

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)

NRC PUBLIC DOCUMENT ROOM

POTOMAC ALLIANCE RESPONSES
TO VEPCO'S INTERROGATORIES
AND REQUEST FOR THE PRODUCTION OF DOCUMENTS



1. The Atomic Safety and Licensing Appeal Board's order of April 21, 1979, designated Citizen's Energy Forum (CEF) as the party responsible for supporting this contention. Interrogatory No. 1 is therefore inappropriately addressed to Potomac Alliance. The Alliance recognizes that interrogatories addressed to it on the radioactive emission contention may become appropriate if the Atomic Safety and Licensing Board grants CEF's pending motion to consolidate and if VEPCO deems it necessary to submit further interrogatories following receipt of CEF's responses with respect to this contention.

2. (a) The increased consequences of possible missile accidents result from the increase in the number of spent fuel assemblies which

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will be stored in the same amount of space. The area of impact of a potential missile will, as a result of the proposed modification, contain approximately 140% more fuel and fission products which are subject to environmental release. The Alliance refers specifically to the Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel (March 1978) (NUREG-0404) at § 4.2.3.2, where the accident scenario described includes damage to a 45-foot row of assemblies. Whereas in the current configuration roughly 26 fuel assemblies would be damaged in such an accident, that figure would rise to roughly 39 given the proposed configuration. VEPCO and the NRC staff have often stated that a tornado missile with the dimensions of a utility pole and moving vertically would not likely damage more than one assembly assuming the current configuration. Under the proposed configuration, however, it would be virtually impossible for such a missile to avoid striking more than one assembly. The harm caused by any given missile entering the pool area -- most seriously, the amount of radiation released by damage to the stored fuel rods -- therefore will be multiplied.

(b) The relevant limits are set forth at 10 CFR §20.105 (off-site doses) and Regulatory Guide 1.13 (rev. 1, December 1975), § B(2) and C(2).

The evidence discussed in part (a) demonstrates that these regulatory standards will not be met.

3. (a) Increasing the inventory of radioactive materials will increase the total amount of decay heat present in the pool and will increase the radiation experienced by the fuel rod cladding, the fuel racks, the liner and other pool components. Although the phenomenon of stress-corrosion cracking is not well understood, studies cite, as factors tending to increase such cracking, radiation (A.B. Johnson, Jr., "Behavior of Spent Nuclear Fuel in Water Pool Storage " (September 1977), BNWL-2256, UC-70 (Johnson study)) and temperature ("heat transfer, as from a fuel rod, intensifies stress-corrosion problems") (D.R. Mash, Affidavit filed in Garrett v. U.S. Nuclear Regulatory Commission (D. Ore., March 27, 1978) (Mash affidavit)). Numerous malfunctions in spent fuel pool facilities have been identified by the NRC, including leaks of unknown cause in the Turkey Point #3 pool, cracks in the liner at Millstone #1, and breach of the liner at G.E. Morris (Mash affidavit).

(b) See answer to part (a). In addition, heat can be expected to have a harmful impact on the concrete walls. The American Concrete Institute has established strict limits on the temperature of fluids retained within safety-related concrete structures. See American Concrete Institute, Code Requirements for Nuclear Safety Related Concrete Structures, ACI 349-76. The ACI's principal limitation sets 150 degrees F as the maximum operating temperature. See App. A, 1978 Supplement at A.4.1. The proposed modification, particularly in light of recent discoveries of defects in the spent fuel cooling system, promises to break that limit frequently.

(c) Among the "resultant problems" envisioned in the contention are

- Liner leakage due to stress-corrosion cracking, leading to potential releases to the environment.
- Cladding leakage releasing radioactivity into the pool water and potentially to the environment.
- Increased radiation exposures for workers involved in repair, fuel handling, and routine occupational functions.

(d) The term "components" refers to the concrete walls, the liner, restraining clips, floor embedment pads, sump channels and pump, and the various parts of the cooling and purification system. The term "contents" refers to the fuel racks and the fuel assemblies, including fuel cladding.

(e) This question is ambiguous. If the interest is to invite the Alliance to join in the assumption that the pool water temperature will not exceed the limits specified, it declines the invitation. Assuming for purposes of this response, however, that such limits will not be exceeded, the proposed modification will still present many adverse effects. First, higher radiation levels cause increased stress upon and corrosion of stainless steel and zircaloy (Johnson study). As stated in its answer 3(a) above, the Alliance maintains that there is evidence that decay heat will intensify stress-corrosion problems. Moreover, the question is not simply one of increased heat but of a greater duration of exposure, because it is now evident that the cladding will be subjected to decay heat on a long-term basis

in contrast to the assumptions extant when the pool was built. The U.S. Court of Appeals for the District of Columbia Circuit, finding that to date the Commission has failed to weigh carefully the long-term implications of spent fuel pool storage, recently commanded the NRC to do so. State of Minnesota v. NRC, No. 78-1269, (D.C. Cir. May 23, 1979). VEPCO's analysis has obviously been no less inadequate than the Staff's.

(f) The Alliance contends that the resultant stress and corrosion might cause cladding leakage, releasing radioactivity into the pool water and potentially to the environment.

(g) The Alliance contends that the modification must be assessed in the light of extended periods of fuel storage. Past analyses of materials integrity were based on the assumption that spent fuel storage was an interim procedure lasting no more than a few months. The current reality is that spent fuel will be stored in the pool well into the next century, and quite possibly longer. The D.C. Circuit Court decision cited in part (e) reflected this reality. It is inappropriate to rely upon "policy statements" to the effect that storage beyond the expected life of the North Anna station need not be considered in this proceeding.

(h) The danger adverted to is that exposure to higher levels of radiation will cause or exacerbate stress-corrosion cracking, causing a weakening of the racks, and will increase the likelihood that repair and/or replacement will be necessary. Exposure to higher levels of radiation may cause flaws in the liner that would allow releases of

radiation. Furthermore, such exposure will increase the likelihood that repairs and/or replacement will be necessary.

(a)

4. Section 5.5.4 and 9.5 of the Summary of Proposed Modifications are inadequate because they base their assumptions upon the experience at Surry Power Station (assuming storage of only 208 assemblies) as opposed to the projected 966 fuel assemblies planned for North Anna. This experience is too remote from the projected expansion to provide meaningful comparison. There is no evidence in this document that appropriate calculations have been made of potential occupational exposure according to individual tasks to be performed. Exposures are cited in terms of mR/hr. without reference to the duration of the exposures or the total doses received. Such estimates do not respond to the question whether total exposures exceed NRC limits.

(b) In order to demonstrate that occupational doses will not exceed NRC regulations, VEPCO must furnish specific predictions on occupancy patterns and dosage rates, and must analyze employee exposure by a breakdown relating to specific tasks, including but not limited to changing filters and resin demineralizers.

The regulations that may be violated are set forth at 10 CFR §§ 20.101 - 20.103.

(c) Questions as to the parties' motives for participation in this proceeding are irrelevant and singularly improper. The Alliance's ability to justify its actions is no more fitting a subject for inquiry than is VEPCO's justification for its past actions in connection with the licensing of the North Anna Station.

5(a) The construction of another spent fuel pool onsite would permit all spent fuel from North Anna to be stored under conditions optimizing the Keff of each pool by maintaining the 21 inch distance between centers of the fuel racks. Continued reliance on the 21-inch center design would prevent significant dangers to stored fuel from missile accidents, and would not create the more hostile conditions under which fuel assemblies would be stored according to the proposed modification. Depending on the assumptions employed regarding the storage capacity of such an onsite pool, its cost might be very low on a per-assembly basis.

5(b) By physically expanding the current pool and maintaining the current distance between centers of 21 inches, all of the environmental benefits identified in the answer to question 5(a) could be obtained. Similarly, different assumptions regarding the capacity of the expanded pool would result in favorable cost/assembly estimates.

As to the question how such an expansion might be effected, the Alliance objects to the question. The Alliance has not and is not required to develop in fine detail alternatives to the proposed modification. In any event, the

Alliance will not be able to suggest mature alternative proposals until it has received responses to its discovery requests from the Applicant and the Staff. Expansion of the spent fuel pool to the south appears on its face to be a reasonable alternative to the proposed modification which should be explored fully by the Applicant and the Staff.

5(c) By maintaining the current distance between centers of 21 inches in the pool now under construction at Units 3 and 4, all of the safety and environmental benefits identified in the answer to question 5(a) could be obtained. Significantly, the alternative of accelerating completion of the pool at Units 3 and 4 appears to offer the most cost-effective means of achieving the Applicant's objective. Faster construction of this pool need not involve the commitment of resources which would otherwise not be spent, but would require only that the construction schedule for Units 3 and 4 be modified slightly. Since completion of the pool and Units 3 and 4 by 1983 may well be within the wherewithal of the Applicant, this alternative may offer substantial economic advantages over the proposed modification.

6. (a) The adequacy of the spent fuel pool cooling system has not been established. The event described in Licensee Event Report No. 79-044/OIT-0, cited the Alliance's Motion to Amend Petition for Leave to Intervene, demonstrates VEPCO's failure adequately to review the effects of increased service water reservoir and component cooling water temperature. The Alliance denies that the explicit and implicit assumptions employed in Question 6(a) are valid.

(b) The Alliance contends that the capability of keeping the temperature below 140 degrees F and 170 degrees F has not been adequately established.

Assuming the spent fuel cooling system has once been approved, the continued validity of such approval has been drawn into serious question, totally apart from the proposed modification. The Licensee Event Report referred to in (a) shows that the capability of the spent fuel cooling system is unknown. See Regulatory Guide 1.142(c)(9) (April 1978); 10 CFR Part 50, App. A, criterion 61. The proposed modification would magnify the risks which were recently uncovered.

(c) The Alliance objects to this question on relevancy grounds. Speculation as to the general parameters of a hypothetically acceptable spent fuel pool is not likely to lead to the discovery of relevant information.

7. At this time, the Alliance has yet to secure firm commitments from qualified experts regarding participation in this proceeding. If and when this occurs the parties will be notified pursuant to 10 CFR §2.740(e).

8. Contention 3(Missile Accidents), Interrogatory No. 2:

- Safety Evaluation Report Related to the Operation of the North Anna Power Station, Units 1 and 2 (June 1976) (NUREG-0053) (hereinafter NUREG-0053).

- Final Safety Analysis Report, North Anna Nuclear Power Station, Units 1 and 2 (May 1973), (as amended) (Hereinafter FSAR).

- Safety Evaluation by the Office of Nuclear Reactor Regulation Relating to Modification of the Spent Fuel Storage Racks, Facility Operating License NPF-4, Virginia Electric and Power Co., North Anna Power Station, Units 1 and 2 (January 29, 1979) (Hereinafter SE).

- Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel (March 1978) (Hereinafter NUREG-0404).

- Environmental Impact Appraisal of the Office of Nuclear Reactor Regulation Relative to a Proposed Increase in Storage Capacity of the Spent Fuel Pool, North Anna Power Station, Units 1 and 2 (April 2, 1979) (Hereinafter EIA).

Contention 4 (Materials Integrity), Interrogatory No. 3:

- NUREG-0404.

- Summary of Proposed Modifications to the Spent Fuel Storage Pool Associated with Increasing Storage Capacity for North Anna Power Station Units 1 and 2, Virginia Electric and Power Company

(revision 1, May 11, 1979) (Hereinafter cited as Summary).

- SE.
- NUREG-0053.
- American Concrete Institute, Code Requirements for Nuclear Safety Related Concrete Structures, ACI 349-76, and 1978 Supplement.

Contention 6 (Occupational Exposure), Interrogatory No. 4:

- EIA.
- SE.
- Summary.

Contention 7 (Alternatives), Interrogatory No. 5:

- EIA.
- Summary.

Service Water Cooling Contention, Interrogatory No. 6:

- Licensee Event Report No. 79-044/01T-0 (April 17, 1979)
- (Docket No. 50-338; License No. NPF-4).

9. The interrogatories concerning missile accidents were answered by Fred Millar with the assistance of James Dougherty.

The interrogatories concerning materials integrity were answered by Peter Lichtner with the assistance of James Dougherty.

The interrogatories concerning occupational exposure were answered by Fred Millar with the assistance of Lawrence Lempert.

The interrogatories concerning alternatives were answered by Fred Millar with the assistance of James Dougherty.

The interrogatories concerning service water cooling were answered by Fred Millar with the assistance of Lawrence Lempert.

10. This question has been addressed within the context of each contention.

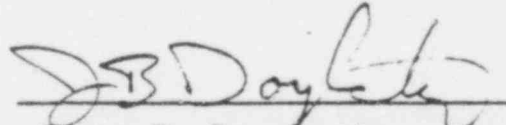
11. Contention 4 (Materials Integrity):

- A.B. Johnson, Jr., "Behavior of Spent Nuclear Fuel in Water Pool Storage " (September 1977), BNWL-2256, UC-70.

-D.R. Mash, Affidavit filed in Garrett v. U.S. Nuclear Regulatory Commission (D. Ore., March 27, 1978).

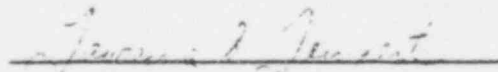
The documents and studies referred to herein are hereby expressly made available to VEPCO at the offices of counsel for the Potomac Alliance, 1346 Connecticut Ave., N.W., Suite 627, Washington, D.C. 20036, by appointment.

Respectfully submitted,


James B. Dougherty

Of counsel:

Gloria M. Gilman, Esq.


Lawrence S. Lempert

Counsel for the Potomac
Alliance

Dated this 6th day
of June, 1979.

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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)NOTICE OF APPEARANCE

Notice is hereby given that Lawrence S. Lempert enters an appearance as counsel for the Potomac Alliance in the above-captioned matter. The following information is provided pursuant to 10 CFR § 2.713(a). (No change in the service list is required.)

Name: Lawrence S. Lempert
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Lawrence S. Lempert

Dated this 6th day of June, 1979
at Washington, D.C.

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