beginning of foundation problems at the site.

"...an unexpected amount of settlement has been experienced by the service water pumphouse...several inches in magnitude and includes some tilting. This movement may have caused leakage paths for impounded water to leave the reservoir...

"By controlling groundwater levels under the pumphouse, additional soaking and softening of the supporting saprolites will be prevented, so that rapid settlement or tilt of the pumphouse should not occur. The seismic resistance of the soils...is enhanced by preventing excess pore pressures prior to a seismic event..." SER 6/76

But VEPCO's Amendment 53 appears to contradict the foregoing: "Operation of the dewatering system and local lowering of the groundwater to elevation 264' will cause an additional increase in effective stress...It is expected that the operation of such a dewatering system would therefore cause additional settlement of the service water pump house..." Thus our first question must be:

Q. 1-b: Has it been experimentally determined yet at North Anna whether controlling groundwater levels will prevent settlement or cause settlement beneath the service water pumphouse?

Abnormal settling...saprolite/halloysite (cont.)

The more that is learned about saprolite, the less desirable it becomes as foundation material at North Anna.

"...its compressibility under foundation and dike loadings is more than originally anticipated...these recently determined properties of the saprolites have significantly changed from those originally presented by the applicant...the capability of this foundation is less than originally expected." SER 6/76

"Most of the clay in the saprolite is halloysite, a mineral difficult to orient and one which contains much water...The halloysite content may account in part for the low relative densities obtained for the saprolite." Dr. R. Torrence Martin, 6/76 Am. 53

Dr. Martin had endeavored to determine "if the somewhat unusual field-observed settlements were related to change in the fabric of clay material." He emphasizes that all samples contain halloysite, a hydrated form of kaolinite.

Surely such analyses should have been made at least as early as 1970. It should not be in 1976 that the NRC is admitting that it has "little or no data on the cyclic response of a saprolite," is finding that the Army Corps of Engineers is in the same "no data" position, with the consequent need to order cyclic triaxial tests on samples of saprolite from North Anna in May of 1976.

(In layman's terms, triaxial testing determines the bearing capacity of a soil or how large a load it can carry without settling. Cyclic data gives test information on soil integrity during simulated earthquake conditions. "Low relative density" in the saprolite means the soil is "loose," according to the Corps, an undesirable quality in nuclear foundation materials.)

The saprolite analysis of the Corps of Engineers, received by NRC on March 11, 1977, describes the North Anna samples as "highly plastic," "moderately plastic," "very micaceous" with several repetitions of "silty sand," "silty clay," "sandy silt," "poorly graded."

When NAEC asked the Corps what the foregoing analysis implied in terms of the safety and integrity of the North Anna nuclear site, the answer was that "the report was not meant to head toward conclusions."

Abnormal settling...saprolite/halloysite (cont.)

Since the Operating License Hearing for North Anna began over 3 months before the NRC received the Army's saprolite report, urgent questions regarding "conclusions" must be raised:

Q. 2-b: Since the North Anna nuclear station was designed and built without information on "the dynamic behavior of saprolitic soils," now found to be weaker than anticipated, how can North Anna's design withstand possible lack of integrity in saprolitic foundations?

Q. 3-b: What is the extent of saprolitic "soft zones" beneath other structures exhibiting abnormal settling such as the turbine and auxiliary buildings?

Q. 4-b: What is the significance of a new report of "overstressed service water pipe...due to the differential settlement of the service and turbine buildings" for Unit 2? (IE Rpt. Nos. 50-338/77-2 & 50-339/77-1)

Q. 5-b: Given that saprolitic soils are only now being intensely studied, on what experiential or experimental basis can predictions be made about the future course of settlement at North Anna?

c. Micro-earthquake indications

In 1974, the Atomic Safety and Licensing Board of the Show Cause Hearing on North Anna's fault siting "found reasonable assurance that Lake Anna would not induce seismic activity."

Subsequent microseismic events have proved the Board wrong.

Not only do microearthquakes ring Lake Anna (please see attached Dames & Moore map), but "microearthquake activity in the vicinity of Lake Anna appears bounded, or nearly so, to the northwest approximately coincident with an extrapolation of the plant site faulting to the northeast."

NRC's Safety Supplement #2 goes on to say that "because there is a tenuous relationship between the limits of

Micro-earthquake indications (cont.)

occurrence of microearthquakes and a boundary approximately defined by an extrapolation of the faults in the vicinity of the plant site, we require continued operation of the 17 station network for at least one year commencing August 1, 1976 in order to provide data to determine if this relationship dissipates or changes in such a way that additional action may be required..."

Q. 1-C: If the minimum one year of monitoring of activity along the North Anna fault will not be concluded until August 1, 1977, must not the Board for the Operating License delay its decision until that date?

Q. 2-C: If the correlation between seismic activity and the North Anna fault grows, what specific "additional action" would the NRC require?

NRC's Regulatory Guide 1.127 notes in regard to an artificial lake that "several years may pass before the foundation and structures have fully adjusted to the loads." The movement around Lake Anna is particularly disturbing in that "the largest rate of activity seems to be occurring at the intersection of Neuschel's Lineament (a possible regional fault) and the lake" per NRC seismologist Reiter.

Q. 3-C: Given that the science of microseismic monitoring and prediction is considered in its infancy by its own practitioners, on what basis will the NRC decide that microseismic activity at North Anna augurs adequate stability for the 30-year life of the reactors?

Q. 4-C: What studies has the NRC done of the possible relationships between microseismic activity, regional faulting (Neuschel's Lineament, Stafford faulting et al), and the weakness of saprolite as a foundation material?

d. Earthquake design deficiencies

North Anna reactors are 40% deficient in seismic design.

In its January 17, 1977 letter on North Anna, the Advisory Committee on Reactor Safeguards (ACRS), recognizing "uncertainties" about Eastern earthquakes, recommended that new reactors have a "minimum safe shutdown earthquake (SSE)

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of 0.2g acceleration" whereas North Anna's SSE design is only .12g, just 60% of the recommended minimum.

Evidently the fact that North Anna is already constructed makes its 40% deficiency "acceptable," although Drs. Page and Okrent admit to uneasiness.

Q. 1-d: Does NRC Inspection and Enforcement, in the light of cumulative foundation problems at North Anna (abnormal settling, excessive groundwater, suspect saprolite) also find a 40% design deficiency "acceptable"?

Westinghouse's Seismic Unacceptability

"The seismic testing of Westinghouse...is unacceptable. It cannot be determined that the equipment and instruments can perform their safety functions during and subsequent to a seismic event."

The foregoing NRC statement of January 3, 1975 is essentially repeated in Mr. Stello's evaluation of June 26, 1975. It is our understanding that the same evaluation was current in 1977.

Q. 2-d: Is it still the position of the NRC that W electrical and control equipment cannot perform safely during a seismic event?

Q. 3-d: If the NRC evaluation has changed since 1975, what changes in W equipment have brought it about? Are there still "re-qualification" procedures required at North Anna?

Seismic design of the North Anna dam

When the North Anna dam was built, neither NRC nor the public knew that there were 12 faults beneath it.

Neither did they know that a microseismic network would pick up a cluster of earthquakes northwest of the dam, some strong enough to "exceed the dynamic range of the instrumentation" and all suggesting a "Dip-Slip Fault."

Q. 4-d: Is the North Anna dam designed to withstand activity on a nearby fault or activity from from the point where Neuschel's Lineament transects the reservoir?

e. Severe leakage problems in Westinghouse steam generators

VEPCO's nuclear operation at Surry has been badly crippled by leaking steam generators. Its September 15, 1976 steam generator tube rupture was reported to Congress in NUREG 0090-5 which reported "generic implications" under study.

VEPCO calls North Anna a "mirror image" of Surry, and NRC/Atlanta as of 4/22/77 reports the leakage problem in W steam generators of this vintage still "hot" and "not solved." NRC also said that brackish water has not been proved the cause of the problem. (This would appear to cast doubts on the statements of the VEPCO chairman that "no significant deterioration of steam generator tubes" is anticipated at North Anna.)

Q. 1-e: Since NRC considers the leaking steam generator problem unsolved, how can there be "reasonable assurance" of proper steam generator operation at North Anna?

Q. 2-e: Since steam generator leakage causes significant increased radioactive emissions, and since VEPCO has been unable to calculate or control these emissions properly at Surry, what "reasonable assurance" is there regarding proper calculations or controls at North Anna?
(N.B. IE Inspection Report Nos. 50-280/76-18 and 50-281/76-18)

Q. 3-e: What tests have been done to determine the effect of the possible presence of heavy metals in the water at North Anna upon chemistry in the steam generator tubing?

This last question encompasses all of the foregoing:

Q. a-e: Will the Office of Inspection and Enforcement provide knowledgeable persons to give testimony on safety issues a, b, c, d, and e at the May 2 Operating License Hearing?

In relation to the last question, we shall send a copy of this letter to the Atomic Safety and Licensing Board and ask them to consider it the Coalition's formal request for them to explore these issues on the record, noting that all of the problems have developed since the 1974 Show Cause fault hearing and lack ASLB evaluation. Thank you.

Most sincerely,

cc: ASLB

June Allen, NAEC President

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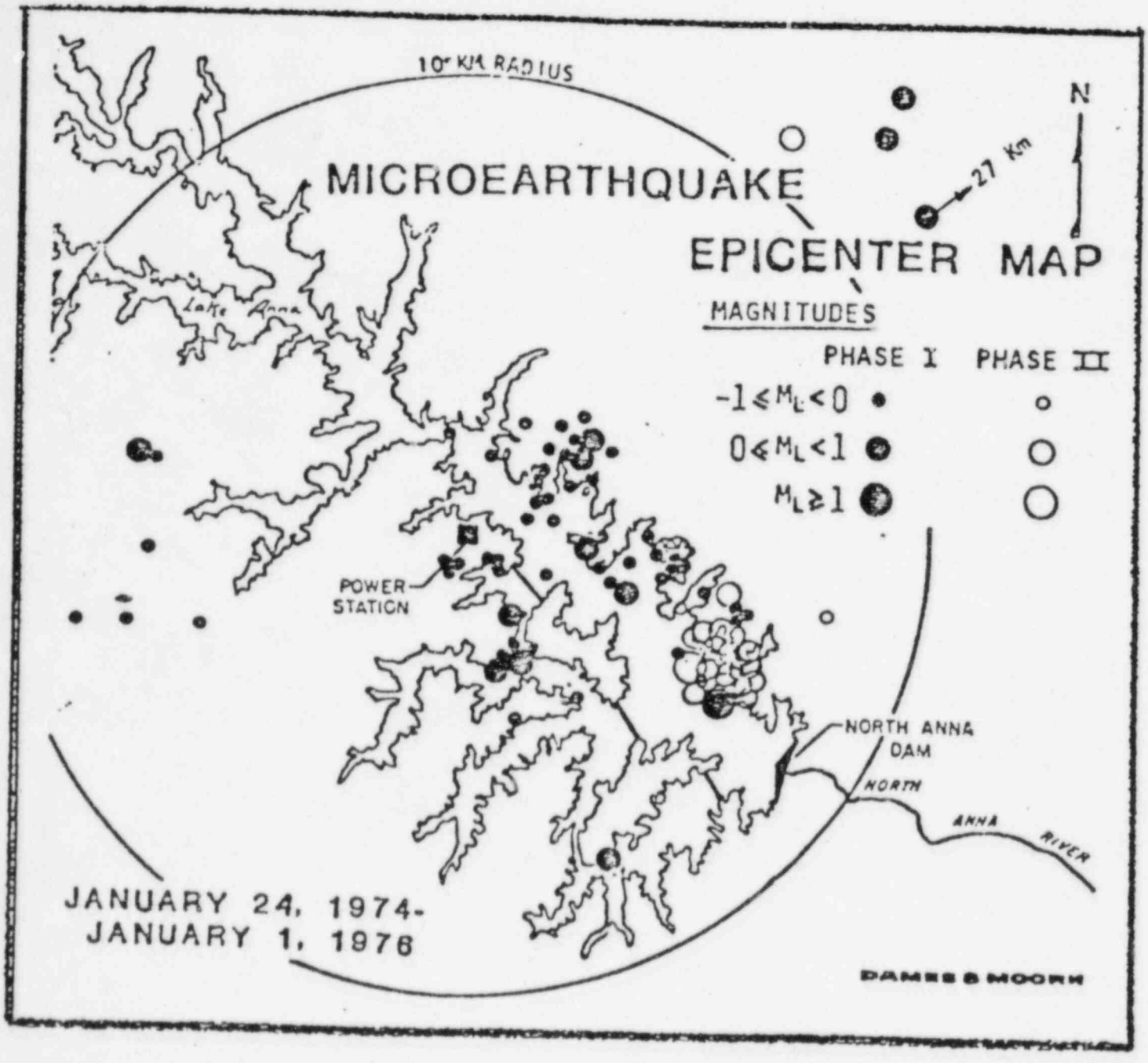

1973—DAMES & MOORE Report dismissed Lake Anna's seismic influence as "insignificant."

1974—Atomic Safety and Licensing Board "found reasonable assurance that Lake Anna will not induce seismic activity. The Licensing Board for Units 3 and 4 agreed with this conclusion, but required, as a condition of the construction permits for Units 3 & 4, the installation of a dense seismic network to conclusively demonstrate whether seismic activity is associated with the faults at the site and whether Lake Anna is affecting that activity..."

1976—108 microearthquakes at site since 1974—86 within 10 Km, almost all clustered around Lake Anna...notable increase in microearthquake activity during time of heavy rains when lake level rose one foot... 22 events concentrated near the dam appear to outline a NNW fault.