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

January 17, 1973

Honorable James R. Schlesinger
Chairman
U. S. Atomic Energy Commission
Washington, D. C. 20545

Subject: REPORT ON WATERFORD STEAM ELECTRIC STATION UNIT NO. 3

Dear Dr. Schlesinger:

At its 153rd meeting, January 11-13, 1973, the Advisory Committee on Reactor Safeguards completed its review of the application of the Louisiana Power and Light Company to construct Waterford Unit No. 3. This project was considered at Subcommittee meetings on November 2, 1972, at the site, and on January 9, 1973, in Washington, D. C. During its review the Committee had the benefit of discussions with representatives and consultants of the Louisiana Power and Light Company, Ebasco Services Incorporated, Combustion Engineering Incorporated, and the AEC Regulatory Staff. The Committee also had the benefit of the documents listed.

The Waterford site is in an industrial area on the west bank of the Mississippi River at a point about 21 miles upstream from the closest boundary of New Orleans. The site has about 7500 feet of river frontage, and contains more than 3600 acres of flatland. The plant is about 900 feet from the Mississippi River landward of the levee. It is about 500 feet from Louisiana State Highway No. 18, which is adjacent to the levee. The Texas and Pacific Railroad crosses the property about 2500 feet south of the reactor and a highway is under construction, crossing the property some 3000 feet south of the railroad. Two fossil fired units (Waterford No. 1 and No. 2) are under construction 2000 feet upstream from Waterford No. 3. The closest residence is 4000 feet from the reactor site. The closest industrial property is about 3000 feet downstream.

Waterford Unit No. 3 is founded upon some 30,000 feet of alluvial deposits. The upper 50 feet of these deposits is soft, recently deposited material. The soils below the upper material are much older, firm clays and sands. All Class 1 structures will be placed on a mat resting on the lower material. The Committee finds this satisfactory.

The nuclear steam supply system will be provided by Combustion Engineering and will include a 3390 MWt pressurized water reactor essentially identical to those to be provided for San Onofre Units 2 and 3 and Forked River Unit 1, previously reviewed. The Committee reiterates its previous statements with respect to similar reactors that adequate confirmation of the predicted core performance must be obtained to justify the higher power density of this reactor.

The Waterford containment will be a steel structure separated by an annulus from a surrounding concrete structure. The annulus will be maintained at a negative pressure under normal and accident conditions. The Committee understands that the Regulatory Staff is reviewing the adequacy of the proposed design pressure for the reactor containment building. The Committee wishes to be kept informed.

Explosions of material transported on the river, State Highway 18, or the Texas and Pacific Railroad were reviewed for possible danger to Waterford Unit No. 3. The applicant's studies indicate that the potential magnitude of such explosions, or the infrequency of their occurrence, eliminates need for additional protective measures at the plant. The Regulatory Staff should evaluate the adequacy of the analysis.

The applicant has committed himself to inclusion of two trains of wet and dry cooling towers to serve normal and emergency component cooling. When the design is completed it should be reviewed for adequacy by the Regulatory Staff.

The applicant described an experimental and analytical program intended to provide improved understanding of phenomena entering into the loss-of-coolant accident, which can provide the basis for developing improvements in ECCS design. He also described flexibility in design which can be used to improve ECCS effectiveness. The Committee believes it important that improvements in ECCS effectiveness be included in Waterford Unit No. 3, and recommends that the final design of the ECCS be reviewed by the Regulatory Staff and the ACRS prior to fabrication and installation of major components.

The Committee recommends that a study be made of the probability of unacceptable consequences arising from potential missiles in the unlikely event of turbine failure, and of the possible need for protective measures if this probability should be unacceptably high.

In addition, the Committee believes that analytical and experimental work on the penetration of reinforced concrete by missiles of the type of interest is desirable to provide a suitable basis for establishing the probability of penetration of thick-walled concrete structures and damage to safety-related components.

The applicant intends to use pre-pressurized fuel and is considering other modifications of the fuel assemblies. The fuel rod problem involving densification and associated movement of the fuel pellets is undergoing intensive investigation. The Regulatory Staff and the ACRS should review the resolution of this matter.

The Committee recommends that the applicant give careful attention to the use and improvement of instrumentation capable of providing continuing quantitative information of the local performance characteristics of high power density cores.

The Committee believes that protection against pipe whip should be provided by the applicant in accordance with criteria being developed by the AEC Regulatory Staff.

The Committee believes it desirable for the applicant and the Regulatory Staff to review further Waterford Unit No. 3 for design features, in accordance with Safety Guide No. 17, that should reduce the possibility of sabotage.

The Committee reiterates its previous comments concerning the need to study further means of preventing common mode failures from negating reactor scram action, and the design features to make tolerable the consequences of failure to scram during anticipated transients. The Committee believes it is 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. This matter should be resolved during construction in a manner satisfactory to the Regulatory Staff and the ACRS.

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 the items mentioned above can be resolved during construction and that, if due consideration is given to the foregoing, the Waterford Steam Electric Station, Unit No. 3 can be constructed with reasonable assurance that it can be operated without undue risk to the health and safety of the public.

Sincerely yours,

H. G. Mangelsdorf

H. G. Mangelsdorf
Chairman

References

1. Louisiana Power and Light Company Application to Construct and Operate Waterford Steam Electric Station, Unit No. 3, with Preliminary Safety Analysis Report, Volumes 1 through 4

2. Amendments 1 through 28 to the Application

3. Louisiana Power and Light Company Letter, dated January 5, 1973, "Effects of Fuel Densification"