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

March 13, 1973

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

Subject: REPORT ON DUANE ARNOLD ENERGY CENTER

Dear Dr. Ray:

At its 155th meeting, March 8-10, 1973, the Advisory Committee on Reactor Safeguards completed its review of the application by the Iowa Electric Light and Power Company for authorization to operate the Duane Arnold Energy Center at power levels up to 1658 MWt. This project was considered at a Subcommittee meeting at the site on December 20, 1972, and at a Subcommittee meeting in Washington, D. C. on January 27, 1973. During its review the Committee had the benefit of discussions with representatives and consultants of Iowa Electric Light and Power Company, General Electric Company, Bechtel Corporation, Chicago Bridge and Iron Company, and the AEC Regulatory Staff. The Committee also had the benefit of the documents listed. The Committee reported to the Commission on the construction of this plant in its letter of December 18, 1969 and in its supplementary letter of February 11, 1970.

The Duane Arnold Energy Center Nuclear Plant will be located on a site of approximately 500 acres adjacent to the west bank of the Cedar River in a rural area approximately eight miles northwest of the city of Cedar Rapids, Iowa.

The applicant proposes to install, no later than the first scheduled refueling outage, a leak-off system intended to reduce the potential consequences of excessive leakage from the main steam isolation valves. The criteria for functional adequacy of the leak-off system and the detailed design in conformance with the criteria are not yet fully established. The Regulatory Staff should assure itself that the system finally installed does satisfy all of the considerations appropriate to the enhancement of containment reliability.

The applicant will employ a recirculation pump trip as a means of limiting the consequences of the unlikely occurrence of a failure to scram during an anticipated transient. The trip will be installed prior to initial fuel loading. The Committee believes that this represents a substantial improvement. The specific means for implementing the pump trip should be resolved in a manner satisfactory to the Regulatory Staff.

The applicant is committed to the installation of a rod sequence control system which will render the probability of occurrence of a postulated, high-worth control rod drop accident negligibly low. This matter is under review and should be resolved in a manner satisfactory to the Regulatory Staff. Approved measures should be placed in effect prior to operation above 1% of rated power.

The shipping cask pool is physically separated from the spent fuel pool by a wall to a height above the top of stored fuel elements and a removable gate above that level. A postulated cask drop is calculated to result in penetration or cracking of the cask pool bottom if unprotected. To avoid such damage, the applicant intends to install an energy absorbing material covering the bottom of the cask pool, no later than the first refueling operation. This matter should be resolved in a manner satisfactory to the Regulatory Staff.

In the unlikely event that a break occurs in the recirculation pump discharge line, the pump impeller might act as a turbine causing the pump and motor to overspeed and become potential sources of missiles. The applicant is reviewing means of dealing with this possibility. The Committee believes that this matter should be resolved in a manner satisfactory to the Regulatory Staff.

The potential effects of some aspects of fuel performance and LOCA-related phenomena on acceptable linear fuel heat ratings for the Duane Arnold Energy Center are under study. This matter should be resolved in a manner satisfactory to the Regulatory Staff. The Committee wishes to be kept informed.

The applicant has provided protection against pipe whip in accordance with the criteria proposed by the Regulatory Staff in the Regulatory Guide, "Protection Against Pipe Whip Inside Containment", now under preparation. The Committee has emphasized the desirability of such protective measures in several letters. The Committee also recognizes that systems for restraining against pipe whip could generate undesirable stress concentrations unless properly designed and suitably installed. Therefore, particular emphasis should be devoted to the following: (1) a better understanding of transient response in piping than is usually required; (2) quality assurance pertaining to design and installation of pipe restraints, including verification that the design computational techniques account for operational conditions and postulated transients; (3) careful examination during preoperational testing and hot startup to validate that the installation meets the design criteria.

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.

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 Duane Arnold Energy Center can be operated at power levels up to 1658 MWt without undue risk to the health and safety of the public.

Sincerely yours,

H. G. Mangelsdorf

H. G. Mangelsdorf
Chairman

References Attached:

References

1) Final Safety Analysis Report, Duane Arnold Energy Center

2) Amendments 1-12, Final Safety Analysis Report, Duane Arnold Energy Center

3) Supplement to Amendment No. 1, dated June 6, 1972

4) Iowa Electric Light and Power Company letter dated July 10, 1972 re: Relief Valve Discharge Line

5) Iowa Electric Light and Power Company letter dated October 24, 1972 re: fuel design (proprietary)

6) Iowa Electric Light and Power Company letter dated December 18, 1972 re: installation of a main steam line isolation valve seal system in the Duane Arnold Energy Center

7) Iowa Electric Light and Power Company letter dated January 15, 1973 adopts the GE NEDM-10735 "Densification Considerations in BWR Fuel Design and Performance"

8) Iowa Electric Light and Power Company letter dated January 16, 1973, re: the gaseous effluent discharges from the Duane Arnold Energy Center being "as low as practicable" and consistent with the proposed Appendix I to 10 CFR Part 50

9) Iowa Electric Light and Power Company letter dated January 22, 1973 transmitting revised operating pressure and temperature limits for Duane Arnold Energy Center

10) Directorate of Licensing Safety Evaluation Report dated January 23, 1973

11) Directorate of Licensing Supplement No. 1 to the Safety Evaluation dated March 2, 1973