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

October 17, 1973

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

Subject: INTERIM REPORT ON DONALD C. COOK NUCLEAR PLANT UNIT NO. 1 OPERATING LICENSE REVIEW

Dear Dr. Ray:

At its 162nd meeting, October 11-13, 1973, the Advisory Committee on Reactor Safeguards completed an interim review of the proposal to operate the Donald C. Cook Nuclear Plant Unit No. 1. The Committee had previously considered this project at Subcommittee meetings in St. Joseph, Michigan on September 12, and in Washington, D. C. on September 25 and October 5, 1973. A tour of the site was made on September 13, 1973. During its review the Committee had the benefit of discussions with representatives of the Indiana and Michigan Power Company, American Electric Power Company, Westinghouse Electric Company, and the AEC Regulatory Staff, and ACRS consultants. The documents listed below were also available.

The plant will be a two-unit station located on the eastern shore of Lake Michigan about 11 miles south-southwest of Benton Harbor, Michigan. Each unit will include a pressurized-water reactor designed for a maximum operating power of 3250 MW(t). Since Unit No. 2 is not scheduled for completion for approximately two years, the Committee considered only operation of Unit No. 1 in this review.

The containment structures for the D. C. Cook Nuclear Plant are the first to include ice condensers to limit the magnitude and duration of post-accident overpressure. This concept has been a subject of review by the Committee in the past and a Committee report on this subject was submitted on November 9, 1967. During subsequent years, the concept has been evaluated in design qualification tests by Westinghouse and a number of detailed reports on the system have been issued. Changes have been made in the original design to correct structural deficiencies, and some additional confirmatory full scale tests are yet to be completed on certain components of the system. The Committee recommends that the Regulatory Staff review the results of these tests and assure itself of the thermal, hydraulic, and structural adequacy of the ice condenser system before Unit No. 1 is operated.

The Committee also urges that this first ice condenser system be made the subject of a continuing series of monitoring and evaluation measures. These measures should include assessment of the retention and behavior of the ice within the condenser, and approximately quarterly checks of the performance of the three sets of movable doors of the ice condenser, at least during the first year. In addition, when the Regulatory Staff has completed development of an independent capability to evaluate ice condenser behavior under postulated accident conditions, this capability should be utilized to confirm independently the Applicant's analysis of system behavior as a supplement to those reviews the Staff has already made. The Committee believes interim operation need not await such confirmation.

The Committee has reviewed in detail the instrumental and theoretical approaches that the Applicant and his contractors are planning to employ to estimate the reactor core peaking factors and the maximum linear power density that might result from various conditions of operation and the assumed state of the fuel including densification. Analyses by the Applicant of postulated loss-of-coolant accidents, employing the Interim Acceptance Criteria as modified by the Regulatory Staff for the Cook ice condenser containment, have been reported to lead to a maximum acceptable initial power of 81% of the rated power of 3250 MW(t). The Committee believes that, in the consideration of the operation of Unit No. 1 at higher power levels, several factors enter, including the following: confirmation of the adequacy of the Axial Power Distribution Monitoring System (APDMS); completion by the Regulatory Staff of a detailed independent confirmation of various factors entering the determination of the actual peaking factor, including the nuclear uncertainty allowance and potential errors in measurement; completion by the Regulatory Staff of an independent confirmation of LOCA-ECCS analyses; and consideration of the possibility of improvements in ECCS effectiveness to provide additional margin.

Experience gained through these assessments and by operation of Unit No. 1 at reduced power should then be reviewed by the Regulatory Staff and the ACRS before consideration is given to permitting the reactor to be operated at higher power levels. Further, because of the low peaking factors and other operating limits that will be required in the Technical Specifications, the Committee requests that it be kept informed as these Specifications are developed. The Committee plans to conduct a detailed review of the Specifications prior to operation of Unit No. 1 beyond 81% of rated power.

Primary to secondary coolant leakage through faulty steam generator tubes is currently a problem in pressurized water reactors. Studies by the reactor vendor have indicated that the causes of this problem can be attributed to poor secondary water chemistry control and design characteristics of the steam generator. The Committee believes that these problems should be the subject of additional research and evaluations.

The Applicant has not proposed to install equipment for monitoring for loose parts in D. C. Cook Plant, Unit No. 1. However, because the Committee views such equipment as significant to the safe operation of nuclear power plants and because equipment which appears to be capable of performing an adequate monitoring function is now commercially available, the Committee recommends that the Applicant install such a system prior to reactor startup.

The gaseous and liquid radioactive waste treatment systems and the planned environmental surveillance program for the D. C. Cook Plant appear to be adequate. Because of the proximity of the plant to the Palisades and Bailly nuclear power stations, the Committee requested that the Applicant investigate the possibility of overlap of waste streams from the several facilities. In addition, because the town of Lake Township plans to install a drinking water supply intake 3500 feet from the D. C. Cook cooling water discharge, the Committee requested that an assessment be performed of the potential intake of radioactive materials by the Lake Township population. These analyses were performed and indications are that, because of the dilution factors present and the direction of normal water flow in Lake Michigan, the accompanying radionuclide intakes will be acceptable. The environmental monitoring program should include the necessary features to confirm this evaluation.

The Applicant should assure himself that instrumentation for determining the course of postulated accidents is on hand at the station and that appropriate calibration methods and calculated bases for interpreting instrument responses are available. It should also be assured that the range of installed instrumentation is adequate to cover various potential radioactivity releases.

The Committee recommends that the recently announced Regulatory Staff position concerning protection against anticipated transients without scram be implemented in timely fashion for Cook Unit No. 1.

The Committee recognizes that re-evaluation of operating limits may be necessary as a result of possible changes in the acceptance criteria for emergency core cooling systems. The Committee wishes to be kept informed.

Other problems relating to large water reactors which have been identified by the Regulatory Staff and the ACRS and cited in previous reports should be dealt with appropriately by the Regulatory Staff and the Applicant as suitable approaches are developed.

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 D. C. Cook Nuclear Plant, Unit No. 1, can be operated without undue risk to the health and safety of the public. As stated above, the Committee recommends initial operation at no greater than 81% of rated power prior to further Committee review.

Dr. Edward A. Mason did not participate in the Committee deliberations on this project.

Additional comments by Dr. W. R. Stratton are presented below.

Sincerely yours,

/s/

H. G. Mangelsdorf
Chairman

Additional Comments by Dr. W. R. Stratton

I believe that the importance of peaking factors and associated calculated peak clad temperatures subsequent to a postulated accident have been overemphasized as measures of safety significance. This overemphasis has led to the restrictions in power levels of this reactor and to the various requirements that must be met before power levels greater than 81% will be allowed. I disagree with these restrictions and requirements. Given a satisfactory startup and power ascension program, and a report indicating approval from the Regulatory Staff, I believe that this reactor can operate safely at design power.

References attached.

References

1. Final Safety Analysis Report for the Donald C. Cook Nuclear Plant, Volumes I-VI, January 1969, (Amendment No. 12 to D. C. Cook application)

2. Amendments 13 through 49 to the D. C. Cook application

3. Safety Evaluation by the Directorate of Licensing, USAEC - D. C. Cook Nuclear Plant, Units 1 and 2 dated September 10, 1973

4. Supplement No. 1 to the DRL Safety Evaluation - D. C. Cook Nuclear Plant, Units 1 and 2, dated October 10, 1973

5. Letter, DRL to Applicant dated January 2, 1973, requesting additional information required to complete D. C. Cook safety evaluation

6. Letter, DRL to Applicant dated March 30, 1972, requesting additional information required to complete D. C. Cook safety evaluation

7. Letter, American Electric Power Service Company to DRL dated December 8, 1970 transmitting status reports on safety review items