

UNITED STATES OF AMERICA  
ATOMIC ENERGY COMMISSION

DOCKET NUMBER  
PROD. & UTIL. FAC. Crystal River

In the Matter of )  
 )  
FLORIDA POWER CORPORATION )  
 )  
(Crystal River Unit 3 Nuclear )  
Generating Plant) )

Docket No. 50-302

BRIEF OF THE REGULATORY STAFF  
IN SUPPORT OF EXCEPTIONS



I

Statement of the Case

This proceeding involves the application of Florida Power Corporation (applicant), dated August 10, 1967, and five amendments thereto ("the application") filed under § 104 b. of the Atomic Energy Act of 1954, as amended (the "Act"), for a construction permit to construct a pressurized water reactor designated Crystal River Unit 3 and designed to operate initially at power levels up to 2452 megawatts (thermal), to be located on the applicant's 4,738 acre site located on the Gulf of Mexico about 70 miles north of Tampa, Florida, and seven and one-half miles north of the Town of Crystal River, Florida.

The application was reviewed by the regulatory staff (staff) of the Atomic Energy Commission (Commission) and the Advisory Committee on Reactor Safeguards ("ACRS"), both of which concluded

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that the proposed reactor can be constructed and operated at the proposed site without undue risk to the health and safety of the public.

A notice of hearing was issued on May 29, 1968, designating an Atomic Safety and Licensing Board ("Board") to conduct this proceeding to determine whether a provisional construction permit should be issued to the applicant.

By Order dated June 23, 1968, the Board granted a Petition to Intervene filed by the City of Gainesville, Florida, and the Gainesville Utilities Department ("the intervenors"), but limited the intervenors' participation to the question of the jurisdiction of the Commission to issue a construction permit under § 104 b. of the Act. 1/ A Motion to Broaden Issues filed by the intervenors was denied. As a result of this intervention, the proceeding is a contested proceeding as defined by 10 CFR § 2.4(n). The State of Florida also was permitted to participate in the proceeding pursuant to § 2.715(c) of the Commission's "Rules of Practice", 10 CFR Part 2, but did not oppose the granting of the application.

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1/ There is no controversy among the parties with respect to any other matter in issue in this proceeding.

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The Board issued its Initial Decision on September 24, 1968, directing the issuance of a provisional construction permit for the proposed Crystal River Unit No. 3, but recommending to the Commission that a condition be added to the construction permit to require "that data be developed upon a record made at a public hearing in this contested case concerning the use of either a chemical spray as an 'iodine fixing additive' or other devices for purposes of controlling the release of radioactive iodine...". (I.D., pp. 10 and 19.)

In accordance with the provisions of § 2.762(a) of the Commission's "Rules of Practice", 10 CFR 2, the staff has filed exceptions to the Initial Decision.

## II

### Argument

#### A. The Record In This Case Supports The Issuance Of An Unconditioned Provisional Construction Permit Pursuant To § 50.35 Of The Commission's Regulations

The containment spray system which will be incorporated in the Crystal River facility is designed to limit containment pressures to design values following an assumed loss of coolant accident and to reduce the level of fission products in the containment building atmosphere. The description and evaluation of this engineered safety

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feature are contained in the Preliminary Safety Analysis Report (PSAR) submitted with the application. (PSAR, Vol. 2, Section 6, paragraph 6.2.)

To reduce the amount of radioactive iodine available for leakage from the containment, the applicant proposes to inject an iodine fixing additive into the containment spray water. The additive proposed is an alkaline buffered solution of sodium thio-sulfate. 2/ Since the proposed Crystal River reactor is identical to the reactor approved in the Metropolitan Edison case, 3/ the application incorporates by reference certain portions of the application submitted by the Metropolitan Edison Company relating

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2/ The Board seems to imply in its Initial Decision, particularly footnote 8, page 9, that the applicant's proposal to use an alkaline solution of sodium thiosulfate became known to the Board for the first time at the hearing. However, it is clear from the application, particularly the portion of the Metropolitan Edison application, Docket No. 50-289, which was incorporated in the Crystal River application by reference, that the additive proposed was to be an alkaline solution of sodium thiosulfate which would be maintained in an alkaline condition by the addition of sodium hydroxide or other similar chemicals. In any event, the testimony clearly indicates that the applicant had always intended to use such a combination solution (Tr., pp. 473, 476-7) and that the staff was aware of the applicant's intention and had evaluated the system on this basis. (Tr., pp. 360-63, 477.)

3/ In the Matter of Metropolitan Edison Company, Docket No. 50-289. The Initial Decision of the Atomic Safety and Licensing Board in this case, issued May 16, 1968, became the final Decision of the Commission on July 1, 1968.

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to the use of chemical sprays. This portion of the application discusses the design criteria for the proposed chemical spray and provides a list of references thereto. (Response to question 5.13, Metropolitan Edison application, Docket No. 50-289, Supplement 1, pages 5.13-1 through 5.13-3.) In addition, the application contains a detailed description of the comprehensive research and development program being carried out by the applicant's contractor, Babcock and Wilcox Company, to establish the effectiveness of the alkaline sodium thiosulfate solution as an iodine absorber, as well as the stability and compatibility of the solution under accident conditions. (Response to question 17.4, Metropolitan Edison application, Supplement 3, dated December 8, 1967, Docket No. 50-289, pages 17.4-1 through 17.4-8.) The program relies on experiments by Oak Ridge National Laboratory to establish removal rates. A list of the experiments to be conducted is set forth in this application. (Addendum I to the response to question 17.4 in the Metropolitan Edison application.) In addition, the Babcock and Wilcox Company has under way a research and development program to demonstrate the compatibility of the solution with the boric acid which is also present in the spray solution. (Tr., pp. 492-3.)

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The regulatory staff reviewed the proposed research and development program and concluded that the applicant's program, in conjunction with the current studies under way at the Oak Ridge National Laboratory, should establish that the reduction factors necessary to reduce the iodine concentrations at the site boundary to Part 100 guidelines could be achieved or exceeded. (Safety Evaluation, pp. 42-5.)

In fact, the reports on several of the experiments conducted at the Oak Ridge National Laboratory had become available by the time of the hearing and were referred to on the record. The applicant testified that a preliminary evaluation of the results of these experiments indicates that they substantiate the effectiveness of the chemical spray system. (Tr., p. 325.) References were provided to reports which demonstrate that under many varying conditions, including temperature, iodine concentrations, steam content in the atmosphere, spray solution composition, spray nozzles, spray flow rate and spray solution temperature, the iodine removal rates have been greater than those set forth in the application. An experiment at the Nuclear Safety Pilot Plant at the Oak Ridge National Laboratory, under conditions closely approximating post accident conditions, indicated an iodine removal rate constant of

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81 per hour which, when extrapolated to the Crystal River building conditions, indicates an iodine removal rate constant of about 100 per hour, which is approximately four times greater than that assumed in the application and approximately 50 times greater than that required to meet Part 100 guidelines. The applicant provided additional references to experiments relating to the stability of the spray solution. (Tr., pp. 325-30.)

The research and development program relating to both the iodine absorbing ability of the chemical spray and to the stability and compatibility of the solution will be continued both at the Oak Ridge National Laboratory and by Babcock and Wilcox and others. (Tr., pp. 325-30, 361 and 492.)

In the event the research and development programs do not establish that the spray system is acceptable for iodine removal, alternative means to reduce iodine concentrations at the site boundary will be employed. Charcoal filters and reduction of the containment leak rate are among the alternatives that could be used. (PSAR, Vol. 1, Section 1, paragraph 1.3, item 11; Safety Evaluation, p. 45.)

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Section 50.35 does not require that all design details of the facility must be supplied at the construction permit stage, nor that every safety question must actually have been satisfactorily resolved at that stage. 4/

The record in this proceeding fulfills all the requirements of § 50.35 of the Commission's regulations for the issuance of an unconditioned provisional construction permit. As indicated above, the applicant has described the proposed design of the containment spray system and outlined a comprehensive research and development program to resolve any questions remaining concerning the effectiveness of the spray system to absorb radioactive iodine, its stability under accident conditions and compatibility with other parts of the system. If, for any reason, the spray system is not acceptable, charcoal filters can be installed in the facility to reduce the iodine available for release to the environment.

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4/ In the Matter of Jersey Central Power and Light case, 3 AEC 28, May 6, 1965; In the Matter of Florida Power and Light, 3 AEC \_\_\_\_\_, August 4, 1967.

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B. There Is No Reasonable Basis Set Forth In The Initial Decision To Support Board's Recommendation

In support of its recommendation that a condition be included in the construction permit for the Crystal River facility, the Board relies on certain unspecified reports of experiments conducted at the Oak Ridge National Laboratory. 5/ The Board states at page 8 of the Initial Decision that:

"[T]he work which has been undertaken [presumably by the Oak Ridge National Laboratory] to this time lends doubt whether the [containment spray solution proposed by the applicant] achieves the necessary iodine radioactive factors."

Again, at page 9 of the Initial Decision, the Board states that:

"The Oak Ridge National Laboratory reports indicate that neither of the applicant's chemical additives for sprays will achieve the necessary reduction factors."

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5/ Pursuant to the Board's request, the staff submitted a list of references to reports on the effectiveness of the containment sprays using a chemical additive as an iodine absorber. The applicant also made reference to various reports in its application and testimony. The Board did not request comments from the applicant or the staff with respect to any of these reports. Our response here is directed at those reports to which we assume that the Board was referring in the Initial Decision.

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The Board seems to base these conclusions on a report to the effect that such chemical solutions "undergo radiation decomposition..." during recirculation cooling of the reactor. <sup>6/</sup> The possibility of radiation instability, however, was recognized by the applicant and its reactor supplier and was considered by the staff in its review. The research and development program proposed by the applicant includes a thorough investigation of this matter. (Tr., pp. 325-30 and 492.)

Moreover, the staff's calculations of the iodine removal capacity available for the Crystal River facility would not be affected by the reduction of total iodine capacity on the order of that set forth in the Initial Decision for the spray solution proposed. These calculations establish that because of the large excess of reagent available, the reduction factors necessary to limit iodine concentrations at site boundaries to Part 100 guide-

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<sup>6/</sup> ORNL-4228, Nuclear Safety Program, Annual Progress Report for Period Ending December 31, 1967, p. 232.

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lines could be achieved with only one of the two containment sprays. (Safety Evaluation, pp. 43 and 56.) As an additional factor of conservatism, the staff's calculations also assumed that 10 percent of the iodine in the containment was non-removable by sprays. (Tr., pp. 365-66.)

The Board also refers to data in an ORNL report concerning the production of hydrogen gas when the chemical additive is exposed to radiation. The Board quotes from the report as follows:

"The results obtained to date in the study of the various proposed spray solutions indicate that radiolytic H<sub>2</sub>'s produced in quantities sufficient to be of concern in the proposed spray system." 7/

Following the sentence quoted by the Board, the report indicates that another study had been initiated to determine the feasibility of using other additives to decrease the radiolytic hydrogen production. The report then continues:

"...the nitrate ion is known to lower the radiolytic hydrogen yield by scavenging the hydrogen atom. Therefore, a brief study

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7/ ORNL-4228, p. 235.

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of the effects of such added nitrate was made.... The data shows a definite decrease in radiolytic H<sub>2</sub> production with increasing NO<sub>3</sub> - concentration. However, while these data indicate that the radiolytic H<sub>2</sub> production may be reduced by addition of 'scavengers,' the question of the compatibility of such additives with the usage and purpose of the spray solutions must be studied in detail." (Emphasis added.)

While the matters raised in the reports discussed in the Initial Decision must, of course, be considered in the final evaluation of the containment spray system, they do not, per se, support the Board's conclusions that the system will not achieve the necessary reduction factors. The question of the stability of the spray solution and the generation of radiolytic hydrogen are included in the applicant's research and development program. The reports referred to by the Board do not provide a reasonable basis for its recommendation that the construction permit for the Crystal River facility be conditioned to require a further hearing.

The Board cites the Florida Power and Light case in support of its recommendation that a condition be included in the Crystal River construction permit. (I.D., p. 10, footnote 10.) 8/ In

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8/ The Board seems to suggest that this recommendation is justified because this proceeding is "contested". (I.D., pp. 10 and 19.) The Board did not explain why matters should be considered in another public hearing in a "contested" case and not in an "uncontested" case. In this case the intervention by Gainesville, which provided the only basis for making this case "contested", related solely to the jurisdictional issue whether a provisional construction permit may be granted under § 104 b. of the Act, and the Board specifically limited the intervenors' participation to the

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that case the Board imposed a condition in the construction permit requiring a further hearing with respect to certain alternative safeguard features, including containment spray and charcoal filters, required to reduce the concentrations at the site boundary to Part 100 limits if additional meteorological information indicated that such radioactive safeguard features were necessary. The Commission, after noting that the Board did not have the authority to direct the holding of hearings following the issuance of a construction permit, remanded the proceedings to the Board for the purpose of receiving additional evidence with regard to the alternative safeguards.

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(Footnote 8 con't.)

jurisdictional question. There is no controversy among the parties to this proceeding with respect to the iodine removal question. In this connection, § 6(a)(2) of Appendix A to 10 CFR 2, "Rules of Practice", provides that:

"In considering those issues, however, the board will, as to matters not in controversy, be neither required nor expected to duplicate the review already performed by the Commission's regulatory staff and the ACRS; the board is authorized to rely upon the uncontroverted testimony of the regulatory staff and the applicant and the uncontroverted conclusions of the ACRS."

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In the Florida Power and Light case, however, the applicant chose to rely solely on its expectation that additional meteorological information would establish that the additional safety features were not required. The record contained no evidence concerning the adequacy of the alternative safety features. The applicant did not propose a research and development program to resolve any questions which might have been outstanding with respect to such safety features. In this case, the record contains an abundance of evidence concerning the proposed containment spray system and the research and development program proposed with respect to that system.

Another case in which the Commission directed further hearings following an Initial Decision authorizing the issuance of a conditioned construction permit, the Malibu case, 9/ provides no support for the Board's recommendation in this case. As stated by the Commission in the Florida Power and Light case:

"...the alternative engineered safeguards... 10/  
are hardly comparable either in their basic

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9/ In the Matter of Department of Water and Power, City of Los Angeles, 3 AEC 179, March 27, 1967.

10/ As indicated above, one of the engineered safeguards was a containment spray system for the reduction of iodine.

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relationship to the structure of the facility or in their safety implications to the matter of protection against differential ground displacement dealt with in our Malibu decision."

The use of containment sprays for the removal of radioactive iodine has been proposed in many previous facilities which have been approved for construction, e.g., Wisconsin Electric Power Company and Wisconsin Michigan Power Company, Point Beach Units 1 and 2. Moreover, as indicated above, the proposed Crystal River facility is identical to the facility recently approved for construction by the Metropolitan Edison Company. A containment spray system using the same iodine "fixing" additive to reduce iodine concentrations is also proposed for the Metropolitan Edison facility. The description of the chemical spray system and the proposed research and development program with respect to the system contained in the Metropolitan Edison application was incorporated in the record of this proceeding by reference. In addition, this record contains discussions of the results of some of the research and development studies which were not available at the time of the hearing on the Metropolitan Edison facility.

The Initial Decision of the Board in the Metropolitan Edison case issued May 16, 1968, which has since become the final Decision

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of the Commission, authorized the issuance of an "unconditioned" provisional construction permit. The construction permit has been issued and the facility is now under construction.

C. The Commission's Established Procedures Are Adequate

The objective apparently sought to be achieved by the Board's recommendation can be achieved under the Commission's established procedures. In accord with these procedures, the information developed in the research and development program and the final design of engineered safety features for the Crystal River facility will be submitted as part of the application for an operating license. If the Commission, for any reason, determines that a further hearing is desirable, or if any member of the public whose interest might be affected requests a hearing, a further hearing can be held at that time. In any event, the results of the research and development program and the final design of the engineered safety features, including any alternative safety features, such as charcoal filters, will be reviewed by the staff and the ACRS as part of their review of the application for an operating license. The situation presented in this case with respect to the containment spray system is essentially no different from the situation in many other cases in which a research and

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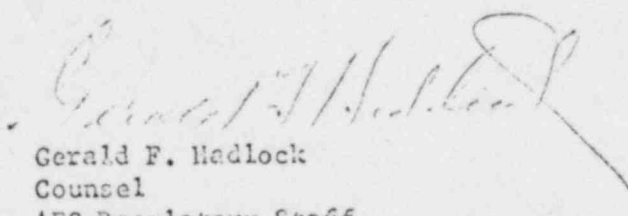


development program is required to establish more definitively the adequacy of a safety feature.

Conclusion

The staff respectfully requests that its exceptions to the Initial Decision be granted and that the Commission reject the recommendation of the Board that the construction permit issued to Florida Power Corporation be conditioned to require a further public hearing concerning the use of the containment spray as an iodine absorber.

Respectfully submitted,

  
Gerald F. Hadlock  
Counsel  
AEC Regulatory Staff

Dated at Bethesda, Maryland,  
this 14th day of October, 1968.

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