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

December 12, 1974

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

Subject: REPORT ON ST. LUCIE PLANT UNIT NO. 2

Dear Dr. Ray:

At its 176th meeting, December 5-7, 1974, the Advisory Committee on Reactor Safeguards completed its review of the application of the Florida Power and Light Company for authorization to construct a second nuclear power unit at its Hutchinson Island site in St. Lucie County, Florida. Members of the Committee visited the site on May 19, 1974; and a Subcommittee meeting was held in West Palm Beach, Florida, on that date. A second Subcommittee meeting was held in Washington, D. C. on November 13, 1974. During its review, the Committee had the benefit of discussions with the Applicant, Combustion Engineering, Inc., Ebasco Services, Inc., the AEC Regulatory Staff, and their consultants. The Committee also had the benefit of the documents listed. The Committee reported on the construction permit application of St. Lucie 1 (Hutchinson Island) on March 12, 1970.

The St. Lucie Plant Unit No. 2 will be located next to St. Lucie Unit No. 1 on a tract of land of approximately 1100 acres, about half way between the towns of Fort Pierce and Stuart on the east coast of Florida. About 1000 people live within a five mile radius of the site. The nearest population center is Fort Pierce (population about 34,000), which is eight miles to the north. However, some buildup of population on the island is probable in the coming years, and the plant and its engineered safety features will be designed on the basis of a low population zone distance of 1 mile.

The plant site on Hutchinson Island is underlain by sand to a depth of several hundred feet. To provide satisfactory bearing and settlement characteristics and resistance to liquifaction, the area of most seismic Category I structures was dewatered, excavated to minus 60 feet (MSL), and filled with compacted soils to form a 30-foot-thick base.

Earthquake-induced liquefaction of banks of the cooling water canals or of the soils under a non-seismic Class 1 structure such as the St. Lucie Unit 1 switchyard represents a potential problem for the continued reliability of shutdown cooling. One important aspect of this matter relates to the potential for blockage of the inlets for the cooling water system and possibly to the presence of turbidity and particles in the cooling water. The Applicant and the Staff concur that a practical engineering solution exists for any regions which appear to be subject to liquefaction after the current tests are completed and evaluated. The Committee recommends that a conservative approach be taken in assuring integrity of the ultimate heat removal capability. This matter should be resolved in a manner satisfactory to the Regulatory Staff.

The proposed pressurized water reactor has a design power level of 2570 MW(t). The St. Lucie Plant Unit No. 2 design duplicates most of the principal features of Unit No. 1; the use of 16x16 fuel in Unit 2 is a principal difference between the two units. The containment system consists of a steel vessel enclosed within a reinforced concrete building, with the annular space maintained at a slightly negative pressure and exhausted through filters. The Applicant has stated that the containment and other structures and systems important to safety will be designed to meet the same tornado design criteria as nave been used for other recently reviewed plants, and that protection of vital components will be provided against the probable maximum hurricane-induced flood and runup level as estimated by National Oceanic and Atmospheric Administration and Corps of Engineers methodology.

The St. Lucie Plant Unit No. 2 is the first to propose use of the Combustion Engineering (CE) 16x16 fuel assembly at the construction permit stage. However, some previously reviewed plants employing CE nuclear steam-supply systems are converting from 14x14 fuel to 16x16 fuel during the construction stage and should operate prior to St. Lucie Unit No. 2. Mechanical tests, fuel tests and other research and development are underway. Neither the Regulatory Staff nor the ACRS have completed their review of the new core design. The Committee wishes to be kept informed concerning the results of the various on-going experimental and analytical programs and of any design changes which may be proposed in the future.

An evaluation of the compliance of St. Lucie 2 with 10 CFR 50.46 remains to be performed; however, calculated peak clad temperatures well below the limit are anticipated by the Applicant and the Regulatory Staff.

The ATWS evaluation, including any need for design modifications, remains to be submitted by the Applicant and evaluated by the Regulatory Staff. The Committee wishes to be kept informed.

St. Lucie Unit No. 2 has some reactor vessel and core design features different from other Combustion Engineering reactors. The Regulatory Staff plans to require an instrumented reactor internals vibration program appropriate to a prototype plant unless the Applicant can provide test results for other plants which clearly substantiate the St. Lucie Unit No. 2 analytical vibration response model. The Committee concurs.

The adequacy of protection against flooding of the ECCS pump room is under study. This matter should be resolved in a manner satisfactory to the Regulatory Staff.

Means of qualification of the electric cables from the diesel generators for operation under conditions of temporary tunnel flooding are under review. A different design approach represents a possible alternative for this important function. The Committee recommends that the Applicant and the Staff continue to study this matter.

The Regulatory Staff has proposed that the Applicant upgrade specific pressure systems to seismic Category I and Quality Group C in accordance with interpretations of Regulatory Guides 1.26 and 1.29. Included systems are the letdown loop of the chemical and volume control system, the component cooling lines which service the letdown heat exchanger and the reactor coolant pumps, and the fuel pool makeup system. The Applicant believes that alternate flow paths exist where a safety function must be met and that there is no requirement to upgrade to seismic Category I and Quality Group C in components not necessary to safety. The Committee recommends that the safety significance of these systems be reassessed by the Applicant and by the Staff and the matter resolved in a manner satisfactory to the Regulatory Staff. The Committee wishes to be kept informed.

The matter of the generation of turbine missiles and their probable effects on reactor safety is under review, including the possible need of design features to reduce the probability or mitigate the consequences. This matter should be resolved in a manner satisfactory to the Regulatory Staff.

Generic problems relating to large water reactors have been identified by the Regulatory Staff and the ACRS and discussed in the Committee's report dated February 13, 1974. These problems should be dealt with expeditiously and appropriately by the Regulatory Staff and the Applicant.

The Committee believes that the above items can be resolved during construction and that, if due consideration is given to these items,

St. Lucie Unit No. 2 can be constructed with reasonable assurance that it can be operated without undue risk to the health and safety of the public.

Sincerely yours,

/s/

W. R. Stratton
Chairman

References attached

References

1. St. Lucie Plant, Unit 2, Preliminary Safety Analysis Report, Volumes 1-8 (including Amendments 1-6, 8-16, 18-22).

2. Safety Evaluation of the St. Lucie Plant, Unit No. 2 (Directorate of Licensing Report), November 7, 1974.

3. FP&L letter dated December 31, 1973 furnishing information related to ATWS.

4. Directorate of Licensing Safety Evaluation Report, October 1974.

   a. Supplement to SER dated November 7, 1974.