ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
UNITED STATES ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

April 18, 1973

Honorable Dixy Lee Ray
Chairman
U. S. Atomic Energy Commission
Washington, D. C. 20545

Subject: REPORT ON PRAIRIE ISLAND NUCLEAR GENERATING PLANT UNITS 1 AND 2

Dear Dr. Ray:

At its 156th meeting, April 12-14, 1973, the Advisory Committee on Reactor Safeguards completed its review of the application of the Northern States Power Company for authorization to operate Units 1 and 2 of the Prairie Island Nuclear Generating Plant at power levels up to 1650 MW(t). This project had been considered previously at the Committee's Special Meeting, October 26-28, 1972, at its 151st meeting, November 9-11, 1972, and at Subcommittee meetings at the plant on October 24, 1972, and in Washington, D. C. on March 31, 1973. The applicant expects Unit 2 to be ready for operation approximately a year after Unit 1. During its review, the Committee had the benefit of discussions with the Northern States Power Company, the Westinghouse Electric Corporation, the Pioneer Service and Engineering Company, the AEC Regulatory Staff, and their consultants. The Committee also had the benefit of the documents listed. The Committee previously discussed this project in a construction permit report dated March 12, 1968.

The Prairie Island Nuclear Generating Plant is located on the west bank of the Mississippi River in Goodhue County, Minnesota, approximately 6 miles northwest of Red Wing, Minnesota, and 30 miles southeast of the Twin Cities metropolitan area.

Each containment consists of a free-standing steel vessel within a reinforced-concrete shield building. An annular space of about five feet separates the two structures. A common auxiliary building serves both units. A region of this building which contains the outer terminations of penetrations from the interior of the steel vessel is designated as a special ventilation zone. Both this zone and the annular spaces are provided with redundant fan-filter systems which can maintain negative pressures relative to the environment and filter any leakage from the steel vessel prior to release. The design and function of this containment system are similar to that of the Kewaunee Plant.

The Committee considered the problem of the unlikely rupture of a high energy piping line outside of containment. The applicant described an evaluation, carried out in accordance with criteria established by the Regulatory Staff. Design modifications including encapsulation sleeves, equipment protection, equipment relocation, equipment qualification and impingement barriers are under consideration. The Committee recommends that the final design and installation meet the requirements of the Regulatory Staff.

The Interim Acceptance Criteria for ECCS effectiveness are under review by the Regulatory Staff. When new criteria have been established, these may influence the allowable peak power or peak linear fuel rating. Also, defects in unpressurized fuel due to pellet densification have been observed in some plants. The Prairie Island fuel is prepressurized and there is reason to expect improved performance with this fuel; however, further information and experience are needed. The applicant will propose limits for linear power and procedures for surveillance of core power distribution and fuel condition. This matter should be resolved in a manner satisfactory to the Regulatory Staff prior to operation at appreciable power. The Committee wishes to be kept informed.

Studies indicate that a false signal from one unit coincident with an actual LOCA in the other unit, coupled with a loss of offsite power, would probably cause tripping of both diesel generators due to overload. The Committee recommends that, prior to operation of both units at power, either analyses should show that the likelihood of the above combination of events is sufficiently low, or changes should be made to avoid such a loss of onsite power. This matter should be resolved in a manner satisfactory to the Regulatory Staff.

The Committee reiterates its previous comments on the need for further study of means for preventing common mode failures from negating reactor scram action, and of design features to make tolerable the consequences of failure to scram during anticipated transients. The Committee believes it desirable to expedite these studies and to implement in timely fashion such design modifications as are found to improve significantly the safety of the plant in this regard. The Committee wishes to be kept informed of the resolution of this matter.

Other problems relating to large water reactors which have been identified by the Regulatory Staff and the ACRS and cited in previous ACRS reports, should be dealt with appropriately by the Regulatory Staff and the applicant as suitable approaches are developed. In particular, the Committee recommends that as the results of additional research, analyses, and design studies become available they should be used by the applicant for evaluation and possible improvement of the Emergency Core Cooling System.

The Advisory Committee on Reactor Safeguards believes that, if due regard is given to the items mentioned above, and subject to satisfactory completion of construction and preoperational testing, there is reasonable assurance that the Prairie Island Nuclear Generating Plant Units 1 and 2 can be operated at power levels up to 1650 MW(t) without undue risk to the health and safety of the public.

Mr. Hill did not participate in the review of this project.

Sincerely yours,

H. G. Mangelsdorf

H. G. Mangelsdorf
Chairman

References Attached.

References

1) Final Safety Analysis Report (FSAR), Prairie Island Nuclear Generating Plant

2) Amendments 8-12, 14-20, 22-25, and 27-32 to FSAR

3) Nathan M. Newmark report, August 22, 1972

4) Safety Evaluation by Directorate of Licensing dated September 28, 1972

5) Anonymous letter, undated and unsigned, received October 25, 1972

6) Northern States Power Company (NSP) Letter, November 6, 1972, Response to AEC-DL Staff Oral Questions of November 3, 1972

7) Pioneer Service and Engineering Company letter, Draft Main Steam and Feedwater Line Rupture Study, November 22, 1972

8) Letter, K. Kniel, AEC, to A. V. Dienhart, NSP, January 3, 1973

9) Letter on Fuel Densification, E. C. Ward, NSP, to A. Giambusso, DL, January 8, 1973

10) Letter, R. C. DeYoung, AEC, to Northern States Power Company, January 11, 1973

11) Letter, A. Giambusso, AEC, to Northern States Power Company, February 9, 1973

12) Supplement No. 1 to Safety Evaluation by Directorate of Licensing, March 21, 1973

13) Letter, G. J. Merritt, Minnesota Pollution Control Agency to Executive Secretary, ACRS, March 27, 1973

14) Letter, K. Kniel, AEC, to Northern States Power Company, March 27, 1973

15) Letter, K. Kniel, AEC, to Northern States Power Company, March 30, 1973