UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket Nos. 50-338 SP
VIRGINIA ELECTRIC AND POWER COMPANY	)	50-339 SP
	)	
(North Anna Power Station, Units 1 and 2)	)	(Proposed Amendment to operating license NPF-4)

INTERROGATORIES TO VEPCO FROM THE POTOMAC ALLIANCE

Pursuant to 10 CFR §2.740b, the Potomac Alliance requests that the following interrogatories be answered fully, in writing, and under oath or affirmation by any employees or members of VEPCO who have personal knowledge thereof or are the closest to having personal knowledge thereof. The person answering each question should set forth his or her name and title, and should identify any other individual who furnishes information on which the answer to the question is based.

Each question is instructed to be answered in five parts as follows:

Answer to Question _____:

A) Provide the direct answer to the question.

B) Identify all documents and studies relied upon by VEPCO, now or in the past, which serve as the basis for the answer. Any such document shall be identified with reference to its title, the date it was prepared, its author(s), any identifying serial numbers or filing numbers, the particular

the parts thereof which are relied upon, and the places, other than the offices of VEPCO, where it is known to be available for inspection. In lieu thereof, a copy of each document and study may be attached to the answer.

C) Identify all documents and studies, and the particular parts thereof, known to exist but not relied upon, which pertain to the subject matter of the question. In lieu thereof, a copy of each document and study may be attached to the answer.

D) Explain whether VEPCO, the NRC staff, or any other individual is engaged in or intends to engage in further research which may affect the answer. Identify such research or work.

E) Identify the expert(s), if any, whom VEPCO intends to have testify on the subject matter of the question. State the qualifications of each expert.

QUESTIONS:

1. Provide sketches, including plans, which show the spent fuel pool (SFP) for Units 3 and 4 in relation to the surrounding structures, including Units 1 and 2. Describe the storage capacity of the SFP for Units 3 and 4 and its potential for compaction. Identify and describe all differences, in terms of both physical design and operating procedures, between the SFP for Units 3 and 4 and the SFP for Units 1 and 2.

2. (a) Describe the extent to which the construction of the SFP for Units 3 and 4 is completed in terms of both economic investment and physical completion.

(b) Estimate the cost of completing construction of the SFP for Units 3 and 4.

(c) Assuming that maximum possible commitment of resources is devoted to completion of the SFP at Units 3 and 4 and related essential components, what is the earliest date at which the pool could be rendered fit for storage of spent fuel?

3. Identify any physical barriers which may prevent transfer of spent fuel between the SFP for Units 3 and 4 and the SFP for Units 1 and 2.

4(a). Have you considered and analyzed the possibility of expanding the physical area of the existing SFP as an alternative to the proposed modification?

(b). If so, describe such analysis and any documents referring to this alternative.

5(a). Have you considered and analyzed the possibility of constructing a separate spent fuel storage pool on-site as an alternative to the proposed modification?

(b). If so, describe such analysis and any documents referring to this alternative.

6(a). Have you considered and analyzed the possibility of using the SFP at Units 3 and 4 for storage of spent fuel from Units 1 and 2?

(b). If so, describe such analysis and any documents referring to this alternative.

7(a). Assuming that the proposed operating license amendment is not granted, when, according to your projections, will:

(1) the first defueling of Unit 1 occur;

(2) Unit 2 begin commercial operations;

(3) the SFP be filled to capacity, less a reserve for one full core discharge;

(4) the SFP be filled completely?

(b). Describe fully the basis for the above projections, including any assumption made regarding the number of months between refuelings, the number of fuel assemblies discharged per refueling, and whether the cask loading area will be used for fuel storage.

8(a). Assume that the proposed license amendment is not granted, and that the SFP reaches capacity. Will you have any alternative other than to shut down the plant? If so, describe such alternatives. If not, why not?

(b). Describe the environmental, health, and safety implications of each alternative identified in response to (a), and the financial cost of each.

9(a). To your knowledge, is any private corporation or consulting group presently preparing a study on the logistics or other aspects of storing and handling spent fuel?

(b). Identify all preliminary drafts, working papers, and analyses which have been developed pursuant to such studies, and describe the substance of each document so identified.

10. Indicate whether, as of the date of your response to this question, any of the new fuel racks have been placed or installed in the SFP.

11. (a) What was the actual economic cost of purchasing the new racks? Provide documentation.

(b) Identify other costs in current dollars.

(c) What are the projected future costs (identify any increases due to inflation)?

12. (a) Have there been any changes in the NRC safety requirements relating to spent fuel pool storage since the expansion was proposed?

(b) Describe all such changes. What are the projected costs of compliance with any such requirements?

13. (a) Do you know of any proposed or pending modifications to the NRC requirements regarding spent fuel storage?

(b) Describe these modifications fully and project the cost of compliance with such requirements.

14. Was the fabrication of the austenitic stainless steel material used in the construction of the spent fuel storage racks monitored so as to assure compliance with the standards and regulations cited in §2.3 of the Safety Evaluation Report(SER)? Provide supporting documentation.

Questions 15 - 17 refer to the affidavit of H. Stephen McKay.

15 (a)(no response required) On p. 2 it is stated that "It will require a maximum of 12 gpm of evaporation to dissipate the additional heat discharged to the environment because of the proposed modification."

(b) Provide the facts and analysis leading to this conclusion.

16 (a)(no response required) On p. 2 Mr. McKay assumes a stretch rating of 2900 MWt for full power to determine the design basis heat load.

(b) Define the term "stretch rating" as used in the statement recounted in (a).

(c) Why was the assumed stretch rating not 2990 MWt?

(d) How would the calculations recounted in (a) be affected by the assumption of a higher stretch rating?

17 (a)(no response required) At. p. 2 it is stated that a temperature of 177.5°F was used for the structural analysis of the SFP.

(b) Describe all structural analyses of the SFP which have been performed and the results thereof. Identify all assumptions used, including SFP temperatures.

(c) Has a structural analysis of the SFP been performed using a temperature greater than 177.5°F?

(d) If the answer to (c) is in the negative, explain why not.

18. Identify all materials and techniques to be used to inhibit corrosion of the materials in the SFP. Discuss the ability of such materials or techniques to inhibit corrosion over the life of the SFP.

19. Based upon operating experience with zircalloy clad fuel, approximately how many of the discharged spent fuel assemblies are expected to contain defective fuel rods? Of these, what percentage of the fuel rods contained therein are expected to be defective?

20. Based upon your experience with and knowledge of zircalloy clad fuel, describe all types of cladding defects that have been observed to occur.

a) For each defect type, describe the causative conditions.

b) For each defect type, state the probable release rate of radioactive matter, in mass and activity units.

21. Describe all information in your possession, including personal knowledge, concerning the adverse effects (including corrosion and stress-related effects) upon:

a) fuel rod cladding;

b) fuel assembly materials other than fuel rod cladding;

c) fuel storage racks; and

d) the pool liner

as a result of exposure to environments similar to that which will exist in the SFP. The response to this question should discuss, but not be limited to, occurrences of such effects at all nuclear reactors.

22. Describe all adverse effects mentioned in Question 21 as they may be expected to occur over the following time periods:

a) five years

b) fifteen years

c) forty years

If such information is not in your possession, is it in existence? If so, identify it. If not, why not?

23 (a)(no response required) In the Original Summary it is stated that the SFP cooling and purification system is located in the auxiliary building. In the Revised Summary it is stated that the SFP cooling and purification is located in the fuel building.

(b) In which building is the SPF cooling and purification system located?

(c) If a change in the location of the SFP cooling system has been proposed, explain the nature and basis of this change.

(d) Describe any electrical, plumbing or other systems that relate to the SFP and are located in whole or in part outside of the fuel building. Provide sketches or diagrams of such systems.

24 (a) Identify any NRC regulatory limitations on the temperature of the water in the SFP.

(b) Is it VEPCO's position that it may permit the water in the SFP to exceed the regulatory limit identified in question (a) above? See Table 7-3, p. 52, Summary of Proposed Modification to the Spent Fuel Pool Associated with Increased Storage Capacity for North Anna Pool Storage Units 1 and 2 (April 1978), hereinafter cited as Original Summary.

25. (a)(no response required) In Table 7-3 of the Original Summary at p. 52 it is stated that in the event of failure of a SFP cooling pump of exchanger, standby pumps or exchangers will be started manually within an hour after failure.

(b) What guarantee is there that the malfunction will be noticed by plant operators within this time?

(c) What would be the consequences is such a failure were not noticed within (i) five hours or (ii) fifteen hours?

(d) Describe the procedures necessary to manually start a standby pump or exchanger.

(e) Describe the procedure necessary to enable one of the SFP cooling pumps to pump water through two heat exchangers.

(f) Describe the procedure necessary to enable both of the SFP cooling pumps to pump water through one of the heat exchangers if this is possible.

26. (a)(no response required) In §5.2.2 of the Original Summary at p. 15 it is stated that the fuel pool cooling and purification system has two 100% capacity shell and tube heat exchangers two 100% circulating pumps, and three 100% capacity purification and two 100% curculating pumps.

(b)(no response required) In §5.2.2. of the Revised Summary it is stated that the fuel pool cooling and purification system has two shell and tube heat exchangers and two circulating pumps.

(c) Why was this portion of the Original Summary amended?

(d) What is meant by the term "100% capacity?"

(e) What is the capacity of the circulating pumps?

(f) What is the capacity of the shell and tube heat exchangers?

(g) For each piece of equipment described in (e) and (f), what capacity is required under the technical specifications?

27. How are the Unit 1 control room instruments and alarms including the spent fuel pit monitoring system and alarms mentioned on p. 2 tested?

(a) How often are these tests performed?

(b) Describe any documentation of this testing and the results.

28. Describe the engineering techniques used to measure and record fuel pool temperatures.

29. In the event of a leak in the SFP as described at p. 3 of the McKay affidavit, how would such a leak likely be discovered and what would be the likely consequences if:

(a) the sump pump failed

(b) the alarm system failed

(c) the pump and the alarm system failed

30. (no response required for parts a and b)

(a) At p. 48 of the Revised Summary it is stated that the service water has a "design maximum" of 110°F.

(b) At. p. 1 of the Attachment to Licensee Event Report (LER) 79-044/01T-0 (April 17, 1979) it is stated that the service water has a "normal maximum" of 95°F.

(c) Define and distinguish the terms "normal maximum" and "design maximum" as used in the statements recounted in (a) and (b) and elsewhere.

(d) What is the "design maximum" temperature for the service water?

(e) what is the "normal maximum" temperature for the service water?

(f) Describe any limitations on the service water temperature imposed by the NRC or by VEPCO.

(g) If the difference in the temperatures used in the statements recounted in (a) and (b) reflect any change or changes in circumstances, assumptions, or in VEPCO's operating procedures or specifications, describe such changes and the reasons therefor.

31. (no response required for parts a, b, and c)

(a) At p. 48 of the Original Summary it is stated that the component cooling water has a "design maximum" of 105°F.

(b) At p. 1 of the Attachment to LER 79-044 it is stated that the component cooling water will have a "peak temperature" of approximately 120°F.

(c) At p. 48 of the Revised Summary it is stated that the circumstances there described will yield a component cooling water temperature of 113.2°F.

(d) Define and distinguish the terms "design maximum temperature" and "peak temperature" as used in the statements recounted in (a) and (b).

(e) What is the "design maximum" temperature for the component cooling system?

(f) What is the "peak temperature" for the component cooling system?

(g) If the difference in the temperatures used in the statements recounted in (a), (b), and (c) reflects a change in circumstances, assumptions, or VEPCO's operating procedures or specifications, describe such changes and the reasons therefor.

(h) Define the term "design basis heat load" as used in §7.2 of the Revised Summary at p. 47.

32. When answering all subparts of this question, assume the existence of the factual circumstances set forth in §7.2 of the Revised Summary at p. 47 (including service water temperature of 110°F and "abnormal (full core discharge) conditions").

(a) Can the service water cooling system maintain the component cooling system water at a temperature of 113.2°F?

(b) Describe the amount of heat, in BTU/hr., which will be transferred from the component cooling system to the service water cooling system if the water temperatures of those systems is maintained at 113.2°F and 110°F, respectively.

(c) If the component cooling water temperature is 113.2°F, at what temperature can the SFP water temperature be maintained where:

(i) both SFP heat exchangers and both SFP cooling pumps are functioning normally;

(ii) one SFP heat exchanger is not functioning and both SFP cooling pumps are functioning normally;

(iii) one SFP heat exchanger is not functioning and one SFP cooling pump is not functioning; and

(iv) both SFP heat exchangers are functioning normally and one SFP cooling pump is not functioning.

Describe the bases for your answer.

(d) In (c)(i),(ii), (iii), and (iv) describe the amount of heat, in BTU/hr., which would be transferred from the SFP water to the component cooling system water.

33. (a)(no response required) In §7.2 of the Revised Summary at p. 48 it is stated that the SFP water temperature would be maintained within the limit of 140°F for the "normal case."

(b) Define the term "normal case" as used in the statement recounted in (a).

(c) Identify the source of the 140°F limit.

34. (a)(no response required) In §7.2 of the Revised Summary at p. 48 it is stated that, on the basis of certain assumptions, the SFP water temperature would be maintained within the 170°F limit in the "abnormal case" if one SFP cooling system pump and two SFP coolers are used.

(b)(no response required) In §7.2 of the Original Summary it is stated that, on the basis of the assumptions referred to in (a), the SFP water temperature would be maintained within the 170°F limit in the "abnormal case" if one SFP cooling system pump and one SFP cooler were used.

(c) Discuss any changes in circumstances, assumptions, and VEPCO's operating procedures or limitations reflected in the disparity between the statements recounted in (a) and (b).

(d) Define the term "abnormal case" as used in the statement recounted in (a).

(e) Define the term "abnormal case" as used in the statement recounted in (b).

(f) Define the term "full core discharge case" as used in assumption #4, §7.2 at p. 47 of the Revised Summary.

34 (g) Define and distinguish the terms "fuel pit coolers" as used in Table 7-3, p. 52 of the Revised Summary with the term "spent fuel pool heat exchangers" as used in the McKay affidavit at p. 2. If these terms refer to the same equipment, list all other terms which in the past have been or in the future will be used by VEPCO to describe the same equipment.

(h) What is the probability of failure of a fuel pool cooling system pump?

(i) What is the probability of failure of a fuel pool heat exchanger?

35. (a) (No response required) In §3.3.2 of the Final Safety Analysis Report for the North Anna Stations it is sated that a tornado could generate a missile, such as a utility pole measuring 40 feet in length, 12 miles in diameter, and weighing 50 pounds/ft.^{3}, travelling in a vertical direction at 150 m.p.h.

(b) Does the statement recounted in (a) reflect your current expert opinion? If not, explain.

(c) (No response required). In §9.1-4 of the Final Safety Analysis Report (FSAR) it is implied that the 40 foot missile described in (a) would lack sufficient velocity to clear a height of 25 feet.

(d) Does the statement recounted in (c) reflect your current expert opinion? If not, explain.

(e) Are the statements recounted in (a) and (c) inconsistent in any way? Explain your answer.

36. Describe the most destructive (1) tornado and (2) turbine missiles which could conceivably be expected to enter the SFP.

37. (a) What is the probability that the missiles mentioned in question 38 would be expected to enter the SFP over the life of the station?

(b) What would be the radiological consequences of such missiles?

(c) Assuming that the proposed modification is not permitted, what is the probability that such missiles would strike directly more than one fuel assembly?

(d) Assuming that the proposed modification is permitted, what is the probability tnat such missiles would strike more than one assembly?

38. Is it your opinion that the distance between assemblies stored in the SFP is relevant to the question whether more than one assembly is likely to be struck by a missile or a utility pole? Explain your answer.

39. Describe the damage that would have to be sustained by the fuel in the SFP in order to exceed the limits established in 10 CFR Part 100.

40. (a)(no response requir[illegible]. At §9.1.4 of the FSAR it is stated that vertically moving missiles would strike no more than one fuel assemblies.

(b)(no response required) At §4.2.3.2. of the Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel (March 1978)(NUREG-0404) it is stated that a tornado entering a SFP could impact a 45 foot row of assemblies.

(c) Justify the discrepancy between these estimates.

(d) What would be the radiological consequences if a 45 foot row of assemblies were damaged by a tornado or turbine missile at the North Anna SFP?

41. Assume that the proposed modification of the SFP is not permitted, and that the SFP is filled to its capacity of 400 fuel assemblies.

(a) Describe all employee activities within the fuel building which involve a risk of radiation exposure, including but not limited to:

(i) changing filters and resin cartridges

(ii) other maintenance, including equipment maintenance

(iii) cleaning operations

(iv) surveillance

(v) fuel loading and unloading

(vi) preparing spent fuel for shipment offsite

(b) Describe the magnitude of the radiation exposures, in person-rems, involved in these activities, including the radiation levels at all relevant locations and the person-hours of activity at those locations.

42. Assume that the proposed modification is permitted, and that the pool is filled to its capacity of 966 fuel assemblies.

(a) Describe all employee activities within the fuel building which involve a risk of radiation exposure, including but not limited to:

(i) changing filters and resin cartridges

(ii) other maintenance, including equipment maintenance

(iii) cleaning operations

(iv) surveillance

(v) fuel loading and unloading

(vi) preparing spent fuel for shipment offsite

(b) Describe the magnitude of the radiation exposures, in person-rems, involved in these activities, including the radiation levels at all relevant locations and the person-hours of activity at those locations.

43. In §9.1 of the Revised Summary at p. 54 it is stated that in the event that the SFP cooling system were to become completely inoperable, installed station sources would provide sufficient makeup water to cool the fuel and to maintain sufficient water shielding over the pool. These sources are described as

(1) primary grade water system

(2) fire protection system

(3) boron recovery system

(4) refueling water storage tank

(a) Describe the procedures to be followed in order to render each of these systems able to cool the SFP.

(b) Describe the ability of each of these systems to cool the SFP. Include in this description an expression of the cooling ability of each system in BTU/hr.

44. Identify all correspondence between VEPCO and the NRC concerning the proposed modification of the SFP.

45. Identify all memoranda and written summaries or transcripts of other communications between VEPCO employees concerning the proposed modification of the SFP.

46. Identify all memoranda and written summaries or transcripts of other communications between VEPCO employees and others, including legal counsel, concerning the proposed modification of the SFP.

47. Identify all correspondence between VEPCO and the United States Department of Energy, its constituent agencies, or its predecessor agencies, concerning spent nuclear fuel.

Respectfully submitted,

James B. Dougherty

Counsel for the
Potomac Alliance

Of counsel:

Gloria M. Gilman, Esq.

Dated this 1st day
of June, 1979

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of VIRGINIA ELECTRIC AND POWER COMPANY (North Anna Power Station, Units 1 and 2)	Docket Nos. 50-338 SP 50-339 SP (Proposed Amendment to Operating License NPF-4)

POTOMAC ALLIANCE REQUEST FOR PRODUCTION OF DOCUMENTS BY VEPCO

The Potomac Alliance hereby requests that VEPCO provide it with copies of the documents identified in VEPCO's answers to the Interrogatories filed simultaneously herewith, or make such documents available for inspection and copying.

Respectfully submitted,

James B. Dougherty

Counsel for the
Potomac Alliance

Of counsel:

Gloria M. Gilman, Esq.

Dated this 1st day
of June, 1979

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing POTOMAC ALLIANCE MOTION TO OBTAIN DISCOVERY FROM THE NRC STAFF, INTERROGATORIES TO THE NRC STAFF FROM THE POTOMAC ALLIANCE, POTOMAC ALLIANCE REQUEST FOR PRODUCTION OF DOCUMENTS BY THE NRC STAFF, INTERROGATORIES TO VEPCO FROM THE POTOMAC ALLIANCE, and POTOMAC ALLIANCE REQUEST FOR PRODUCTION OF DOCUMENTS BY VEPCO were served this 1st day of June, 1979, by deposit in the United States Mail, First Class, to the following:

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