Appendix 1

June 21, 1985

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC
SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
VIRGINIA ELECTRIC AND POWER COMPANY	)	Docket Nos. 50-338/339 OLA-1
	)	
(North Anna Power Station, Units 1 and 2)	)	

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LICENSEE'S PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW

I.

Background

1. Virginia Electric and Power Company (the Licensee) filed with the Nuclear Regulatory Commission (NRC) on July 13, 1982, an application for amendments to its North Anna Power Station Units 1 and 2 operating licenses that would authorize the receipt and storage at North Anna of up to 500 spent nuclear fuel assemblies from its Surry Power Station (the Application).

2. On October 22, 1982, Concerned Citizens of Louisa County (CCLC) filed with respect to the Application a Petition for Leave to Intervene. On October 15, 1984, the Board admitted CCLC as an intervening party in this proceeding. On the same date the Board admitted as the sole contention in this proceeding the following Consolidated Contention 1:

> The Staff's Environmental Assessment is inadequate and an Environmental Impact Statement should be prepared. The bases for this

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> contention are two-fold. First, the Environmental Assessment, in relying upon the inapplicable values in Table S-4, did not evaluate the probabilities and consequences of accidents occurring during the transportation of spent fuel casks from the Surry Station to the North Anna Station or which might be occasioned by acts of sabotage or by error of Applicant's employees in preparing the casks for shipment. Second, contrary to the National Environmental Policy Act, 42 U.S.C. 4332(2)(E), consideration was not given to the alternative method of constructing a dry cask storage facility at the Surry Station which is feasible, can be effected in a timely manner, is the least expensive and safest method for at least 50 years, and can be used on or offsite.

3. On January 7, 1985, the Board granted the Licensee's and the Staff's motions for partial summary disposition regarding Table S-4, revising Consolidated Contention 1 to read as follows:

> The Staff's Environmental Assessment is inadequate and an Environmental Impact Statement should be prepared. The bases for this contention are two-fold. First, the Environmental Assessment did not evaluate the probability and consequences of accidents occurring during the transportation of spent fuel casks from the Surry Station to the North Anna Station which might be occasioned by acts of sabotage or by error of Applicant's employees in preparing the casks for shipment. Second, contrary to the National Environmental Policy Act, 41 U.S.C. 4332(2)(E), consideration was not given to the alternative method of constructing a dry cask storage facility at the Surry Station which is feasible, can be effected in a timely manner, is the least expensive and safest method for at least 50 years, and can be used on or offsite.

This Contention involves three subjects: the risks of sabotage attacks against spent fuel shipments, the risks of human error in cask preparation, and the feasibility, cost, availability, and environmental effects of the dry cask storage alternative. Each is dealt with below under separate heading.

4. A hearing was held in Charlottesville, Virginia on May 21 and 22, 1985. CCLC filed no written testimony or exhibits and put on no direct case.

II.

Findings of Fact

A. Sabotage

5. The successful sabotage of a spent fuel shipment would involve (a) a breach of the cask and (b) a discharge of some portion of its spent fuel contents into the environment. Lahs et al., ff. Tr. 346, at 6. The principal radiological consequences of such a discharge would be related to the amount of material released in a form that could be inhaled and retained in the lungs; this is called "respirable" material. Id. at 9. In order to consider sabotage a significant threat to the quality of the human environment, the Board must make three findings: (a) spent fuel shipments are likely to be attacked by saboteurs; (b) if an attack is attempted, the probability of success is good; (c) if an attack is successful, the respirable material released is likely to cause significant harm to the public and the environment. The evidence does not support these findings.

1. Threat of sabotage

6. The history of attacks on spent fuel shipments, and consultations with law enforcement and intelligence-gathering agencies, reveals no identifiable threat to spent fuel cask shipments. Id. at 8. NRC studies confirm the testimony of the Licensee's witness, Robert M. Jefferson, that there have been no significant attempts to breach spent fuel shipping casks, either

in the United States or in other western countries. Id. at 8; Jefferson, ff. Tr. 326, at 9. This is so despite the fact that since 1964, over 5,000 shipments of spent fuel have occurred in this country alone. Id. at 9.

7. Saboteurs might consider attacking a spent fuel shipment for three different reasons: (a) acquiring nuclear material for weapons, (b) embarrassing the government or nuclear industry (a "political statement"), and (c) intentionally injuring the public. Id. at 14-15.

8. Materials for weapons use could be obtained from spent nuclear fuel only by reprocessing. Id. at 14. We find it highly unlikely that a saboteur could successfully reprocess stolen spent fuel. See id. It is thus unlikely that he would attempt to gain possession of the material for that purpose. See id. Moreover, if the saboteur's goal were diversion, there exist other, more inviting targets. Id.

9. Historically, actions taken in this country to make political statements or otherwise to harass government or industry have been timed and carried out so as to avoid injury to the public. Id. at 14-15. Thus, such exercises are not likely to cause significant harm. Id. Moreover, given the obstacles and dangers, discussed below, that would be faced by a would-be attacker, it is probable that a spent fuel shipment would be an uninviting target for purposes of making a political statement. Id. at 15.

10. A saboteur whose purpose is to injure the public would face substantial obstacles and time constraints in his

effort to breach the cask. See Proposed Findings 12 through 23, infra. In particular, he would face a significant threat of personal injury, either from law enforcement agencies or from irradiation. Id. at 14, 19-22; Tr. at 330. Moreover, the consequences of a successful attack are likely to be quite low. Jefferson, ff. Tr. 326, at 18-32; see Proposed Findings 26 and 31, infra. The saboteur, then, is likely to find spent fuel shipments an uninviting target. Jefferson, ff. Tr. 326, at 18. If harm to the public is his goal, there are other targets that provide fewer risks to the saboteur and greater promise of significant damage to the public. Id.

11. To summarize, we find that there is no history of sabotage attacks on spent fuel shipments despite there having been over 5,000 shipments in this country. We also find that the likelihood that a saboteur would achieve his goal in carrying out an attack on a spent fuel shipment is quite small. He is therefore unlikely to attempt such an attack in the first place.

2. Probability of success

12. Even if a saboteur were to target a spent fuel shipment, the impediments to a successful attack would create a high probability of failure. These impediments include the cask design itself, the physical protection system required by 10 C.F.R. § 73.37, and the time necessary to successfully sabotage a spent fuel cask.

13. As discussed below, see Proposed Findings 45 and 61, infra, the TN-8L cask is designed to maintain radiation shielding in the face of severe accident conditions, Jefferson,

ff. Tr. 326, at 6, which include conditions produced by certain accident-like events staged by saboteurs. Lahs, et al., ff. Tr. 346, at 7. A combination of steel shells and radiation shields makes the cask virtually impenetrable, except through the use of explosives by one knowledgeable in both explosives and cask design. Id.

14. NRC has promulgated the physical protection regulations in 10 C.F.R. § 73.37 in direct response to the possibility of sabotage against a spent fuel shipment. Lahs et al., ff. Tr. 346, at 8. These regulations require, for example, advance notification to NRC of each shipment, procedures for coping with threatening events, prior arrangements with local law enforcement authorities, and a continuously manned communications center. For shipments by road, such as those planned by Licensee, the shipping vehicle will be equipped with an immobilization device. Jefferson, ff. Tr. 326, at 10-11. Armed escorts or local law enforcement agents are required to accompany the shipping vehicle, and these escorts, the shipping vehicle, local law enforcement agencies and the shipper's communications center will be capable of contacting each other through communications equipment required by 10 C.F.R. § 73.37. Id.

15. The Licensee has in place a physical protection system that complies with, and in some instances exceeds, the requirements of 10 C.F.R. § 73.37. Smith (II), ff. 328, at 1.

16. The physical protection system is designed to increase the obstacles faced by a would-be saboteur and, in particular, to create substantial time pressures for the saboteur.

Jefferson, ff. Tr. 326, at 11, 13. The saboteur would face armed resistance from the outset. Id. at 12. The transport and escort vehicles could quickly alert local and state police. Id. at 13. The transport vehicle could activate the vehicle's immobilization device at the first sign of a threat. Id. If the saboteur gained control of the vehicle, he could not swiftly drive it away; he would have to uncouple the heavy trailer from the immobilized tractor and recouple it with another tractor in full view of the public. Id. at 16-17. The time necessary to deal with this array of obstacles would greatly reduce the probability of success. Id. at 12.

17. Considering the design of the cask, and its inherent resistance to damage, and the impediments described above, the Board finds that there is a low probability that an attempt to sabotage a spent fuel shipment will succeed.

18. A saboteur who overcomes the impediments described above might attempt any of three methods to breach the cask: (a) mechanical means, (b) use of projectiles, and (c) use of explosives. Lahs et al., ff. Tr. 346, at 10.

19. The first of these would be extremely difficult, dangerous and time-consuming. Id. at 11; Jefferson, ff. Tr. 326, at 19. As previously indicated, the cask is designed to survive severe accident-like events. See Finding 7, supra. Thus, the saboteurs might attempt to disassemble the cask mechanically. Lahs et al., ff. Tr. 346, at 10-11. Performance of this task would be difficult for several reasons. See Jefferson, ff. Tr. 326, at 19. In the first place, the 37 ton cask is designed for

vertical unloading but rests horizontally on the truck. Id. The saboteur must either have access to a 50-ton crane or its equivalent in order to erect the cask or face the problems of removing the cover from the horizontal cask. Id.

20. To remove spent fuel from the horizontal cask, the saboteur would first have to remove the 900 pound shock absorbing cover. Id. Then, he would have to remove the lid of the cask, which weighs almost a ton and is designed to fit tightly into the cask. Id. It is likely that the heavy lid would bind during the process. Id. Furthermore, a vertical steel wall, welded across the front of the trailer, would make it difficult to use cables to pull the lid off. Id.

21. In the event that a saboteur could remove the lid the cask would then project a radiation beam that would be lethal near the cask opening. Id. at 20. The saboteur would have to deal with this beam if he should attempt to remove the spent fuel assemblies. Id.

22. To remove the fuel assemblies, the saboteur would have to grapple blindly for a place to hook the spent fuel assemblies, probably with a specially constructed tool. Id. This would be difficult, because the only grasping points lie flush against the chamber walls, making them difficult to hook. Id. at 20. It would also be dangerous, as the saboteur might expose his arm to a high dose of radiation. Id. Moreover, the vertical steel wall at the front of the trailer would block the complete extraction of the fuel assemblies from the cask. Id.

23. If the saboteur were to attempt to breach the cask in this manner, apart from the risks of irradiation and the difficulties of disassembly, he would face severe time constraints. Id. at 22; see Proposed Finding 10, supra. If he wished to maximize his time to dismantle the cask fully before interdiction, he would not attack the cask near a heavily populated area where law enforcement agencies would be centered and the chance of detection would be greatest. Jefferson, ff. Tr. 326, at 22. Instead, he would attack the shipment in a remote area. Id. If the attack were carried out in a remote area, however, the consequences to the public would be minimized. Id.

24. Saboteurs might also attempt to breach the cask by using projectiles. Id. The NRC Staff has concluded that the use of small firearms, high powered rifles and machine guns would not result in the penetration of the spent fuel cask. Lahs et al., ff. Tr. 346, at 11-12. Tests conducted by Sandia National Laboratories (the Urban Study) establish that neither light antitank weapons nor armor piercing projectiles would be effective means of penetrating the casks. Jefferson, ff. Tr. 326, at 23. Light antitank weapons prove ineffective for two reasons: (a) the extremely accurate aim required (a skill not expected in those who do not use the weapons continuously), id., and (b) the limited penetration capability of the charges used, Tr. at 334. Moreover, armor-piercing projectiles would be especially ineffective against the TN-8L cask because the lead shielding is not an effective transmitter of impact shock waves. Jefferson, ff. Tr. 326,

at 23. The use of projectiles, then, will not release respirable material into the environment. Id.

25. The most effective means available to breach the casks is the use of explosives. Lahs et al., ff. 346, at 12. At the request of the Department of Energy (DOE), Sandia National Laboratories examined possible attack methodologies and concluded that conical-shaped charges, while requiring some skill, would be the most effective means available, id. at 13, and could cause a penetration of the cask, id.

26. The Board concludes, in light of the impediments to successful sabotage attack, that such an attack, however it may be carried out, is unlikely to succeed. The Board further concludes that the likelihood of a successful attack on a spent fuel cask by mechanical means is remote, even if the attacker should succeed in gaining control of the cask, and by projectile is virtually non-existent. The record indicates, however, that if a saboteur were to gain control of a cask and attack it with explosives he could in some circumstances succeed in producing a penetration of the cask.

3. Consequences of explosive attack

27. Two studies form the bases of our conclusions about the effects of a cask breach on the public and the environment. Lahs et al., ff. Tr. 346, at 14. The first is Licensee Exhibit 3, An Assessment of the Safety of Spent Fuel Transportation in Urban Environs, SAND82-2365.TTC-D398 (printed June 1983) (the Sandia Study); the second is a NRC-sponsored program performed by Battelle Columbus Laboratories, Lahs et al., ff. Tr. 346, at 14.

28. The Sandia Study, performed for DOE, measured the fuel material released from a full-scale cask containing a single unirradiated, depleted UO_2 fuel assembly when subjected to a full-scale conical shaped charge attack, Jefferson, ff. Tr. 326, at 26; Licensee Ex. 3 at 2-3. The Battelle program, performed for NRC, utilized a ¼-scale cask containing irradiated fuel pins. Tr. at 355.

29. Health consequences were calculated using the following scenario: a three-assembly truck cask is successfully sabotaged in Manhattan during mid-afternoon of a week day. Licensee Ex. 3 at 4; Lahs _et_ _al_., ff. Tr. 346, at 15.

30. The Sandia Study indicated that less than 34 grams of respirable material would be released; the Battelle program indicated a release of less than 18 grams. _Id_. at 15. NRC considers the Sandia Study release results to be higher than releases would be under uncontrolled circumstances. The Sandia Study established that the release of this material would result in no early fatalities and an average of four latent cancer fatalities. _Id_. at 15. The Battelle program indicated that there would be no early fatalities and less than one latent cancer fatality. _Id_. Early fatalities are defined as those occurring within one year after exposure to the radioactive material. Licensee Ex. 3 at 93. Early latent cancer fatalities occur at any time after the initial exposure and are the result of that exposure. _Id_. These fatalities include early fatalities. Jefferson, ff. Tr. 326, at 28. When the maximum value is assigned to each factor in the

calculation, the maximum effect would be three early fatalities and fourteen latent cancers. Jefferson, ff. Tr. 326, at 28.

31. These predicted radiological consequences would be significantly reduced where, as in the case of the Surry-North Anna shipments, the fuel transported is 730-day-cooled fuel and the maximum population along the proposed route is 3.5% of the test population. Id. at 29. Under these circumstances, and applying maximum values, the maximum possibility drops to one-half a latent cancer for a successful sabotage in Richmond, Virginia, the most populous area along the proposed route. Id. Assuming that the attack were to occur in a remote area, the consequences would be reduced to zero.

32. The Board concludes that CCLC's concerns about the threat of sabotage against spent fuel shipments have no basis in fact. Not only are saboteurs unlikely to attack these shipments and to succeed in any such attack, but the maximum possible harm in a perfectly executed sabotage is one-half a latent cancer. CCLC presented no evidence to the contrary and did not cross-examine witnesses for the Licensee or the Staff on the subject. Tr. 354-355.

B. Human Error

1. Table S-4

33. The radiological and non-radiological environmental effects of transportation of spent fuel are examined in WASH-1238, "Environmental Survey of Transportation of Radioactive Materials To and From Nuclear Power Plants," December 1982, and in Supplement 1, NUREG-75/038, April 1985. For use in licensing

proceedings, these effects are summarized in Summary Table S-4, "Environmental Impact of Transportation of Fuel and Waste To and From The Light-Water-Cooled Nuclear Power Reactor." Smith (I), ff. Tr. 247, at 16; see 10 C.F.R. § 51.52.

34. Table S-4 was intended to provide a generic measure of fuel transport impacts where the particular fuel transport contemplated involves distances, population exposures, accident probabilities or other factors equal to or less than those assumed in developing the Table S-4 impact values. Statement of Considerations, 40 Fed. Reg. 1005 (January 6, 1975).

35. The parameters used in WASH-1238 are: number of shipments per year for two units -- 120; decay (cooling) time before shipment -- 150 days; distance shipped one way -- 1,000 miles; shipment duration -- 3 days; stops -- refueling, rest. Staff Ex. 1 at 27-28. For the proposed transshipment from Surry to North Anna the impacts are: numbers of shipments per year for two units -- 40; decay (cooling) time for shipment -- 730 days; distance shipped one way -- 177 miles, maximum, and 159 miles, preferred route; shipment duration -- 4 hours, 20 minutes, maximum; stops - none required. Staff Ex. 1 at 27-28.

36. Comparing the key parameters used in WASH-1238 for calculation of environmental effects through the use of Table S-4 with the parameters for the proposed transshipments from Surry to North Anna, the radiological impact of the latter would be less by a factor of 3 for number of shipments, a factor of about 2.5 for decay time and a factor of about 6 for distance shipped. No

credit is taken in these calculations for shorter shipment duration or fewer stops. Staff Ex. 1 at 28.

37. From these comparisons, the Staff concluded in its Environmental Assessment that the radiological impact on the environment would be less by a factor of at least 30 than that shown in Table S-4 and that, accordingly, the impact would be well within the scope of Table S-4. Staff Ex. 1 at 28.

38. In its Environmental Assessment the NRC Staff thus relied on Table S-4 to evaluate the environmental impact of the transportation activity associated with the proposed transshipment of spent fuel from Surry to North Anna, including potential accidents. Staff Ex. 1 at 27-28.

39. This B rd has ruled that, as a matter of law, the Staff properly relied on the values in Table S-4 in its Environmental Assessment. In the Matter of Virginia Electric and Power Co., (North Anna Power Stations, Units 1 and 2), Docket Nos. 50-338/339 OLA-1 (January 7, 1985).

40. The generic environmental impact analysis for transportation of radioactive materials in Table S-4 includes consideration of accidents caused by human error. Lahs et al., ff. Tr. 346, at 18. See also WASH-1238 at 16 and App. A. at 72.

41. Estimates in WASH-1238 indicate that the probable frequency of casks being improperly closed prior to shipment is very low. Lahs et al., ff. Tr. 346, at 18. WASH-1238 also concludes that the likelihood of an error, such as a package being used in a manner not in accordance with the design, is small in light of the regulatory requirements for quality assurance and

for various observations and tests before each shipment. Lahs et al., ff. Tr. 346, at 18.

42. The Staff agreed with the conclusions in WASH-1238 concerning the likelihood of human error. Id. at 18. The estimated frequency of improper cask closure due to human error as reported in WASH-1238 has been substantiated by the more recent NUREG-0170 (Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes). Id. at 18.

43. CCLC has presented no evidence on this issue.

44. The Board finds that the environmental impact of the transportation activity associated with the proposed transshipment of spent fuel, including potential accidents caused by human error, is within the scope of Table S-4 in 10 C.F.R. § 51.52 and, as will be seen from our Conclusions of Law below, need not have been addressed on a site-specific basis in this proceeding.

2. Cask description

45. The cask to be used for the Surry-to-North Anna shipments is the model TN-8L cask manufactured by Transnuclear, Inc. McCreery, ff. Tr. 220, at 3. The TN-8L cask is designed to carry three pressurized water reactor fuel assemblies, one in each of three compartments. Id. The cask cavity consists of three stainless steel square pressure vessels welded to an end plate and circular stepped top flange, separated by a T-shaped copper plate, and surrounded with boron carbide and copper plates. Id. The main shielding consists of 135 mm of lead, 26 mm of steel and 150 mm of resin. Id. A wet cement layer is located between the lead and the outer steel shell to reduce heat flow in the

event of fire. Id. Radial copper fins are welded to the outer shell and cover the surface of the cask between the end drums. Id. Each end of the cask is surrounded by stainless steel drums reinforced by radial gusset plates and filled with balsa wood. Id. A disk-shaped shock absorbing cover, constructed of carbon steel and balsa wood, is fastened to each drum with four, 1¼ inch bolts. Id. The cask has six trunnions, which are the structures by which the cask is handled. Id. Impact limiters are attached to the trunnions to reduce impact loads in the event of a side drop onto a trunnion. Id. at 3-4. Certain vent and drain lines that penetrate the inner cavity are equipped with positive closures. Id. at 4. All access ports are protected by the shock absorbing covers. Id.

46. NRC has issued a Certificate of Compliance certifying that the cask meets the safety standards in 10 C.F.R. Part 71. McCreery, ff. Tr. 220, at 4 and App. 2.

47. The main cask penetration is the opening on the top of the cask through which spent fuel is loaded and unloaded. McCreery, ff. Tr. 220, at 4. This opening is covered by a lid that is a welded stainless steel circular flanged shell containing lead and resin shields. Id. The lid is secured by sixteen 1¼ inch diameter bolts and is provided with a double seal consisting of two concentric Viton "O-rings" located within recessed grooves on the top flange. Id.

48. Three other penetrations lead to the fuel cavity -- the "A," "B" and "C" penetrations. Id. at 4-5. The "A" and "B" penetrations are located in the lid. Id. at 5. The "C"

penetration is located on the side of the cask near its bottom. Id. The "A" penetration passes through the lid and is 1½ inches in diameter. Id. at 4. The "A" penetration is used for cask evacuation and drying in the vacuum drying test, and for venting when the cask is being filled with water. Id. The "B" penetration is a penetration from the bottom of the lid that passes upward through a Hansen valved quick-disconnect fitting. Id. at 5. It is used to provide access for instrumentation to obtain pressure readings within the cask during cask handling operations, and for backfilling the cask with nitrogen. Id. When the cask first arrives, it is used to compare the pressures inside and outside the cask. Id. The "C" penetration is a penetration formed by the drain lines at the bottom of the cask that converge into a single Hansen valved quick-disconnect fitting. Id. It is used to drain water out of the cask and to fill the cask with water. Id.

49. The "A" penetration is sealed by the "A" plug, a lead-filled flanged cylinder that has one "O-ring" seal on the underside of the flanged portion and is secured to the lid by three bolts. Id. at 4-5. The "B" penetration is sealed by a circular flange with a single "O-ring" and is held in place by three bolts. Id. at 5. The Hansen valved connector acts as a second seal. Id. The "C" penetration is sealed by a flange cover, with one "O-ring" and three bolts. Id. Again, the Hansen valved connector acts as a second seal. Id.

50. The "D" opening is an opening into the lid that does not lead into the fuel cavity. Id. at 6. It is an access

port to the annulus between the two lid "O-rings." Id. It allows access from the top of the lid to the space between the two "O-rings" so that the integrity of the main lid "O-rings" can be checked. Id. It is sealed by a threaded plug with an "O-ring" on the underside of the head of the plug. Id.

51. The three bolts in the "A," "B" and "C" penetrations, the threaded plug in the "D" opening, and the 16 bolts in the lid are torqued to levels specified in the operating procedure, in a specified sequence. Id. The specified torque is applied to the bolts to compress the "O-rings" and to form a tight seal against the metal on both sides. Id. The Hansen valved connectors in the "B" and "C" penetrations act as a second seal. Id.

3. Safety-related design features

52. Both Staff and Licensee witnesses testified that certain design features of the model TN-8L cask minimize the potential for damage-producing human error in cask handling. Lahs et al., ff. Tr. 346, at 17-19; McCreery, ff. Tr. 220, at 7.

53. Some of the design features of the model TN-8L cask make errors less likely. Id. Some would minimize the effect of an error if one were committed. Id.

54. First, the cask is shipped "dry," i.e., with no water in the fuel cavities. Id. That precludes the development of steam pressures inside the cask, since there is no residual water that can turn to steam. Id. The absence of steam pressure reduces the possibility of a release of radioactive gas in the event an employee erred and, for example, failed to properly tighten the lid bolts, or failed to detect a defective seal. Id.

If no positive pressure exists inside the cask, there is no driving force to force radioactive gases outside the cask. Id. Also, the less pressure, the less chance for a seal to fail. Id.

55. Second, the casks were designed to carry fuel that has been discharged from the reactor only six months and is thus "hot" (thermally) with a decay heat of approximately eight kW per assembly. Id. at 8. The design parameters of the cask enable it to contain pressures of 105 psig, with a safety factor of three. Id. The Surry fuel that will be shipped to North Anna has been out of the reactors for over five years, with a heat output per assembly of less than two kW, and so is producing heat at only a fraction of the design capacity of the cask. Id. This is another important safety factor over and above the original design safety factor of three. Id.

56. Third, the fact that the fuel to be shipped is being selected from reactor discharges that indicated a low relative activity, and thus no major failures, also makes it less likely that a significant driving force would be created inside the cask. Id.

57. Fourth, the cask is designed to carry the maximum payload that can be transported by highway. Id. One unloading/loading cycle removes as much fuel as three loads in the only other available highway cask model. Id. The likelihood of handling errors is thus decreased during any given shipping campaign, since the Licensee will need one-third as many shipments with the model TN-8L cask. Id.

58. Fifth, while only one seal for each penetration will satisfy NRC requirements, the cask features double seals for the lid opening and two of the other three penetrations into the cask cavity. Id. at 8-9; Lahs, et al., ff Tr. 346, at 19; Tr. 224. The NRC Staff testified that based on the cask closure design of the TN-8L cask, as well as on the cask handling procedures, a release of radioactive material due to employee error is unlikely. Lahs et al., ff. Tr. 346, at 17-18.

59. Sixth, the cask uses seals made of a rubber-like material (Viton) rather than metallic seals. McCreery, ff. Tr. 220, at 9. A seal containing this rubber-like material is less susceptible to damage than a metallic seal, in that if it is deformed during handling operations it will regain its original shape. Id. This minimizes the possibility of additional handling, which would be required if a seal had to be changed, and thus decreases the likelihood of error. Id.

60. Seventh, the cask is relatively simple in design. Id. The simplicity of design results in easy-to-follow operating procedures. Id. The less complicated the operation of the cask, the less likely it is for an error to occur. Id. And, if an error occurred, it would be easily detected and corrected. Id.

61. Eighth, the cask is designed pursuant to 10 C.F.R. § 71.73 to withstand severe accidents without significant damage. It is designed to withstand a 30 foot drop onto an essentially unyielding surface, a side drop of 40 inches onto a 6-inch diameter steel bar, exposure for not less than 30 minutes to a fire of not less than 1475°F. and immersion under at least three feet of water

for not less than eight hours. McCreery, ff. Tr. 220, at 9-10; Tr. 226.

4. Cask handling procedures

62. From the time the empty cask is removed from the truck until it is placed back on the truck filled with spent fuel, the following procedures are prescribed:

1. Cask protective devices are removed.
2. Cask is taken to decontamination area.
3. Skirt (cover) is placed on it, so that radioactive contamination will not accumulate on fins while the cask is in the spent fuel pool.
4. Sixteen bolts that engage the cask lid are removed.
5. Cask is filled with water and then moved to the loading station in the pool.
6. Cask lid is removed while cask is under water.
7. Cask lid is lifted above the water with a crane.
8. Seals are inspected for defects.
9. Seals that have defects are replaced.
10. Three assemblies are loaded into the cask.
11. Cask lid is replaced while cask is under water.
12. Cask is lifted partially out of water, and four bolts are replaced, hand-tight, in lid.
13. Cask is moved to decontamination area, and the remaining 12 bolts are installed.
14. Numbered template prescribing the order for bolt tightening is placed on the cask.

15. All 16 bolts are tightened to 290 ft. lbs. with calibrated torque wrenches.
16. Water in cask is drained (gravity draining) through penetration "C."
17. Leak tightness of the lid seal is checked through the "D" opening.
18. Air is evacuated from the cask.
19. Any remaining moisture is evaporated by the vacuum drying system.
20. When pressure inside cask is less than 20 millibars, cask is tested for 10 minutes. If pressure increases no more than three millibars duing this time the seals are working and the cask is dry (vacuum drying test).
21. Evacuated cask is back-filled with nitrogen to prevent oxidation of the fuel.
22. Cask is back-filled with nitrogen to one atmosphere, in order to equalize the pressures inside and outside the cask.
23. Remaining penetrations into the cask are checked under vacuum for leak-tightness.
24. Skirt is removed, and the cask is ready to be moved to truck.
25. Cask is secured to its specially designed trailer by a system designed to restrain the cask in all three motion modes.

26. Cask protective devices are attached to ends and trunnions. Security seals are attached at each end.

27. Procedures are repeated when the shipment reaches its end destination and the cask begins its descent into the fuel pool.

McCreery, ff. Tr. 220, at 14-16; see Licensee Exs. 1 and 2.

63. A supervisor watches as the operator performs each step of the operating procedure. McCreery, ff. Tr. 220, at 16. The supervisor's responsibility is to ensure that the operators perform each step in the proper sequence and as prescribed by the operating procedure. Id. The procedure contains a "check-off" space beside each step delineated to verify that each step has been properly performed. Id. at 16-17.

64. In addition, whenever a step is taken that requires that its performance be verified by readings of pressure, torque or visual examination, these values or attributes are confirmed by a quality control representative. Id. at 17. Required quality control checkpoints provide an additional layer of assurance during the performance of the more important steps. Id.

65. The cask handling procedures are thorough rather than complex. Id. They conservatively require checks and double checks. Id. Not only is a seal visually inspected, id. at 10, and then subjected to a leak test, id, but it is also replaced annually, despite a five year shelf-life, whether or not it is deteriorated, id. at 12. It is then subjected to a still more

demanding leak test. Id. The drying test is also a verification of proper installation of the lid seals. Id. at 11.

66. The procedures also include "self-checking" operations, i.e., procedures that would make manifest any earlier mistake. Id. at 17-18. For example, the "dryness" test under vacuum will not pass if the lid or penetration bolts are not in place, or if the cask is not drained of water, or if the seals are defective. Id. at 18.

67. There is a great deal of redundancy in leakage barriers and in the tests performed on them, and so any error would likely be found by test or negated by a redundant leakage barrier. Lahs et al., ff. Tr. 346, at 20.

68. The cask handling procedures are based on over 500 cask-years' operating experience. McCreery, ff. Tr. 220, at 17. Similar casks have been used in Europe since the 1970's. Id. There have been at least 50 loadings and unloadings in the United States. Id. The cask handling procedures to be used in the shipment from Surry to North Anna evolved from this operating experience and from knowledge gained through technical investigations. Id. The operating history of similarly designed casks attests to the cask design benefits and to the success of the operating procedures. Id. at 20.

69. A generic operating procedure has been approved by NRC along with the cask's Safety Analysis Report. Id. at 17. The site-specific procedures have been reviewed and verified by Transnuclear, Inc. to conform to the generic requirements. Id.

70. Licensee's employees have been trained to properly implement the cask handling procedures. Pickworth, ff. Tr. 222, at 3.

71. The employees that will be involved in shipping the Surry fuel have had seven hours of classroom instruction in cask handling and have become certified operators after completing an 80-hour course in crane operation and rigging by the Crane/MIT Operator School. Id. These employees also obtained hands-on experience with the cask at the Allied Gulf Nuclear Services facility in Barnwell, South Carolina in August, 1983. Id. at 2-3. Additionally, these employees have gone through a "dry-run" (without fuel) that took place at Surry in November 1983. Id. at 3. A refresher course will be given, informing employees of any minor changes in cask handling procedures before any spent fuel is shipped. Id.

72. We found above that the effects of human error in cask handling are reflected in the values in Table S-4, and need not have been explored at all in this proceeding. We find in addition that, in any event, the probabilities and consequences of human error in cask preparation have been analyzed thoroughly on the record in this proceeding, and that the analysis supports the conclusion that Licensee's proposal will not significantly affect the quality of the human environment, since the design features of the cask, and the handling procedures that Licensee plans to use, make insignificant the likelihood and effect of any human error in preparing casks for shipment.

C. The Dry Cask Storage Alternative

1. Need for additional spent fuel storage space

73. The spent fuel storage capacity of the Surry Units 1 and 2 spent fuel storage pool is 1,044 spent fuel assemblies. Smith (I), ff. Tr. 247, at 3. At the end of 1985, 886 of the fuel storage spaces in the Surry pool will be occupied. Id. at 2 and App. 2. Thus, at the end of 1985 the Surry spent fuel pool storage racks will contain 158 vacant spaces. Id. at 3.

74. Each of the two Surry reactor cores contains 157 fuel assemblies. If the reactor core from either Surry Unit must be discharged, to permit either inspections or maintenance activities, 157 spaces must be available to store the spent fuel. Id. at 3. We shall refer to these 157 spaces as "full core reserve." Id.

75. The Licensee has carried out several full core discharges in the past. Id. The Licensee presently plans a full core discharge at Surry during 1986 in order to carry out required inspections. Tr. 261.

76. If the Licensee were required in the future to remove a full fuel core from a Surry Unit in order to perform an inspection or work essential to continued operation, and if there were inadequate space to store the 157 fuel assemblies comprising the core, an outage would result and would last until additional space could be made available. Smith, ff. Tr. 247, at 3. This outage would be long and expensive. Id. The Licensee estimates that the cost of replacing the power from a single off-line Surry Unit would be $300,000 per day. Id. Thus, prudent operation

requires that the Licensee make every reasonable effort to maintain full core reserve. Id.

77. The wisdom of maintaining full core reserve has been confirmed recently by the NRC. In findings issued pursuant to § 135(b)(2) of the Nuclear Waste Policy Act of 1982, 42 U.S.C. § 10155(b)(2) (1982) (NWPA), the Commission made a generic determination that maintenance of full core reserve is necessary for continued, orderly operation of a nuclear power plant. See 50 Fed. Reg. 5548-67 (1985); Smith (I), ff. Tr. 247, at 3-4.

78. The Licensee currently plans to refuel Surry Unit 1 beginning July 5, 1986. Id. at 4. This date assumes that Surry Unit 1 will be operated beyond its normal end-of-cycle date in a "coastdown" mode. Id. But if Surry Unit 1 were to operate at a higher than anticipated capacity factor prior to the 1986 outage or if an unplanned shutdown were to occur during the "coastdown", the refueling outage now scheduled for July 5, 1986, could start several weeks before that date. Id.

79. The Licensee plans to discharge 56 fuel assemblies during the 1986 Surry Unit 1 outage. Id. at 5. This would leave only 102 vacant fuel spaces in the Surry spent fuel pool, 55 fewer than necessary to maintain full core reserve. Id. Thus, at least 55 fuel assemblies must be removed from the Surry spent fuel pool and stored elsewhere prior to the end of the 1986 Surry Unit 1 refueling outage. Id. In fact, for reasons set out in the following Finding, these 55 assemblies ought to be removed before the Surry Unit 1 1986, outage begins. Id.

80. The Licensee would prefer to avoid transshipping spent fuel between Surry and North Anna while a refueling outage is in progress at either Station. Id. This is because refueling outages are periods of intensive activity, and work that may increase the length of an outage should be avoided in order to minimize outage duration and replacement power costs. Id. Shipment of spent fuel involves use of facilities in the spent fuel pool that are also needed during outages for core off-loading and on-loading. Id. Also, some of the personnel required for spent fuel shipments would have conflicting responsibilities during a refueling outage. Id. The Licensee presently has outages scheduled for North Anna Unit 1 during the period November 1 through December 19, 1985, and for North Anna Unit 2 during the period April 25 through June 12, 1986. Id. at 5 and App. 3.

81. In addition, the Licensee would prefer to avoid planning for spent fuel shipments during the period from mid-December through February because of the higher probability that bad weather would result in delays in the shipment of spent fuel. Id. at 5. Such delays would result in increased cask lease charges and personnel costs. Id. at 6.

82. The Board believes that the Licensee's desire to avoid shipping during a refueling outage at either Station, and during the mid-December through February period, is prudent. That being so, the Licensee needs to remove at least 55 spent fuel assemblies from the Surry spent fuel pool before the 1986 Surry Unit 1 refueling period. Id. This limits the "windows"

for transshipment to September and October 1985 and March and April 1986.

83. The Licensee also has an outage scheduled for Surry Unit 2 during the period October 17 through December 14, 1986, id. at App. 3, and it plans to discharge an additional 60 assemblies during that outage, id. at App. 2. Thus, prior to that outage, the Licensee must have provided storage space outside the pool for both the 55 Surry Unit 1 assemblies, discussed above, and these 60 Surry Unit 2 assemblies.

2. Dry cask storage

84. CCLC argues that consideration has not been given to the alternative of constructing a dry cask storage facility at the Surry Station and that dry cask storage "is feasible, can be effected in a timely manner, is the least expensive and safest method for at least 50 years, and can be used on or off site." See Consolidated Contention 1.

85. Dry cask storage involves the storage of spent nuclear fuel in large metal casks (dry casks) that, in the Licensee's case, would be stored on site at the Surry Power Station. Smith (I), ff. Tr. 247, at 6. Although the Licensee filed the application at issue in this proceeding, it has continued to pursue the dry cask storage alternative. Id. In fact, the Licensee has (a) applied to NRC for a license for a dry cask storage facility at its own Surry Power Station and (b) entered into a cooperative development program with DOE designed to demonstrate the feasibility of dry cask storage. Id. at 7-11.

86. In October 1982, the Licensee submitted to NRC a license application under 10 C.F.R. Part 72 for a dry cask storage facility at the Surry Power Station. Id. at 7. The facility would consist of concrete pads and security facilities, which would be built by the Licensee, and dry storage casks, which the Licensee would purchase from one or more cask vendors. Id. The NRC Staff issued its Environmental Assessment for the proposed dry cask storage facility on April 12, 1985. Id.; Lahs et al., ff. Tr. 346, at 23; see Staff Ex. 3. The conclusions embodied in that document are described below. With respect to the public health and safety aspects of the application, the Licensee has answered most of the questions received from NRC, and NRC estimated during the hearing that its review of the application might be completed during the late spring of 1985. Tr. 350. On April 10, 1985, the Licensee requested permission from NRC to begin construction of the dry cask facility at Surry. Smith (I), ff. Tr. 247, at 7. The Licensee estimates that approximately 10 months will be required to build the dry cask facility. Id. The testimony revealed that if the Licensee were to receive an early construction authorization from NRC, construction could begin as early as June 1985.[1/] Id. at 8. In that event, the dry cask facility could be ready for operation as soon as April 1986. Id. If, on the other hand, the early construction authorization were denied

[1/] On June 10, 1985, after the record was closed in this proceeding, NRC advised the Licensee that it "does not intend to invoke legal bars" to the pre-license construction work proposed by the Licensee.

and issuance of the license occurred, for example, in September, the facility would not be ready until August 1986. Id.

87. The Licensee has ordered the first dry storage cask for use in the facility. Id. The cask, which will hold 21 assemblies, is scheduled for delivery in November 1985. Id. The Licensee testified that it expected to order four additional casks during May 1985. Tr. 255. The Licensee plans to order still more casks for Surry as often as necessary to maintain full core reserve in the Surry fuel pool. Smith (I), ff. Tr. 247, at 8. Once the facility is completed, the first cask is delivered, and personnel training is finished, the 21 assemblies could be loaded into the first cask in about a week. Id.

88. Pursuant to § 218(a) of NWPA, 42 U.S.C. § 10198(a) (1982), the Licensee and DOE signed a Cooperative Agreement on March 29, 1984, to conduct a dry cask storage demonstration program. Id. The program will consist of (a) a NRC-licensed demonstration at the Surry Power Station, using the facility described in Proposed Finding 86 above, and (b) research and development activities to be conducted by DOE at a Federal site. Id. at 9. Pursuant to the Cooperative Agreement, the Licensee had, at the time of the hearing, ordered two storage casks for delivery to the Federal site, one with a 21-assembly capacity and one with a 24-assembly capacity. Id. The former was delivered in December 1984, and the latter is scheduled for delivery in February 1986. Id. In addition, at the time of the hearing, the Licensee was in the process of ordering a third cask, this one with a capacity of

24 assemblies. Id. This third cask is scheduled for delivery in September 1985. Id.

89. At the time of the hearing DOE was scheduled to begin receiving Surry spent fuel for storage in the already-delivered cask in July 1985. Id. These shipments were expected to take about two months. Id. If this program was completed on schedule, the number of assemblies that would have to have been removed from the Surry spent fuel pool prior to the July 5, 1986, outage at Surry Unit 1 would have been reduced by 21 assemblies, leaving 34 assemblies to be removed in order to reserve full core preserve after that outage. Id. Shipment of spent fuel for the next cask, consisting of 24 assemblies, was scheduled to begin in October 1985 and to require about two months. Id. Successful completion of this portion of the program would leave the Licensee ten spaces short of full core reserve after the 1986 Surry Unit 1 refueling period. Id. If another cask were delivered, as planned, in February 1986, shipment of 24 additional assemblies could begin in March or April of that year. Id. Thus, if all three of these shipping campaigns were carried out more or less on schedule, full core reserve would be assured, without any shipments to North Anna, for the period immediately following the Surry Unit 1 outage and until the October 17, 1986, outage at Surry Unit 2. Id. at 11; see Tr. 258. Even so, an additional 46 assemblies would have to be removed from the Surry pool before the October 17, 1986, Surry Unit 2 outage. See Smith (I), ff. Tr. 247, at App. 2. Of course, if the Surry dry cask facility were licensed by NRC and completed in early-to-mid 1986, it could be used to avoid the

loss of full core reserve during the October 17, 1986, Surry Unit 2 outage and thereafter. See Proposed Finding 86, supra.

90. The Licensee would prefer to use dry cask storage and forego shipping from Surry to North Anna to the extent consistent with the preservation of full core reserve at Surry. Smith (I), ff. Tr. 247, at 11. The foregoing discussion, of course, reveals that chances are very good that the Licensee's dry cask options will materialize in time to avoid the necessity for shipping fuel from Surry to North Anna at this time. Nevertheless, the Cooperative Agreement Program, involving as it does a maximum of four casks, would not, in the best of circumstances, permit the preservation of full core reserve indefinitely. The Licensee hopes, of course, that an NRC license for the proposed Surry dry cask storage facility will be issued during 1985, but that license has not yet been issued. It is conceivable, moreover, that the license will not be issued or that, if issued, it might be revoked by NRC at some future date for reasons that cannot now be foreseen. Id. at 18. If that were to happen, the Licensee would have no immediately available option for providing additional storage for its Surry spent fuel unless it could ship spent fuel assemblies from Surry to North Anna. Id.

91. In addition, § 111(a)(5) of NWPA, 42 U.S.C. § 10151(a)(1) (1982), explicitly makes utilities primarily responsible for interim storage of their spent nuclear fuel until a Federal repository is available. The Act provides for limited Federal interim storage for utilities, but only if they are unable to provide their own storage through the use of transshipment,

dry cask storage or new fuel pools. 42 U.S.C. § 10155(b)(1)(A), (B) (1982). Indeed, utilities are required by 10 C.F.R. Part 53, if they are to qualify to use Federal interim storage, to demonstrate to NRC that they have "diligently" pursued these options. Id. In the event that both dry cask storage and transshipment were unavailable, the Licensee might have to apply for Federal interim storage. Id. The Licensee could qualify for Federal interim storage only if it could show that it had diligently pursued the authorization for receipt and storage of Surry fuel at North Anna that it seeks in this proceeding. Thus, given its shortage of spent fuel storage space at Surry, Licensee has little choice but to seek the authorization that is the subject of this proceeding.

92. In light of the foregoing discussion of the Licensee's efforts to utilize dry cask storage, we conclude that the use of such storage is "feasible", provided that the NRC ultimately issues a license for the Licensee's proposed Surry dry cask storage facility.

93. With respect to the "availability" of dry cask storage, the record in this proceeding, as reflected in the foregoing discussion, indicates that dry cask storage at the Federal facility pursuant to the Cooperative Agreement Program may have become available by the time this Initial Decision is issued. As we stated in Proposed Finding 90 above, however, that program involves only four casks and thus provides at best only short-term relief for the Licensee. The best that can be said for the Licensee's proposed Surry dry cask storage facility, based on the

record before us, is that it is not now available, because NRC has not yet issued a license for it.

3. Comparative costs

94. The cost of actual transshipment of spent fuel from Surry to North Anna is estimated at $15/kgU. Id. at 12. The cost of storing intact spent fuel at Surry in dry casks would be in the range of $70 to $90 per kgU. Id. at 13. It is possible that the fuel stored in dry casks could be stored in consolidated form by removing the fuel pins from the grids and storing them in cans such that the equivalent of two assemblies could be stored in the space that would be occupied by one intact assembly. Id. at 9. Estimates for consolidation run from $10 to $25 per kgU. Id. at 13, 15. If consolidation should cost $10 per kgU, the cost of dry cask storage at Surry would range from $45 to $55 per kgU. If consolidation should cost $25 per kgU, the cost of dry cask consolidated storage at Surry would range from $60 per kgU to $70 per kgU.

95. Each fuel assembly shipped from Surry to North Anna, however, would occupy a space in the North Anna spent fuel pool that would otherwise be available for a North Anna spent fuel assembly. Id. at 14. Since the North Anna pool will accommodate North Anna fuel only until 1998, absent shipments from Surry, and a Federal repository is not expected to be available until at least that year, Tr. 251, additional storage would probably have to be provided at North Anna eventually if Surry fuel assemblies are stored there, Smith (I), ff. Tr. 247, at 14. The Licensee foresees two options being available for providing

the additional space at North Anna if that should become necessary. Id.

96. First, the fuel at North Anna might be consolidated. Id. The North Anna pool has been designed to accommodate consolidated fuel. Id. If consolidation were to cost \$10 per kgU, then the cost of replacing the North Anna space occupied by Surry fuel would be \$20 per kgU. This \$20 would be added to the \$15 per kgU cost of shipment and would result in a total cost of \$35 per kgU for storing Surry fuel at North Anna, Tr. at 269, which is less than the \$45 to \$55 per kgU that consolidated dry cask storage at Surry would cost.

97. If consolidation were to cost \$25 per kgU, then the cost of the additional space at North Anna, required because of the Surry-to-North Anna shipments, would be \$50 per kgU. This sum, added to the \$15 per kgU for shipment, would result in a total cost for storing Surry assemblies at North Anna of \$65 per kgU, just in the middle of the \$60 to \$70 per kgU cost range for retaining the fuel in consolidated form at a Surry dry cask facility. Smith (I), ff. Tr. 247, at 14-15.

98. If consolidation were to be prohibitively expensive, the Licensee could ultimately provide added storage at North Anna by installing dry casks there. Id at 15. The resulting cost would be the \$70 to \$90 per kgU cask cost plus the \$15 per kgU shipping costs. This would be \$15 per kgU more than the cost of storing the intact fuel at Surry in dry casks. But, of course, the dry casks would not have to be purchased for perhaps 10 years,

id. at 15, and so the effective difference in cost of these options may be smaller than it appears.

99. In any event, given the broad range of estimates of the cost of consolidation found in this record, we conclude that the ultimate costs of (a) shipping assemblies from Surry to North Anna and (b) retaining them at Surry in dry casks would not differ significantly.

4. Comparative environmental effects

100. With respect to environmental effects, the NRC Staff has prepared an Environmental Assessment of the Licensee's proposal to store 500 Surry spent fuel assemblies at its North Anna Power Station. See Staff Ex. 1. The Staff concluded that this action, together with the transshipment of the 500 assemblies from Surry to North Anna, would not "significantly impact on the quality of the human environment." Id. at 3. As we found above, neither the risk of sabotage nor the risk of human error in preparation of the casks for shipment undermines the Staff's conclusion.

101. The Staff's Environmental Assessment does not discuss the environmental implications of alternatives to the Licensee's proposal at issue in this proceeding. As will be seen from our Conclusions of Law, stated below, we do not believe this omission is improper in this case, because we have concluded (a) that no Environmental Impact Statement is required and (b) that there are no unresolved conflicts involving alternative uses of resources, within the meaning of § 102(2)(E) of the National Environmental Policy Act.

102. Nevertheless, the record before us in this proceeding adequately analyzes the environmental implications of the dry cask alternative. As we pointed out in Proposed Finding 86, above, the Staff published on April 12, 1985 an Environmental Assessment of the Licensee's proposal to construct a dry storage cask facility at its Surry Power Station (the Surry EA). See Staff Ex. 3. The Surry EA examines a wide-range of alternatives. See id. at 8-14. It includes a description of the proposed Surry dry cask facility. See id. at 29-36. It analyzes the impacts of construction on land use and terrestrial resources, on water use and resources, on air quality and on noise levels. See id. at 39-40. The Surry EA also examines the expected operational effects of the facility including those due to direct radiation, to radioactivity releases in gaseous effluents and to radioactivity releases in liquid effluents. See id. at 41-51. It analyzes off-site dose commitments to individuals and to the nearby population, as well as collective occupational dose commitments. See id. at 42-44. The Surry EA reviews the potential environmental effects of accidents and the potential for sabotage attacks on the facility. See id. at 45, 56-58. The analysis concludes that no significant construction impacts are anticipated, that the radiological impacts from liquid and gaseous effluents during normal operation will fall within the scope of the impacts evaluated for reactor operations that were assessed in the Surry Units 1 and 2 Final Environmental Impact Statements, that the radiological impacts due to potential accidents are only a small fraction of acceptable limits, and that no significant non-radiological impacts are expected during operation.

See id. at 60-61. The document's ultimate conclusion is that the dry cask facility at Surry will not significantly affect the quality of the human environment. See id. at 61-62. There is no evidence whatever in the record to call into question any of the Staff's conclusions, and we adopt those conclusions as our own.

103. In short, we find that neither the proposal before us nor the dry cask alternative proposed by the Licensee would involve any significant effect on the quality of the human environment. There is, then, no basis on this record for concluding that either proposal is environmentally preferable to the other.

5. Use of resources

104. The proposed action will not involve any noteworthy conflict in the use of resources such as lead, steel, copper, resin, cement, labor vehicles and casks. Lahs et al., ff. Tr. 346, at 24. Presumably, CCLC will contend that there is an unresolved conflict over the "resource" represented by the remaining storage space at North Anna. See Tr. 259. Even if the space is viewed as a "resource" within the meaning of § 102(2)(E) of NEPA, however, we find no "unresolved conflict" over the use of the space. On the contrary, as Mr. Smith testified for the Licensee, any North Anna space preempted by Surry fuel can be replaced when needed either by consolidating fuel in the North Anna pool or by installing dry casks at North Anna. Smith (I), ff. Tr. 247, at 14. Moreover, the Surry fuel could be removed from its original resting place in the North Anna pool and either consolidated or put in dry casks at North Anna in the future if that should be deemed necessary. CCLC has introduced no testimony that suggests

an unresolved conflict over the use of the North Anna space, and we conclude that none exists.

III.

Conclusions of Law

1. Based on the analysis set out in the Staff's Safety Evaluation Report, see Staff Ex. 2 at 4-3, and the conclusions reached in Proposed Findings of Fact 5 through 32, above, the Board finds (a) that the probabilities and consequences of accidents occurring during the transportation of spent fuel casks from the Surry Station to the North Anna Station which might be occasioned by acts of sabotage have been adequately analyzed and (b) that, in light of such probabilities and consequences, the issuance of the operating license amendment requested by the Licensee will not significantly affect the quality of the human environment.

2. The probability and consequences of accidents occurring during transportation of spent fuel casks from the Surry Station to the North Anna Station which might be occasioned by error of Licensee's employees in preparing the casks for shipment are reflected in the values of Table S-4, 10 C.F.R. § 51.52, and need not be reexamined in this proceeding.

3. Notwithstanding Conclusion 2, based on Proposed Findings of Fact 33 through 72, above, the Board concludes (a) that the probabilities and consequences of accidents which might be occasioned by error of Licensee's employees in preparing the casks for shipment have been adequately analyzed and (b) that, in light of such probabilities and consequences, the issuance of the

operating license amendment requested by the Licensee will not significantly affect the quality of the human environment.

4. The Staff's Finding of No Significant Impact with respect to the Licensee's proposal is correct, and, therefore, the Staff correctly concluded that it need not prepare an Environmental Impact Statement.

5. This proceeding does not involve an unresolved conflict with respect to alternative uses of resources within the meaning of § 102(2)(E) of NEPA.

6. In light of Conclusions 4 and 5, the Staff was not required to include in its Environmental Assessment a discussion of alternatives to the Licensee's proposed action.

7. In any event, as reflected in Proposed Findings of Fact 84 through 103, the dry cask alternative has received adequate consideration in this proceeding. There is no basis in the record or in law for concluding that the dry cask alternative is preferable to the Licensee's proposal or that authorization for the latter should be denied. Indeed, §§ 111(a)(5) and 135(b)(1)(B) of NWPA reflect a clear congressional policy in favor of authorizing the receipt and storage of up to 500 Surry spent fuel assemblies at North Anna.

ORDER

WHEREFORE, in accordance with the Atomic Energy Act of 1954, as amended, and the Rules of Practice of the Commission, and based on the foregoing Findings of Fact and Conclusions of Law, IT IS ORDERED that:

1. The Director of Nuclear Reactor Regulation is authorized to issue to the Licensee, Virginia Electric and Power Company, and to Old Dominion Electric Cooperative, an amendment to their North Anna Units 1 and 2 operating licenses (NPF-4 and NPF-7) to permit the receipt and storage of 500 spent fuel assemblies from the Surry Power Station, Units 1 and 2 (Docket Nos. 50-338/339 OLA-1).

2. Pursuant to 10 C.F.R. § 2.760 of the Commission's Rules of Practice, this Initial Decision shall become effective immediately. It will constitute the final decision of the Commission forty-five (45) days from the date of issuance, unless an appeal is taken in accordance with 10 C.F.R. § 2.762 or the Commission directs otherwise. See also 10 C.F.R. §§ 2.764, 2.785 and 2.786.

Any party may take an appeal from this decision by filing a Notice of Appeal within ten (10) days after service of this Initial Decision. Each appellant must file a brief supporting its position on appeal within thirty (30) days after filing its Notice of Appeal, forty (40) days in the case of Staff. Within thirty (30) days after the period has expired for the filing and service of briefs of all appellants, forty (40) days in the case of Staff, a party who is not an appellant may file a brief in support of or in opposition to the appeal of any other party. A responding party shall file a single responsive brief only, regardless of the number of appellants' briefs filed. (See 10 C.F.R. § 2.762.)

IT IS SO ORDERED.

FOR THE ATOMIC SAFETY AND LICENSING BOARD

____
Sheldon J. Wolfe, Chairman
ADMINISTRATIVE JUDGE

____
Dr. Jerry R. Kline
ADMINISTRATIVE JUDGE

____
Dr. George A. Ferguson
ADMINISTRATIVE JUDGE

Bethesda, Maryland

______________, 1985

CERTIFICATE OF SERVICE

I hereby certify that I have this day served Licensees' Post-Hearing Brief upon each of the persons named below by depositing a copy in the United States mail, properly stamped and addressed to him at the address set out with his name.

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By: /s/ Michael W. Maupin
Michael W. Maupin, Counsel for
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Dated: June 21, 1985