

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 SECOND SUPPLEMENTAL ANSWER  
TO VEPCO'S MOTION FOR SUMMARY DISPOSITION

On May 5, 1979 the Virginia Electric and Power Co. (VEPCO) filed a motion for summary disposition in this proceeding. While initially granting this motion with respect to several contentions by Order dated June 18, 1979, the Atomic Safety and Licensing Board (the Board) subsequently announced that it would reconsider that Order, thereby reopening for resolution all of the contentions designated in its Order of April 21, 1979. The Potomac Alliance (the Alliance), on its own behalf and on behalf of Citizens Energy Forum, Inc., hereby asks that VEPCO's motion be denied. As will be shown below, VEPCO has not met its burden of showing

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that there is no genuine issue as to many of the key factual questions raised by the Intervenor, nor that it is entitled to judgment as a matter of law.

#### Applicable Legal Standards

When considering motions for summary disposition under 10 CFR §2.749, licensing boards are to apply the same legal principles governing motions for summary judgment filed in the federal courts pursuant to Fed R. Civ. P. 56. <sup>1/</sup> The purpose of the procedures are the same in both contexts: it is to identify and distill those factual issues which were raised in the initial pleadings but are so clearly not subject to reasonable dispute that they should not be pursued in a trial or formal hearing. <sup>2/</sup> In this proceeding, the contentions put into controversy by the Intervenor have already been sifted in two separate stages. First, through negotiation and stipulations between the parties the Intervenor agreed narrow their contentions from an initial group of more than 60 to 15, 12 of which were subject to unanimous agreement as to their admissibility as matters in controversy. On April 21, 1979, the Board further pared this list to seven contentions. In these two steps all contentions which were not

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<sup>1/</sup> Pacific Gas & Electric Co. (Stanislaus Nuclear Project, Unit 1), LBP-77-45, 6 NRC 159, 163 (1977).

<sup>2/</sup> Wright, Federal Courts §99 at 494 (3d ed. 1976).

the subject of genuine dispute were weeded out.

The burden of proof which must be sustained by the proponent of a motion for summary disposition is a formidable one. To show the lack of a genuine issue on a given factual question the movant must prove the lack of any "reasonable doubt" as to the certainty of the question. <sup>1/</sup> Indeed, some courts have declared summary judgment improper where there is even the "slightest doubt" as to the factual issues. <sup>2/</sup> It is crucial that the Board recognize that if it has the slightest doubt as to the veracity of any of the alleged facts submitted by VEPCO as essential to its case, the Board may not rule in VEPCO's favor on the grounds that its affidavits appear somewhat more persuasive than those presented by the Intervenor, or because the Intervenor has not submitted affidavits from experts competent to testify in a hearing. This would constitute "trial by affidavit" and is clearly improper for purposes of ruling on a motion for summary judgment. <sup>3/</sup> The function of the Board in the immediate context is not to resolve issues of fact, but to identify

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<sup>1/</sup> U.S. v. Farmers Mutual Ins. Ass'n, 288 F. 2d 560, 562 (8th Cir. 1961).

<sup>2/</sup> See, e.g., Tomalewski v. State Farm Life Ins. Co., 494 F. 2d 882, 884 (3d Cir. 1974).

<sup>3/</sup> Poller v. Columbia Broadcasting System, Inc., 368 U.S. 464, 473 (1962). See also 10 Wright and Miller, Federal Practice and Procedure, Civil §2725.

them. If it appears from the pleadings that the Intervenor's have shown doubt as to the certainty of VEPCO's naked assertions, then summary judgment must be denied as to all such issues. It is clear from the foregoing that the standards adverted to in 10 CFR §50.91, contrary to the suggestion in VEPCO's motion at p. 4, are totally inapposite here.

Summary judgment is an extraordinary remedy which may not be granted simply because it appears certain that the moving party will ultimately prevail, or in this case, that VEPCO will ultimately obtain the Board's approval for its proposed modification. This is one instance in which the rules are sharply tilted in the Intervenor's favor. VEPCO is not entitled to rely on inferences which might be reasonably be drawn from its pleadings; rather, the factual and legal situation must be viewed by the Board in the light most favorable to the Intervenor.<sup>1/</sup>

The Alliance, in its ANSWER TO VEPCO'S MOTION FOR SUMMARY JUDGMENT dated June 5, 1979, identified those "facts" as to which VEPCO had asserted that there is no controversy but as to which the Intervenor's assert there remains a legitimate dispute. In addition to the above, each of the seven contentions will be discussed briefly to demonstrate

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<sup>1/</sup> 10 Wright & Miller, Federal Practice and Procedure Civil §2727.



the existence of reasonable factual uncertainty.

THERMAL EFFECTS

If it were assumed that (1) the proposed modification were permitted by the Board and (2) the spent fuel pool (SFP) at all times were to function exactly as planned by VEPCO, the Intervenor would concede that the increased thermal discharges from the plant would not be environmentally significant during the term of the plant's operating license. There has been no presentation, however, as to the modification's likely environmental effects past the expiration date for the operating license, as is required under Minnesota v. NRC, No. 78-1269 (D.C. Cir. 1979). There are thus obviously questions of fact to be pursued regarding this contention.

This contention focuses equally an adverse thermal effects flowing from abnormal circumstances. When viewed in the light most favorable to VEPCO, its assertions seem to imply that there is no real possibility that the proposed modification will lead to the appearance of localized "hot spots" in the fuel array, or that significant leakage of SFP coolant may occur which threatens the safety of the pool and its contents. Yet the latter scenario has been <sup>deemed</sup> sufficiently probable and serious to warrant the preparation of a major study by Sandia Laboratories. <sup>1/</sup> CEF has outlined possible

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1 / SAND-77-1372 (1978).

causes of such a situation, but its position has not been responded to by VEPCO. It is incumbent upon the Board to receive assurances, in the form of evidence, that the risk of significant leakage is sufficiently low, that possible leakage can and will be mitigated with suitable response measures, or that the consequences of such leakage are estimable and acceptable.

#### RADIOACTIVE EMISSION

If the pleadings, circumstances, and relevant law are construed in the light most favorable to VEPCO, it has a good case that the increased radioactive emissions from the SFP can be maintained within acceptable limits. But if the permissible inferences are drawn in the Intervenor's favor, as they must be, there are genuine issues of fact concerning this contention. For example, VEPCO obviously places heavy reliance on the continuing ability of the plant's filtration systems to <sup>reduce</sup> radioactive emissions of the spent fuel. There has been no assertion by any party, however, that once the plant's operating license has expired that the plant will remain capable of performing this essential function. Analysis of such mid-to-long term questions has been commanded by the court in Minnesota v. NRC, supra. They must be the subject of factual presentation and rebuttal in an evidentiary or legislative hearing before the requested operating license

amendment may be issued.

MISSILE ACCIDENTS

In its pleadings the Alliance has presented well supported arguments showing that the proposed modification will increase the likelihood of an accident in which a missile strikes one or more assemblies, as well as the consequences of such an accident should it occur. In response, VEPCO has submitted a series of studies, including its own independent research, which do not refute the Alliance's position, but tend to show only that the previous probability of missile accidents was low, and that the consequences of such an accident would not be substantial. VEPCO has recently amended its written testimony to reflect the discovery of possible accident scenarios which were hitherto thought by it to be incredible, but which now appear to present significant hazards. VEPCO's presentations on this contention have crystallized the need for a hearing on this contention. If nothing else, its considerable research in the area proves that the issues are in serious doubt, rather than non-existent. While the Board has ultimate power to find VEPCO's presentation more probative than the Intervenors', it does not have that power now. Indeed, this would be the epitome of "trial by affidavit." It is essential that the technical positions

of VEPCO and the NRC Staff be subjected to verification in the crucible of a public and adjudicatory hearing.

MATERIALS INTEGRITY

The continued long-term integrity of the materials in the SFP is clearly a key issue around which several other contentions revolve. The Intervenor has collected and presented to the parties numerous studies showing that fuel cladding is subject to a range of defects when stored in aqueous environments, including chemical corrosion. This contention is laden with factual issues which must be resolved by the Board before permitting the proposed modification of the SFP. VEPCO's motion misses the point when relying on the fact that other licensing boards have resolved the issue favorably to the applicants in other proceedings. The fact is that those boards have recognized that genuine questions of fact are involved and found it necessary or desirable to receive relevant evidence from the parties.

To the best of its knowledge, no one has responded to the Alliance's statement that the American Concrete Institute has established 150°F as an upper limit for concrete structures containing fluids.

### CORROSION

The Intervenors' position on the contention labelled Corrosion parallels its position on the contention labelled Materials Integrity.

### OCCUPATIONAL EXPOSURE

The impacts of the proposed modification of the SFP on the workers at the North Anna station is an important question which might easily be resolved to the Board's and the parties' satisfaction, yet VEPCO has declined to address it meaningfully. To date its position has been based on largely irrelevant radiation measurements taken at the Surry SFP, with an inventory of 208 fuel assemblies. No serious attempt has been made to quantify the expected radiation levels at North Anna, or to show how the admitted increases in radiation will be borne by the work force. Some important factual questions, such as the doses involved in moving spent fuel through the compacted pool once it has been filled to capacity, have been overlooked entirely.

### ALTERNATIVES

The National Environmental Policy Act requires the consideration of alternatives to actions such as the proposed modification, regardless whether it will significantly affect

the environment. VEPCO's and the Staff's rough-hewn "estimates" of the costs and benefits of the alternatives propounded by the Alliance have been evaluated by a qualified economist and found inadequate to support a professional judgment as to their merit. See attached affidavit of Phillip M. Weitzman. There are many genuine issues of fact and law embodied in this contention.

SERVICE WATER COOLING SYSTEM

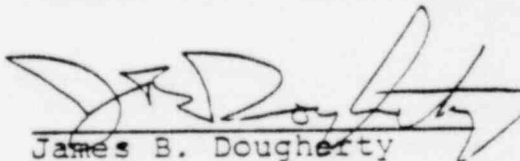
VEPCO has recently notified the parties of the discovery of new information to the effect that previous calculations relating to the ability of the service water cooling system to support the SFP cooling system were erroneous, and that it may now be impossible under certain circumstances to maintain the temperature of the SFP coolant below the limit set forth in the technical specifications for the plant. No clear explanation for this error has been offered. Instead of making necessary improvements in the cooling system, VEPCO has simply revised the design basis criteria in order to give the system the appearance of adequacy. Interrogatories directed to VEPCO have failed to illuminate the gaping questions which remain unanswered. It is essential that the Board understand the nature and implications of the recent developments before allowing VEPCO to add more spent fuel to the pool and thereby strain the cooling system even further.

Similarly, it is essential that this contention be raised in an adversary hearing at which the Intervenors can assist the Board in drawing out VEPCO's and the Staff's views on the matter. There are potentially grave issues of material fact here which must not be summarily dismissed at this premature stage.

Conclusion

As shown above, VEPCO's submissions on each of the contentions in this proceeding is subject to major factual gaps. In several cases the factual issues to be resolved have been expanded by the recent opinion of the D.C. Circuit in Minnesota v. NRC, supra. It is imperative that the Board heed its duty to draw all permissible inferences in favor of the Intervenors and withhold judgment on these complex questions until they have been explored in an adversary hearing. VEPCO's motion must be denied.

Respectfully submitted,

  
James B. Dougherty

Of counsel:

Gloria M. Gilman, Esq.  
Lawrence S. Lempert, Esq.

Counsel for the  
Intervenors

Dated this 23d day  
of July, 1979



Appendix C

Potomac Alliance's Pleadings on Materials Integrity

objections to said order as expressed within its Statement of Objections, filed May 2, 1979, and again requests the Board to reinstate all stipulated contentions as matters in controversy. With respect to the remainder of its contentions, the position of the Alliance is essentially as follows:

#### Missile Accidents

VEPCO has not shown that the spent fuel pool (SFP), if and as modified, can withstand the impact of flying objects which may enter the pool under unusual circumstances such as during a tornado or following an accident in another part of the plant. VEPCO's assertions that the SFP can withstand such accidents in its current configuration are of little or no relevance to the risks presented by the proposed modification because the vulnerability of a compacted pool is significantly greater than that of one which is loosely filled. VEPCO must demonstrate to the Board the safety of the new configuration without reliance on calculations such as the "design basis accident" which were prepared for and are relevant only to the current configuration.

#### Materials Integrity

Any assessment of the effects of the proposed modification on the integrity of the materials in the SFP rests on two unknown variables: (1) the increased destructive effects of the new and more hostile environment in the SFP, and (2) the ability of these materials to withstand such effects over a substantially expanded

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.

time frame. Although VEPCO may be able to identify the short term effect of the harsher pool environment satisfactorily, it has yet to do so. Experience at other nuclear plants shows a pattern of cracking, leaking, and similar damage.

A more crucial and difficult problem is presented by the probable nature of such effects over the long term. Past analyses of the SFP 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 SFP well into the next century, and quite possibly into subsequent centuries. The long term integrity of SFP materials is a matter of hot scientific debate. VEPCO must prove that it has the better of the arguments.

#### Occupational Exposure

Increasing the inventory of spent fuel in the SFP will not only result in higher ambient levels of radiation within the SFP building, but will also mandate increased levels of human activity within the vicinity of the pool, including fuel assembly loading, fuel assembly transport through the pool once it is filled to capacity, maintenance, and surveillance. VEPCO has not performed a thorough analysis of these operations, the increased rates of exposure, and the resultant increases in total man-rems.

#### Alternatives

Neither VEPCO nor the Staff has given meaningful consideration

(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.



of VEPCO and the NRC Staff be subjected to verification in the crucible of a public and adjudicatory hearing.

#### MATERIALS INTEGRITY

The continued long-term integrity of the materials in the SFP is clearly a key issue around which several other contentions revolve. The Intervengers have collected and presented to the parties numerous studies showing that fuel cladding is subject to a range of defects when stored in aqueous environments, including chemical corrosion. This contention is laden with factual issues which must be resolved by the Board before permitting the proposed modification of the SFP. VEPCO's motion misses the point when relying on the fact that other licensing boards have resolved the issue favorably to the applicants in other proceedings. The fact is that those boards have recognized that genuine questions of fact are involved and found it necessary or desirable to receive relevant evidence from the parties.

To the best of its knowledge, no one has responded to the Alliance's statement that the American Concrete Institute has established 150°F as an upper limit for concrete structures containing fluids.

Appendix D

Decision in Garrett v. NRC

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IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF OREGON

SUSAN M. GARRETT and	)	
DELBERT BURNHAM,	)	
	)	Civil No. 78-269
Plaintiffs,	)	
	)	
vs.	)	
	)	ORDER
UNITED STATES NUCLEAR	)	
REGULATORY COMMISSION;	)	
PORTLAND GENERAL ELECTRIC	)	
COMPANY, an Oregon	)	
corporation; PACIFIC	)	
POWER & LIGHT COMPANY, a	)	
Maine corporation; and	)	
THE CITY OF EUGENE, by and	)	
through its Eugene Water &	)	
Electric Board, a municipal	)	
corporation,	)	
	)	
Defendants.	)	

Plaintiffs have brought this action pursuant to the National Environmental Policy Act (NEPA), 42 U.S.C. §4321 <sup>1</sup> et seq. They contend that before defendants may allow or undertake extended storage of spent fuel at the Trojan Nuclear Plant (Trojan), an environmental impact statement (EIS) exploring the effects of that endeavor must be made. Plaintiffs' motion for a temporary restraining order, which was intended to foreclose transfer of spent fuel from the Trojan reactor to the Trojan spent fuel pool, <sup>2</sup> was denied.

Plaintiffs were not entitled to a temporary restraining order because they could not establish irreparable harm. I found that the removal of spent fuel from the reactor to the spent fuel pool did not lead to an unbreakable chain of

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events culminating in an escape of radioactive waste from the spent fuel pool into the environment, in light of the fact that the spent fuel could be returned to the reactor prior to the scheduled May 19, 1978, activation date. I also found the federal government has the wherewithal and intent to construct off-site long-term storage facilities, to which the spent fuel in the spent fuel pool could be removed prior to, and thus avoiding, any harm to plaintiffs. Plaintiffs have filed a motion for preliminary injunction seeking to prevent activation of the reactor. Plaintiffs' motion has been the subject of an extensive two-day hearing on the likelihood that plaintiffs will ultimately succeed on their NEPA claim and the prospective harm that might befall the various parties depending on the outcome of the motion.

NEPA requires preparation of a detailed EIS for all major federal actions "significantly affecting the quality of the human environment." 42 U.S.C. §4332(2)(C). In order for a plaintiff to establish that an EIS is required for a given project, he need not prove that the challenged project will, in fact, have significant effects. Rather, it is enough if he proves that (1) there has been a major federal action which (2) "may cause a significant degradation of some human environmental factor." City of Davis v. Coleman, 521 F.2d 661, 673 (9th Cir. 1975); Save Our Ten Acres v. Kreger, 472 F.2d 463, 467 (5th Cir. 1973). The general rule is that once a NEPA-EIS plaintiff has shown a likelihood of success on the merits, irreparable harm is presumed to come to the plaintiff if an injunction is not issued. Lathan v. Volpe, 455 F.2d 1111, 1116-1117, 1120-1121 (9th Cir. 1971); Friends of the Earth v. Coleman, 518 F.2d 323, 330 (9th Cir. 1975). Therefore, traditional injunction

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1 tests, which involve a balancing of harm, do not normally  
2 apply in NEPA suits for the making of an EIS.<sup>5</sup>

3 Here, the plaintiffs have failed to show that they are  
4 likely to succeed on the merits of their NEPA claim. The  
5 plaintiffs, in seeking preliminary injunctive relief, had  
6 the burden to raise a "substantial question" whether extended  
7 storage of spent fuel at the Trojan spent fuel pool would  
8 cause a significant degradation of some human environmental  
9 factor. Davis, supra, at 673. They relied on a theory of  
10 stress corrosion cracking and the possibility of sabotage.

11 Plaintiffs' theory is that storage of spent fuel in  
12 the Trojan spent fuel pool will create an environment  
13 susceptible to stress corrosion. Extended storage, plaintiffs  
14 contend, will result in a situation where stress corrosion  
15 will cause leaks in the containers in the pool, allowing  
16 radioactive waste to escape into the environment. According  
17 to plaintiffs' sole expert witness, Dr. Donald Mash, stress  
18 corrosion cracking occurs in some chemical environments  
19 and is primarily a function of time and temperature: the  
20 likelihood of stress corrosion increases with time and  
21 temperature.

22 Dr. Mash is a metallurgical engineer. However, he  
23 has had no direct experience in designing or implementing  
24 spent fuel storage facilities. He has never seen the spent  
25 fuel pool at Trojan. His conclusions were derived from  
26 comparisons between situations where stress corrosion  
27 cracking has occurred and the Trojan spent fuel pool environ-  
28 ment. He did not, however, point out any instances where  
29 stress corrosion occurred in a spent fuel pool. I find  
30 that his credibility is weakened by the fact that he did  
31 not have correct information regarding the Trojan spent fuel  
32 pool when making his comparisons. For example, Dr. Mash

1 assumed that the spent fuel pool at Trojan would be main-  
2 tained at temperatures ranging from 125° to 140°. In fact,  
3 the pool is expected to reach a maximum temperature of 140°, bu  
'  
4 for the most part, the pool will be operating at temperatures  
5 up to, and ordinarily less than, 100°. On May 2, 1978,  
6 approximately one month after one-third core of spent fuel  
7 had been placed in the pool, the temperature in the spent  
8 fuel pool was 73°. The pool reaches its highest temperatures  
9 when new spent fuel is placed in it.

10 Dr. John Weeks, who testified on behalf of the defendants,  
11 is a metallurgist associated with Brookhaven National  
12 Laboratory. He is currently the leader of the Corrosion  
13 Science Group in the Department of Nuclear Energy at  
14 Brookhaven. He is involved in an ongoing investigation of  
15 stress corrosion cracking in different environments, but  
16 most particularly as that phenomenon relates to the storage  
17 of spent fuel. He testified that short-term temperature  
18 increases have little effect on the possibility of stress  
19 corrosion cracking. He concluded that stress corrosion  
20 cracking is very rare in water of the temperature of the  
21 Trojan spent fuel pool given the chloride and fluoride  
22 levels in that pool. He pointed out that the only known  
23 instances of stress corrosion cracking in environments the  
24 temperature of the Trojan pool occurred under conditions  
25 much different from those existing in the pool: under  
26 greater concentrations of chloride or fluoride,<sup>6</sup> or where  
27 furnace sensitized stainless steels were involved.<sup>7</sup>

28 Weeks' testimony was corroborated by a Dr. N. Burton Johnson,  
29 Jr., who is a staff scientist with Batelle, Pacific North-  
30 west Laboratories. Johnson is primarily involved in corrosion  
31 research and engineering, and in the past two years has  
32 issued and supplemented a thorough report assessing nuclear

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1 fuel integrity in water pool storage facilities. Dr. Mash  
2 testified that there is no firsthand experience with storage  
3 of spent fuel at pools similar to that at Trojan beyond  
4 one year. He reasoned, therefore, that the time factor,  
5 that is to say, how much time must elapse before stress  
6 corrosion cracking might occur, is an unknown. However,  
7 Drs. Weeks and Johnson pointed to examples, in this and other  
8 countries, of spent fuel being stored for up to eleven years  
9 in pools virtually identical to Trojan's without the appearance  
10 of stress corrosion cracking.

11 The eleven-year lead time of these other spent fuel  
12 storage facilities strongly indicates that if the federal  
13 government constructs off-site storage facilities within  
14 the next eleven years or otherwise provide a means for  
15 removing spent fuel from the Trojan pool within that time,  
16 there is no likelihood that interim storage at Trojan will  
17 lead to detrimental environmental effects caused by stress  
18 corrosion cracking. I have already concluded that the  
19 government has the wherewithal and intent to construct off-  
20 site spent fuel storage facilities. I find the testimony  
21 of Charles Trammell, who is the United States Nuclear  
22 Regulatory Commission's project manager for Trojan, to be  
23 both realistic and persuasive regarding the time within  
24 which the government will provide at least interim off-site  
25 storage facilities. He expects the Department of Energy to  
26 provide interim off-site storage facilities by 1983 which  
27 would allow removal of spent fuel from Trojan by 1984.

28 Mash also found fault with the stainless steel liner  
29 which secondarily encloses the spent fuel in the pool. He  
30 contended that stainless steel liners were dismissed thirty  
31 years ago by the experts in metallurgical engineering as  
32 inappropriate. He did not say what they were replaced with.

ORDER



1 Drs. Weeks and Johnson pointed out that stainless steel  
2 liners have been used as the exclusive secondary enclosure  
3 of radioactive waste in recent years.

4 Mash has simply not raised a substantial question  
5 whether extended storage of spent fuel at the Trojan spent  
6 fuel pool would cause a significant degradation of some  
7 human environmental factor due to stress corrosion.  
8 Plaintiffs have stated that at a trial on the merits, Mash  
9 would be their only expert witness. Accordingly, I find  
10 that the plaintiffs are not likely to raise a substantial  
11 question in that regard after a trial on the merits.  
12 Moreover, assuming for the moment that plaintiffs could  
13 raise a substantial question as to whether stress corrosion  
14 would occur, plaintiffs have entirely failed to rebut  
15 defendants' contention that the backup system at Trojan,  
16 which is designed to capture radioactive waste which  
17 might leak through the stainless steel liner before it  
18 enters the environment, is inadequate for that task. For  
19 stress corrosion to lead to significant degradation of some  
20 human environmental factor, it must allow radioactive waste  
21 to escape into the human environment and not merely through  
22 the stainless steel liner.

23 Plaintiffs also argue that the threats of environmental  
24 harm posed by potential accidents or terrorist activities  
25 at the Trojan plant creates a substantial question as to  
26 whether extended storage of spent fuel in the spent fuel  
27 pool would cause adverse environmental effects. The short  
28 answer to this contention is simply that the possibility of  
29 such accidents or terrorist activities is too remote and  
30 speculative to warrant relief under the NEPA. <sup>8</sup> State of  
31 New York v. Nuclear Reg. Com'n, 550 F.2d 745, 756-757  
32 (2nd Cir. 1977).

1 I share with plaintiffs a concern about the under-  
2 development of spent fuel disposal facilities. I am  
3 convinced that they are litigating this case in utmost  
4 good faith. However, I cannot find that they are likely  
5 to prevail on the merits.

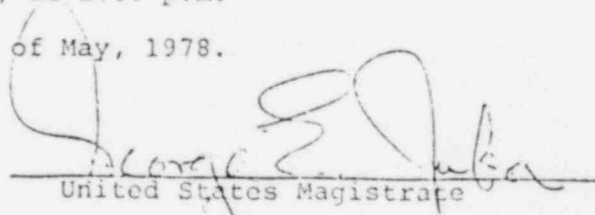
6 Defendants have moved to dismiss plaintiffs' complaint  
7 on the grounds that this court lacks subject-matter juris-  
8 diction and the complaint fails to state a claim upon which  
9 relief may be granted. Defendants' motion raises novel  
10 issues concerned with the doctrines of primary jurisdiction  
11 and exhaustion of administrative remedies. While defendants  
12 filed their motion a few days before the hearing on plain-  
13 tiffs' motion for injunctive relief, plaintiffs understandably  
14 did not have time to respond prior to the hearing. In light  
15 of the scheduled May 19, 1978, activation date at Trojan,  
16 I have considered the motion for injunctive relief  
17 assuming that this court has subject-matter jurisdiction  
18 in this case. The plaintiffs have now responded to  
19 defendants' motion to dismiss, and, in turn, the defendants  
20 have replied to plaintiffs' opposition. I will set  
21 defendants' motion on the May 22, 1978, motion calendar.

22 IT IS ORDERED:

23 1. Plaintiffs' motion for a preliminary injunction  
24 is denied.

25 2. Defendants' motion to dismiss is set for oral  
26 argument on May 22, 1978, at 1:30 p.m.

27 Dated this 11th day of May, 1978.

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29 \_\_\_\_\_  
30 United States Magistrate  
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FOOTNOTES

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1 Plaintiffs originally asserted a pendent state claim as well. They have since moved for a dismissal of their state claim. Their motion was granted.

2 The "spent fuel pool" refers to the actual on-site storage facility for spent fuel at Trojan. The pool is rectangular in shape with an eight foot thick steel reinforced concrete floor and five foot thick steel reinforced walls. This is lined with a 1/4 inch stainless steel liner. It is sunk into the ground.

3 Plaintiffs' counsel agreed with this finding in his memorandum in support of plaintiffs' motion for a preliminary injunction.

4 The idea is that, in suits to compel an EIS, damage is inherent in the starting or continuation of a project, since the public information value of an EIS is diminished unless it is made before action is undertaken. Also, once a project is begun, the cost-benefit analysis that will be done in a subsequent EIS will be slanted in favor of the project, because stopping a project already in progress generally costs more (or wastes more) than not beginning it in the first place.

5 Where unusual circumstances are involved, traditional injunction tests may be applied. Alpine Lakes Protection Society v. Schlapfer, 518 F.2d 1039, 1090 (9th Cir. 1975); Cady v. Morton, 527 F.2d 786, 798, n. 12 (9th Cir. 1975).

6 Where stress corrosion cracking has been observed, the chloride or fluoride concentrations are generally greater than 5 ppm. The Trojan spent fuel pool contains chloride and fluoride levels below 0.15 ppm.

7 Furnace sensitized stainless steel is not present in the Trojan spent fuel pool stainless steel liner.

8 Plaintiffs point out that a bomb was once placed in the visitor's section at Trojan. I do not believe this can serve as the basis for serious concern of sabotage resulting in radioactive waste being released into the environment.

Appendix E

Potomac Alliance's Pleadings on Alternatives

time frame. Although VEPCO may be able to identify the short term effect of the harsher pool environment satisfactorily, it has yet to do so. Experience at other nuclear plants shows a pattern of cracking, leaking, and similar damage.

A more crucial and difficult problem is presented by the probable nature of such effects over the long term. Past analyses of the SFP 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 SFP well into the next century, and quite possibly into subsequent centuries. The long term integrity of SFP materials is a matter of hot scientific debate. VEPCO must prove that it has the better of the arguments.

#### Occupational Exposure

Increasing the inventory of spent fuel in the SFP will not only result in higher ambient levels of radiation within the SFP building, but will also mandate increased levels of human activity within the vicinity of the pool, including fuel assembly loading, fuel assembly transport through the pool once it is filled to capacity, maintenance, and surveillance. VEPCO has not performed a thorough analysis of these operations, the increased rates of exposure, and the resultant increases in total man-rems.

#### Alternatives

Neither VEPCO nor the Staff has given meaningful consideration

to alternative solutions to the problem of the accumulating spent fuel from North Anna. Construction of a new SFP onsite and physical expansion of the existing pool are alternative approaches which will become far more attractive when, assuming for the sake of argument that the proposed modification if approved, the modified SFP is filled to capacity in a matter of a few years. They should be fully evaluated now. To date, VEPCO and the Staff have glossed over the merits of these alternatives, giving virtually no weight to any of their implications save the economics. These alternatives must be analyzed for their environmental and safety advantages, and must be viewed in the broad context of the spent fuel dilemma facing VEPCO over the next 20 to 40 years. The Alliance seeks only a hard look at these alternatives; it will recede from them if they are shown to be inferior to VEPCO's proposal by a factually supported analysis, including consideration of the environmental, safety, and policy implications.

The Alliance does not contend that use of the SFP at North Anna Units 3 and 4 is an alternative which has been given only slight consideration. It has been given no consideration. Yet this commonsense option is one which is so appealing on its face that the Board must take extra steps to assure its full illumination. Once equipped with the products of discovery, the Alliance intends to demonstrate the merits of this alternative to the Board.

#### Service Water Cooling System

A recent Licensee Event Report and other submittals by VEPCO

Contention 7: Alternatives

7-1 (a) 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).

(b) Not applicable.

7-2 Not applicable.

7-3 EIA

Summary

7-4 Same as answer to 7-3.

7-5 Section 6.0 of the EIA, relating to alternatives, is deficient for failure to consider the alternatives of physically expanding the spent fuel pool, building a new pool onsite, or accelerating construction of the spent fuel pool at Units 3 and 4. These alternatives are reasonable, particularly in contrast to several alternatives which were given fuller treatment in the EIA (e.g., "shutdown of the plant" and "reduced plant output"), yet were completely disregarded in the EIA in violation of the Staff's obligations under the National Environmental Policy Act. The SE, to the extent it is held out as evidence of the Staff's adequate consideration of alternatives, is similarly deficient.

The Summary also provides a deficient analysis of the alternatives propounded by the Alliance. Section 4.5



of that document baldly states that an offsite pool would cost roughly \$25,000,000, and then apportions that cost on a per-assembly basis to the nearest dollar. The figures are not substantiated and no basis is provided for the implicit assumption that the offsite pool would have a capacity of 1137 assemblies. Like the Staff, the Applicant has not assessed the safety or environmental implications of this alternative.

In §4.9 of the Summary it is stated that the alternative of physically expanding the pool will involve too much work, time and money. No estimates are provided of the amounts of these resources required to implement this alternative, thus making it impossible for the Board, the Intervenors, or the public to assess the merits of this alternative. The Intervenors plan to challenge the assertion that the decontamination building on the south side of the pool prevents its expansion in that direction. There has been no analysis of the environmental and safety implications of this alternative by either the Applicant or the Staff.

Section 4.10 of the Summary constitutes a four sentence dismissal of a promising alternative to the proposed modification. The Applicant there states that it is "too late" to implement this alternative because it is "difficult" to accelerate the completion of the spent fuel pool at Units 3 and 4. All of the alternatives

facing the Applicant are difficult. The question of their relative difficulties, e.g., cost, safety, and environmental implications, have been totally disregarded by the Staff and the Applicant.

7-6 Yes. 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.

7-7 Yes. 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 7-6 could be obtained. Similarly, differing assumptions regarding the capacity of the expanded pool would result in favorable cost/assembly estimates.

7-8 Yes. 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 7-6 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.

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

Respectfully submitted,

Of counsel:

Gloria M. Gilman, Esq.

  
James B. Dougherty

Counsel for the  
Potomac Alliance

Dated this 30th day  
of May, 1979.

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.

CORROSION

The Intervenor's position on the contention labelled Corrosion parallels its position on the contention labelled Materials Integrity.

OCCUPATIONAL EXPOSURE

The impacts of the proposed modification of the SFP on the workers at the North Anna station is an important question which might easily be resolved to the Board's and the parties' satisfaction, yet VEPCO has declined to address it meaningfully. To date its position has been based on largely irrelevant radiation measurements taken at the Surry SFP, with an inventory of 208 fuel assemblies. No serious attempt has been made to quantify the expected radiation levels at North Anna, or to show how the admitted increases in radiation will be borne by the work force. Some important factual questions, such as the doses involved in moving spent fuel through the compacted pool once it has been filled to capacity, have been overlooked entirely.

ALTERNATIVES

The National Environmental Policy Act requires the consideration of alternatives to actions such as the proposed modification, regardless whether it will significantly affect

the environment. VEPCO's and the Staff's rough-hewn "estimates" of the costs and benefits of the alternatives propounded by the Alliance have been evaluated by a qualified economist and found inadequate to support a professional judgment as to their merit. See attached affidavit of Phillip M. Weitzman. There are many genuine issues of fact and law embodied in this contention.

SERVICE WATER COOLING SYSTEM

VEPCO has recently notified the parties of the discovery of new information to the effect that previous calculations relating to the ability of the service water cooling system to support the SFP cooling system were erroneous, and that it may now be impossible under certain circumstances to maintain the temperature of the SFP coolant below the limit set forth in the technical specifications for the plant. No clear explanation for this error has been offered. Instead of making necessary improvements in the cooling system, VEPCO has simply revised the design basis criteria in order to give the system the appearance of adequacy. Interrogatories directed to VEPCO have failed to illuminate the gaping questions which remain unanswered. It is essential that the Board understand the nature and implications of the recent developments before allowing VEPCO to add more spent fuel to the pool and thereby strain the cooling system even further.

Contention 4: Materials Integrity

4-1 (a) 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).

(b) Not applicable.

4-2 Not applicable.

4-3 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;

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

A.S. Benjamin, et. al., "Spent Fuel Heatup Following Loss of Water During Storage," Sandia Laboratories, (September 1978) (Draft) (Hereinafter cited as SAND-1371);



Z.A. Munir, "An Assessment of the Long-Term Storage of Zircaloy Fuel Rods in Water," University of California at Davis, #154-036, (October 1977) (Hereinafter cited as Munir study);

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

4-4 Same as answer to question 4-3.

4-5 Documents prepared by the Applicant and the NRC Staff which are deficient with regard to the Materials Integrity contention include:

a. The Summary is deficient at §6.3.1 in that it asserts that "stainless steel has... been shown to be compatible with spent fuel pool water and the stored assemblies." This statement implicitly denies that there is a possibility of corrosion or stress-corrosion cracking, either with stainless steel or with zircaloy.

b. The SE is deficient at §2.3 in that it asserts that corrosion of pool components will be "negligible." To the extent that this statement acknowledges the possibility of long-term materials integrity problems, it offers no analysis of such problems. Furthermore, it

is contradicted by NUREG-0404 at §§3.1.1-3.1.4, which specifically identifies corrosion as a problem to be overcome when placing stainless steel and zircaloy in aqueous environments. NUREG-0404 further suggested that long-term storage, such as that entailed in the proposed modification, might result in "stress-corrosion cracking, intergranular corrosion, and hydrogen absorption and precipitation by the zirconium alloys." (§3.1.4.). The Staff's assertion of the long-term integrity of the pool materials paints over the gross inadequacy of existing testing experience with such long-term effects.

- 4-6 The basis for the claim in Contention 4 that the proposed modification will increase the corrosion of, the stress upon, and resultant problems concerning the components of spent fuel pool is that there are well-documented, serious problems which may arise in connection with the long-term storage of spent fuel. These problems "have potential significance principally in the event that pool storage were to be extended into the 20-to-100 year time frame." (Johnson study). Dr. Johnson has also stated that "[i]t is not now clear how long pool storage of spent fuel may be extended." (Johnson study at p.3).

These problems flow from the fact that the proposed modification will increase the total amount of decay heat present in the pool, thereby increasing the stress on the fuel rod cladding, and will increase the radiation experienced by the fuel rod cladding, the fuel racks, the liner and other pool components. In addition, these effects become more serious over extended time frames. As the NRC has stated (NUREG-0404): "corrosion effects that might occur after longer storage periods need to be examined in much greater detail, so that effects such as accelerated corrosion, microstructural changes, or alterations in mechanical properties can be determined." (§3.1.4). The Johnson study and others have pointed out that radiation exacerbates such effects.

Existing experimental data on the storage of spent fuel rods in long-term aqueous environments is based on short-term (less than 15 years) experience and on inadequate methods of observation. (Munir study, Johnson study). For example, the rate of fuel rod failures is unknown. (Mash affidavit). The U.S. Court of Appeals for the District of Columbia Circuit has recently commanded the NRC to weigh carefully the long-term implications of this method of spent fuel storage. This ruling is based on the court's finding that to date the Commission has

failed to do so. VEPCO's analysis has obviously been no less inadequate.

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).

The phenomenon of stress-corrosion cracking is not well understood, but studies indicate that stainless steel fuel racks and liners will be likely to experience such cracking to a greater extent in the environment of the modified pool than in the existing pool. Factors tending to increase such cracking include radiation (Johnson study) and temperature ("heat transfer, as from a fuel rod, intensifies stress-corrosion problems") (Mash affidavit).

4-7 Among the "resultant problems" envisioned in this content-  
ion 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.

4-8 The term "potential problems" is intended to be syn-  
onymous with the term "resultant problems." See answer  
to question 4-7.

4-9 The bases for the assertion in this contention that the  
proposed modification will result in increased rad-  
iation levels include:

a. VEPCO's Summary states: "Storing additional spent  
fuel in the pool will increase the amount of corrosion  
and fission product nuclides introduced into the pool  
water." The proposed modification will "increase the  
amount of radioactivity stored in the pool." (pp. 56-58).

b. Occupational radiation exposures will increase.  
(Summary at p. 56).

c. The proposed modification will lead to an increase  
in the Keff (SE at p. 1-2; Summary at §6.4.3)

4-10 See answers to questions 4-7, 4-8.

The answers to the interrogatories concerning materials  
integrity were answered by Peter Lichtner with the ass-  
istance of James Dougherty.

Appendix F  
Weitzman Affidavit