UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
OFFSHORE POWER SYSTEMS	)	Docket No. STN 50-437
	)	
(Floating Nuclear Power Plants)	)	

NUCLEAR REGULATORY COMMISSION STAFF'S PROPOSED PARTIAL FINDINGS OF FACT IN THE FORM OF A PROPOSED INITIAL DECISION

August 24, 1979

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I. PRELIMINARY STATEMENT AND DESCRIPTION OF THE RECORD

1. The NRC Staff (Staff) concurs in and adopts Applicant's proposed findings 1 through 33 subject to the following modifications:

A. After the last sentence of paragraph 27 add the following:

> On May 25, 1979, the Board issued a memorandum and order denying NRDC's motion for summary disposition and granting the Applicant's and Staff's cross motions for summary disposition. The Board found that section 102(2)(C) of NEPA does not require the preparation of a comprehensive programmatic environmental statement covering more than the eight FNP's before proceeding to approve the specific pending application to manufacture eight FNP's. The Board found that the Staff's final environmental statement complies with section 102(2)(C) in addressing the proposed action, and that the scope of the FES was proper given circumstances of this proceeding.

B. In paragraph 30 strike everything after "April 24, 1978" in the fourth line and substitute the following:

> On April 17, 1978, the Applicant filed a pleading with the Appeal Board in which it opposed certification of the Staff appeal regarding the authority of this Board on schedule matters but cross petitioned seeking an order of the Appeal Board directing certification of the Class 9 accident issue.

II. FINDINGS OF FACT - HEALTH AND SAFETY

2. The Staff concurs in and adopts Applicant's proposed findings 34 through 37 subject to the following modifications:

A. In paragraph 51 add the following reference to the parentheses in the second line: "SER, Section 1.9."

B. In paragraph 54 delete the word "the" in the last line and substitute "eight."

C. In paragraph 55 delete the words "Section 1" from the parentheses in line 7 and substitute "Chap. 20." In the same paragraph, strike the word "the" in the last line and substitute the word "eight."

III. FINDINGS OF FACT - COMPLIANCE WITH THE NATIONAL ENVIRONMENTAL POLICY ACT (NEPA), SECTIONS 102(2) (C) AND (D), AND 10 CFR PART 50, APPENDIX D (NOW 10 CFR PART 51) AND APPENDIX M

3. The Staff concurs in and adopts Applicant's proposed findings 58 through 62 with the following modification:

A. In paragraph 62, line 10, delete everything after the word "facility" and add the following findings:

(1) The FES concludes that the manufacturing license for eight FNP's should be issued, subject to the following conditions for the protection of the environment:

1. A comprehensive environmental monitoring program, which is acceptable to the staff, will be conducted to determine the environmental effects resulting from the manufacturing and preoperational testing activities at the manufacturing facility located on Blount Island, Jacksonville, Florida. In particular,

the applicant will include in his monitoring program those specifically recommended items indicated in Section 5 of the Final Environmental Statement, Part I (NUREG-75/091).

2. Before engaging in any manufacturing activity which may result in a significant adverse environmental impact that was not evaluated or that is significantly greater than that evaluated in the Final Environmental Statement, Part I (NUREG-75/091), the applicant shall provide written notification to the Director, Office of Nuclear Reactor Regulation.

3. If unexpected harmful effects or evidence of irreversible damage are detected during the manufacture or preoperational testing of the floating nuclear plants, the applicant shall provide an acceptable analysis of the problem and a plan of action to eliminate or significantly reduce these harmful effects or this damage.

4. The applicant shall replace the concrete pad beneath the reactor vessel with a pad constructed of magnesium oxide (See Appendix E) or other equivalent refractory material, that will provide increased resistance to melt-through by the molten reactor core in the event of a highly unlikely core-melt accident and which will not react with core-debris to form a large volume of gases. The pad should be as thick as practical, taking into account space availability and applicable design and operating considerations, but not thinner than the concrete pad currently proposed. The proposed efractory material and pad design should not compromise safety requirements and the applicant shall obtain NRC approval of major elements of the FNP hull structure.

(FES-III, p. xv).

(2) In addition, the FES concludes that all applicants who may, in the future, file applications with the NRC for construction permits to site and operate FNP's at specific locations, must comply with the following siting requirements:

A. Provide an assessment of actions that will be taken by the owner/operator of an FNP, including source and pathway interdiction methods, that would provide further protection to the public, and the operating staff and the environment, in the event of a highly unlikely core-melt accident by taking advantage of the delay in core melt-through provided by the magnesium oxide (or equivalent) pad beneath the reactor vessel.

B. Proposed FNP sites in estuaries, rivers or near barrier islands must be appropriately modified in an environmentally acceptable manner such that in the event of a core-melt accident, the release of radioactive material into the surrounding water body shall be limited to levels that will not result in undue impact to man or the ecosystem.

(Id.)

(3) Further, as the result of its agreement with the Environmental Protection Agency, the Staff concluded that some or all of the following requirements should apply, if appropriate, to applicants who wish to site FNP's in rivers, estuaries or in the vicinity of barrier islands:

A. Demonstrate techniques for restoring the bathymetric characteristics of dredged areas at the FNP site.

B. Demonstrate techniques for restoring hydrological characteristics of the natural estuarine and barrier island ecosystem processes, for example, circulation patters, salinity gradients, and the transport and deposition of sediment.

C. Demonstrate techniques for reestablishing original plant communities and wildlife habitat to self-sufficiency in areas where wetlands or landforms have been disturbed or destroyed.

D. Demonstrate techniques for repopulating and reestablishing brackish/marine water areas with original species, including diadromous species.

E. Demonstrate techniques for reestablishing barrier island natural processes such as "dune building," beach "retreating," and overwash and inlet development.

F. Demonstrate mitigative actions to replace a loss of fish, plant or wildlife productivity.

(FES-III, p. xvi).

(4) More specifically, the Staff will require an applicant who wishes, in the future, to site an FNP in a river, estuary or in the vicinity of a barrier island to address whether there is a potential

that siting an FNP at the proposed site would disturb basic physical-chemical processes and thereby adversely affect biological community dynamics and the ecosystem. If so, the applicant must demonstrate, prior to the issuance of a construction permit, that it can and will comply with as many of the six requirements set forth above as are pertinent to the chosen site.

(Id.)

(5) The Staff review was supplemented by its evidentiary presentations at the hearing. These are discussed in Section IV, infra.

IV. THE FINDINGS OF FACT RE: CONTENTIONS ADMITTED AS ISSUES IN CONTROVERSY, BOARD QUESTIONS, AND OTHER MATTERS

A. CONTENTION I - EMERGENCY POWER

5. The Staff concurs in and adopts the Applicant's proposed findings 63 through 80 subject to the following modifications:

A. At the end of paragraph 77 add the following:

> The Staff's failure rate data for 345 KV submarine cable was based on the experience of the Consolidated Edison Company over a period of 11 years. (Staff Testimony, page 3). This experience was accumulated with both submarine and underground cable. (Tr. 1182). During this period 903 mile years of operation were accumulated with a total of 7 failures. None of these failures were cable dielectric failures, i.e., all of them occurred at terminations or at cable splices. The Staff testified that this data reduces to a five-year moving average failure rate of 0.007 failures per mile per year. (Staff Testimony, page 4). Further, Staff testified that since in all likelihood the FNP submarine cable will be buried in the bottom of the ocean the FNP cable should be even less susceptible to failure than the Con Ed submarine cable which was simply layed on the bottom of the body of water without being buried. (Id.)."

B. In paragraph 78 add the following at the end of the paragraph:

Staff witness Rosa concurred with this assessment of the adequacy of the on-site emergency power system, noting that of the four emergency diesel generators on the FNP, only 2 of these diesels are required to safely shut the plant down. (Tr. 1284).

C. Strike the words "General Design Criterion 17" from the last line of paragraph 80 and substitute the following:

both General Design Criterion 17 and General Design Criterion 18 which requires complete testability of the system. (See paragraph 75).

B. CONTENTION II - UNDERWATER ELECTRICAL TRANSMISSION LINES

6. The Staff concurs in and adopts Applicant's proposed findings 81 through 90 subject to the following modifications:

A. In paragraph 84 add the following reference to the parentheses in the last line: "Staff Testimony, page 4."

B. In paragraph 85 add the following reference to the parentheses in the last line: "Staff Testimony, page 3."

C. In paragraph 86 add the following to the end of the paragraph:

The Staff testified that injury to people due to physical rupture of the cable could result only from being in close proximity to the cable at the point and exact time of failure. The energy content of the pressurized oil is not

sufficient to produce an explosive type rupture. A chemical explosion ignited by an electrical short is also unlikely due to the unavailability of oxygen. Since the cable will be buried it is virtually impossible for a member of the general public to get close enough to the cable to be affected by a cable rupture. Therefore, the Staff concluded and the Board finds that the hazard due to physical rupture of the cable is not significant. (Staff Testimony, pp. 3-4).

C. CONTENTION III - MARINE ENVIRONMENT

7. The Staff concurs in and adopts Applicant's proposed findings 91 through 126 subject to the following modifications:

A. In paragraph 92, after the second sentence, add the following:

> The ventilation systems in the associated power, control and instrumentation subsystems are designed to provide positive assurance that airborne salt will be essentially excluded from the plant atmosphere throughout the life of the floating nuclear plant. (Staff's Testimony, Rosa, p. 2).

B. In paragraph 94 add the following after the first sentence:

> Further, the Staff testified that the filters will remove suspended salt particles 1 to 1-1/2 microns in size with the same efficiency rating and particles 1 micron or smaller, while they would remain in suspension, would not settle on electrical surfaces. (Tr. 2106).

C. In paragraph 96 add the following reference to the parentheses in line 7: "Staff Testimony, Rosa, p. 5." In addition add the following after the second sentence of paragraph 96:

> This will provide a means for continuous assessment of the effectiveness of the environmental control system throughout the life of the plant. (Staff Testimony, Rosa, p. 5).

D. In paragraph 98 add the following reference to the parentheses in line 4: "Staff Testimony, Rosa, p. 5."

E. In paragraph 111 add the following sentence at the end of the paragraph:

> The impressed current cathodic protection system has an added advantage in that it can be upgraded during the life of the structure if that is found to be necessary. (Staff Testimony, Remley and Thompson, p. 7).

F. In paragraph 113 add the following reference to the parentheses on the second line of page 51: "Staff Testimony, Remley and Thompson, p. 6."

G. In paragraph 117 after the first sentence add the following:

> The Staff testified that since there is no point outside the reactor vessel itself at which the level of neutron irradiation is great enough to have any effect on metal properties (because the neutron are completely absorbed in the vessel wall) there is no potential for radiation and salt water environment to have a synergistic affect on any time on the floating nuclear plant. (Staff Testimony, Conrad, p. 3).

D. CONTENTION IV - CENTRAL CONTROL ROOM

8. The Staff concurs in and adopts the Applicant's proposed findings 127 through 139 subject to the following modifications:

A. In paragraph 131 replace the period at the end of the paragraph with a comma and add the following phrase:

> such as those associated with a severe tornado, hurricane and forces equivalent to those resulting from high intensity seismic shock. (Staff Testimony, p. 5).

B. In paragraph 135 after the third sentence add the following:

It consists of a foam system with both short range and long range nozzles located such that the operator may achieve 100 percent coverage within 100 feet of the plant. (Tr. 2829).

C. Delete the fourth sentence of paragraph 136 and substitute the following:

A falling water film system will also be provided for protection of exterior floating nuclear plant walls from radiant heat (up to 30,000 BTU/hr./sq. ft.) that might result from a fire in the basin. This system will utilize salt water and will provide a film on the exterior walls that has been shown by tests to be adequate to protect the plant exterior walls for the expected radiant heat fluxes that could result from an oil fire in the basin area. (SER, Section 9.5.1).

E. CONTENTION V - TRANSPORTATION

9. The Staff concurs in and adopts Applicant's proposed findings 140 through 157 subject to the following modifications:

A. In paragraph 141 add the following at the end of the paragraph:

The crane represents an additional conservatism in the FNP design since the Staff's approval of the fuel handling system was based upon the acceptability of the radiological consequences of a cask drop accident. (Tr. 3966, 3987). These radiological consequences are discussed infra.

B. In paragraph 143 add the following at the end of the paragraph:

The Staff's testimony documented the development of the standards contained in 10 CFR Part 71. (Staff Testimony, pp. 13-15).

C. In paragraph 145 add the following reference to the parentheses in line 3: "Staff Testimony, p. 10." In addition add the following sentence at the end of the paragraph:

> Generally, cask rupture would not be expected to occur until the water depth reached 2,000 or 3,000 feet. (Tr. 3977).

D. In paragraph 146 add the following at the end of the paragraph:

> The Staff panel testified that there exists today deep dive capabilities such that objects can be retrieved from depths as great as 2,000 feet. Retrieval at typical offshore sites, therefore, would present no difficulty. (Tr. 3936, 3947).

E. In paragraph 150 add the following at the end of the paragraph:

> As part of the operating license review for each site specific application, the Staff will review the methods proposed by the utility involved to ensure that no barge or propelling vessel or combination will constitute a fire hazard in excess of that which the fire suppression systems can handle. That Staff review will be conducted with the cooperation of the U.S. Coastguard which has responsibility for establishing minimum fire safety requirements on vessels of this type. (Staff Testimony, p. 9).

F. In paragraph 152, in the fourth line from the bottom, add the following after the word "plant":

> while moving at 13 knots and having a kinetic energy of 52 million foot pounds.

Strike the words "page 4" in the parentheses at the end of the paragraph and substitute the following: "pages 3-4."

F. CONTENTION VI - SITE ENVELOPE DATA

10. The Staff concurs in and adopts Applicant's proposed findings 158 through 195 subject to the following modifications:

A. In paragraph 162 add the following reference to the parentheses in the last line: "Staff Testimony, Hawkins, et al., p. 2."

B. In paragraph 166 add the following reference to the parentheses in the second line: "Staff Testimony, Hawkins, et al., p. 3."

C. In paragraph 173 add the following at the end of the paragraph:

> The determination of the design basis tornado characteristics is based upon the premise that the probability of occurrence of a tornado that exceeds the design basis tornado should be on the order of 10^{-7} per year per nuclear power plant site. (Staff Testimony, Hawkins, et al., p. 7).

D. In paragraph 180 place a footnote mark after the word "tied" in the second line and add the following footnote at the bottom of page 77:

> See definition in paragraph 184 infra.

E. In paragraph 184, add the following after the word "are" in the second sentence on page 79:

"equalled or"

Add the following reference after the third sentence: "(Staff Testimony, Hawkins, et al., p. 3)."

F. In paragraph 187 add the following to the end of the paragraph:

Each site applicant will be required to demonstrate that the FNP at its site with its moring system meets the Regulatory Guide 1.60 specifications anchored at an appropriate site specific "g" value applied at the ocean bottom. (Staff Testimony, Hoffman, p. 5, Tr. 1477-78).

G. In paragraph 188 after the first sentence add the following:

The probable maximum seiche is that hypothetical seiche which would be produced by the most severe combination of meteorological parameters that are considered reasonably possible at a site. (Staff Testimony, Hawkins, et al., p. 6).

H. In paragraph 195 add the following at the end of the paragraph:

Further the Board agrees with the Staff's testimony that there are numerous sites along the Atlantic and Gulf coasts where the appropriate design criteria can be met by the Applicant's selected site envelope parameters. (Staff Testimony, Hawkins, et al., p. 8; Tr. 1529).

G. CONTENTION VII - RADIOLOGICAL IMPACT ON SWIMMERS AND BOATERS

11. The Staff concurs in and adopts the Applicant's proposed findings 196 through 206.

H. CONTENTION VIII - AIRCRAFT

12. The Staff concurs in and adopts the Applicant's proposed findings 207 through 225 subject to the following modifications:

A. In paragraph 208 add the following reference to the parentheses in the last line: "Staff Testimony, p. 1."

B. In paragraph 211 add the following to the end of the paragraph:

> The existence of one or more airways in the vicinity of any particular site is unlikely to cause lack of Standard Review Plan criteria compliance. (Staff Testimony, p. 3).

C. In paragraph 215 add the following reference to the first sentence: "(Staff Testimony, p. 4)."

I. CONTENTION IX - SHIP COLLISION

13. The Staff concurs in and adopts Applicant's proposed findings 226 through 241 subject to the following modifications:

A. In paragraph 228 add the following before the first sentence:

> Methods exist for the identification of large scale ocean shipments of uniquely hazardous materials in the vicinity of any specific coastal areas. (Staff Testimony, p. 3).

B. In paragraph 229 add the following after the third sentence:

> The FNP has been found capable of withstanding the impact equivalent to a ship of 3500 tons, 260 feet long, travelling at 13 knots. (Staff Testimony, p. 3). In addition, the FNP will be required to be protected by a structure of sufficient size and strength to prevent large ocean-going vessels from striking it (Staff Testimony, p. 3).

C. Add the following reference to the parentheses at the end of paragraph 230: "SER, Section 9.5.1."

J. CONTENTION X - ICE CONTAINMENT

14. The Staff concurs in and adopts Applicant's proposed findings 242 through 254 subject to the following modifications:

A. In paragraph 244 add the following reference to the parentheses in the last line: "Staff Testimony, p. 2."

B. In paragraph 250, add the following to the end of the paragraph:

> The Applicant has committed to compare the land-based plant motions to the expected floating nuclear plant motions when they are precisely defined, and if the floating nuclear plant motions should be unexpectedly more severe, Applicant has committed to conduct additional tests to determine the ice retention capability of the ice baskets for the floating nuclear plant motions. Precise definition of the induced motions (and loads) at the location of the ice condenser and its components will not be completed until the final design of the plant is completed. (Staff Testimony, p. 4).
>
> In the unlikely event that design motions and/or loads should exceed those for which adequate ice retention has been shown, Staff believes that modification of the ice loading procedures and equipment and/or the structural response of the ice condenser components is feasible. (Staff Testimony, p. 4).
>
> Modifications, such as altering the size of the flake ice particles, altering the flow rate and/or temperature of the ice transport system, or changes in the structural stiffness of ice condenser support structures, will necessitate further testing to demonstrate adequate ice retention under simulated design basis motions. Such changes are within the state of the art and could be made in the FNP during the course of manufacture. Applicant has committed to the conduct of such a test program in the unexpected event that the design basis motions should exceed those for which the ice baskets have already been shown to exhibit adequate ice retention. (Staff Testimony, p. 5).

K. CONTENTION XI - TURBINE-GENERATOR MATTERS

15. The Staff concurs in and adopts the Applicant's proposed findings 255 through 337 subject to the following modifications:

A. In paragraph 260 add the following at the end of the paragraph:

> The Staff testified that in addition to this assumption contributing to safety margin by assuming the extreme deflection for each revolution of the shaft, the assumption in the design of the turbine will increase the ability of the rotor to withstand cyclic stresses and will increase the fatigue life of the shaft. (Tr. 5932).

B. In paragraph 263 remove the period at the end of the paragraph and add the following:

> or in the Staff's analysis of the potential for production of turbine missiles. (Staff Testimony, p. 26).

C. Add an additional finding after paragraph 263 which reads as follows:

> The Applicant also has committed to subjecting the first unit to a series of tests at the turbine and barge manufacturing sites and the operating site. These tests are expected to demonstrate the limiting values of shaft deflection vibration and barring pressure have not been exceeded. The Staff will require that all testing that is possible to be performed at the turbine and barge manufacturing sites be performed there. Should deficiencies arise during the test program, the Applicant has committed them on the first and all subsequent units. Although this testing program has not been required on conventionally sited turbines it will be required for the floating nuclear plant because it is the Staff's belief, and the Board concurs, that reliance cannot be placed solely on analysis to confirm design adequacy. (Staff Testimony, p. 24).

D. In paragraph 268 add at the beginning of the first sentence the following:

Both the Staff and Applicant testified that

In addition add the following transcript references to the parentheses in the fourth line of paragraph 268: "5756, 5757." Finally, add the following reference to the parentheses in the last line of the paragraph: "Tr. 5757."

E. In paragraph 287 add the following references to the parentheses in the last line of the paragraph: "Staff Testimony, pp. 11-12, 17."

F. In paragraph 286 add the following after the fourth sentence:

> The Staff testified that IEEE 279, 1971, has not been applied previously to turbine overspeed protection systems in nuclear facilities. The Staff also testified that the primary affect of applying IEEE 279 to the FNP turbine are to impose requirements for equipment qualification and for periodic inservice testing.

G. Delete the last two sentences of paragraph 307. This finding should await the results of the Staff's analysis of the EPRI tests described in the December 15, 1979 letter to this Board.

L. CONTENTION XII - EFFECT ON BIOTA

16. The Staff concurs in and adopts Applicant's proposed findings 338 through 341.

M. CONTENTION XIII - DISCHARGE OUTFALL

17. The Staff concurs in and adopts Applicant's proposed findings 342 through 350.

N. CONTENTION XIV - FOOD CHAIN

18. The Staff concurs in and adopts Applicant's proposed findings 351 through 354.

O. CONTENTION XV - DREDGING

19. The Staff concurs in and adopts Applicant's proposed findings 355 through 361 subject to the following modifications:

A. In paragraph 359 add the following prior to the first sentence:

> Dredging requirements around the perimeter of the breakwater will be site specific but are not expected to be extensive. (Staff Testimony, p. 2; Tr. 7040).

P. CONTENTION XVI - RESORT ECONOMICS

20. The Staff concurs in and adopts Applicant's findings 362-400 subject to the following modifications:

A. Add the following after the second sentence of paragraph 365:

> The Staff went on to estimate the economic impact of tourist avoidance on the local economies of several areas, assuming that an FNP were sited nearby. (Staff Testimony, pp. 46-62).

B. Add the following after the word "basis" in the fourth line of paragraph 367:

> of the Applicant's belief

C. Add the following words at the beginning of paragraph 372:

The Applicant's panel testified that, in its view

D. Delete paragraphs 391 through 394. Add the following reference to the parentheses at the end of the paragraph: "Tr. 6238."

E. Add the following additional finding after paragraph 398:

(1) The Board finds that although the Applicant and Staff reached the same conclusion with regard to the impact on resort economies from the siting of nuclear facilities in close proximity to the resort communities, the Staff's evidence regarding this contention is more probative and entitled to considerably greater weight than that of the Applicant. We find specifically that the Applicant placed major emphasis in its testimony, and in its conclusions, on the premise that a growth in population is an indicator of a growth in tourism (see paragraph 372, supra). However, the Board finds that this connection was never firmly established. Indeed, the Applicant's panel contradicted itself on at least two occasions with regard to this point. On two occasions, the Applicant's panel did not agree that population growth caused a growth in tourism in a resort economy (Tr. 6304, 6316). Yet, on several other occasions, the panel testified that population growth did indicate such a growth in tourism (Tr.6314, 6318, 6319). Further, although, in the Board's view, the relationship between population growth and growth in tourism should be capable of verification by an examination of actual case histories, the members of the Applicant's panel stated that they had not tested their hypothesis against any sample communities (Tr. 6672) nor had they performed any other generalized tests to examine whether, in fact, the relationship in question exists. (Tr. 6674).

(2) In addition, the Board places little weight on the Applicant's utilization of the Las Vegas weapons testing experience as an analogy to coastal resort communities and the impact of siting nuclear reactors in proximity to them. The Applicant testified that the key point

in the Las Vegas analogy was the proximity of nuclear related operations (Tr. 6417). Yet, the Applicant testified that the test site was 75-85 miles away from Las Vegas (Tr. 6245) and that all tests were announced and closely monitored with regard to meteorological conditions on the days of the tests (Tr. 6259). In contrast, the Board notes that the distance between the coastal reactors used as examples by the Staff, and the resort communities near which they are located, is must shorter (Staff Testimony, pp. 10-32), which, in the Board's view, may impact the public's perception of the danger presented. Further, the contention deals with the fear generated by the possibility of a nuclear accident. The Board deems the possibility of an unscheduled, randomly occurring release of radioactivity from a nuclear accident to be significantly different in kind from the announced test of a weapon at a much greater distance. In the Board's view, these differences render the Las Vegas experience a less persuasive analogy than others used by both the Applicant and the Staff. (See, e.g., paragraph 386, supra).

(3) Based upon its review of the record, the Board finds that the level of tourist activity in resort-oriented communities near coastal operating nuclear power plants has not been adversely affected by the presence of the nuclear facilities.

F. Delete paragraph 399, which is replaced by E(3) above.

Q. CONTENTION XVIII - NET ENERGY YIELD, COST-BENEFIT BALANCE

21. The Staff concurs in and adopts Applicant's proposed findings 401 through 416 subject to the following modifications:

A. Add the following phrase in parentheses after the words "crossover point" in paragraph 403 at the top of page 176:

(including the energy associated with the construction of the Blount Island manufacturing facility)

B. Add the following as the first sentence of paragraph 404:

In view of the fact that the FNP introduces first-of-a-kind siting option, the Staff has provided a more extensive discussion of decommissioning of the breakwater than is normally given in an environmental impact statement for the construction and operation of a land-based facility (Staff Testimony, p. 5).

Add the following after the third sentence of the paragraph:

While the Staff's analysis of decommissioning included consideration of expected costs, the Staff recognized that when economic costs are considered, there is uncertainty in attempting to project these costs with regard to an activity which will take place 40-50 years in the future. In addition, the technologies available well into the 21st century may be markedly different from those utilized today. (Staff Testimony, pp. 6-7).

Replace the parentheses at the end of the paragraph with the following:

(Staff Testimony, pp. 6-12)

C. Add the following findings after paragraph 406:

(1) The Staff also evaluated the environmental costs associated with the use of cooling towers with FNP's. This evaluation included impacts on terrestrial ecology from cooling tower construction and the effects of saline drift and bird collision associated with cooling tower operation. The Staff's testimony in this area supplements the discussion in Section 4.6 of the FES-II and Sections 2.2.2.2, 2.4.2 and 2.5.2 of the Final Addendum to the FES-II. (Staff Testimony, pp. 18-19).

(2) With regard to terrestrial impacts, the Staff testified that approximately 50 acres of land would be required for the construction of cooling towers at each site, which would approximately double the area occupied by the operating plant. (Staff Testimony, p. 19). The Staff also testified that while saline drift deposition rates could be raised to several times the average background rate by cooling tower operation, it is unlikely that the effects of this artificial deposition would exceed those of storm driven drift. (Staff Testimony, pp. 19-20, 21). Finally, while there are no published studies with regard to bird mortality at coastal plants, the Staff examined two unpublished studies which indicated that mortality rates were not high enough to be considered significant. The Staff added the caveat that this cost of cooling tower operation is highly site specific and would have to be evaluated for each site. (Staff Testimony, pp. 20-21).

(3) The Staff concluded that the additional economic costs of cooling tower add-ons to FNP's at inshore sites are acceptable considering the favorable balance of environmental impacts, i.e., considerably reduced impact on coastal acquatic systems and slightly increased impact on coastal terrestrial systems, resulting from the use of cooling towers. (Staff Testimony, p. 23).

D. Replace the first sentence of paragraph 408 with the following:

The Staff testified that eight FNP's sited in two-unit stations could foreclose to other use from 40-800 acres of coastal zone land and from very little up to a mile of beach. Depending on the mix of siting modes for the eight FNP units, the range of land use is comparable to, or less than, that shown for the land based stations sited along or near the shore zone. (Staff Testimony, pp. 33, 35).

E. Add the following finding after paragraph 408:

The Staff concluded that the foreclosure to alternative uses of the coastal area and shoreline needed for the eight FNP units does not alter the overall cost-benefit balance. The portion of available shoreline used for inshore siting of eight FNP units will be less than 0.1%. Based on compliance with applicable environmental control regulation, the terrestrial impact is expected to be acceptable. The economic cost of foreclosure in terms of land value is less than 1% of the total cost of the power station. Finally, there may be public benefits from the environmental protection afforded to most of the exclusion zone. (Staff Testimony, p. 38).

F. Add the following to the parentheses at the end of the paragraph:

Staff Testimony, p. 39

N. B. The pagination in the Staff's testimony is incorrect. Specifically, the testimony with regard to alleged use of 1972 cost estimates appears on pages numbered 37-45. Those pages should be numbered 39-47.

G. Add the following finding after paragraph 410:

The Staff also escalated its cost figures through 1988 and compared them to the 1985 costs calculated in the FES-II. The Staff testified that the 1988 capital costs are about 17% higher than the 1985 costs for the FNP variations and about 23% higher for the land based alternative. Operating

and maintenance costs and nuclear fuel cost would increase by about 20% for both FNP and land based plants. (Staff Testimony, p. 43).

R. CONTENTION XIX - SPECIAL ENERGY REQUIREMENTS

22. The Staff concurs in and adopts Applicant's proposed findings 417 through 428.

S. CONTENTION XX - HEAT PUMPS AND SECONDARY AND TERTIARY RECOVERY OF OIL

23. The Staff concurs in and adopts Applicant's proposed findings 429 through 438 subject to the following modifications:

A. In paragraph 431 add the following after the second sentence:

However, with increasing use of supplemental resistence heating during cold weather, additional generating capacity must be brought on line to supply the energy. (Staff Testimony, p. 5).

B. In paragraph 431, add the following after the last sentence:

Intense consumer use of the air conditioning cycle on the heat pump in extremely hot weather may also influence the need for increased generating capacity. (Staff Testimony, p. 6).

Respectfully submitted,

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Counsel for NRC Staff

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OFFSHORE POWER SYSTEMS	)	Docket No. STN 50-437
	)	
(Floating Nuclear Power Plants)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "NUCLEAR REGULATORY COMMISSION STAFF'S PROPOSED PARTIAL FINDINGS OF FACT IN THE FORM OF A PROPOSED INITIAL DECISION" in the above-captioned proceeding have been served on the following by deposit in the United States mail, first class, or, as indicated by an asterisk by deposit in the Nuclear Regulatory Commission internal mail system, this 24th day of August, 1979:

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