

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

July 16, 1974

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

Subject: REPORT ON SURRY POWER STATION, UNITS 3 AND 4

Dear Dr. Ray:

At its 171st meeting, July 11-13, 1974, the Advisory Committee on Reactor Safeguards completed its review of the application of the Virginia Electric and Power Company for a license to construct the Surry Power Station, Units 3 and 4. This project had been considered previously during a Subcommittee meeting in Williamsburg, Virginia on June 28, 1974, subsequent to a tour of the site. In addition, the ACRS Subcommittee on Babcock and Wilcox Water Reactors discussed topics pertinent to the nuclear steam supply system for this plant at a meeting in Washington, D. C. on July 5, 1974. In the course of its review, the Committee had the benefit of discussions with representatives and consultants of the Virginia Electric and Power Company, the Babcock and Wilcox Company, the Stone and Webster Engineering Corporation, and the AEC Regulatory Staff. The Committee also had the benefit of the documents listed. The Committee previously reported to the Commission on the construction and operation of the Surry Power Station, Units 1 and 2, in its letters of April 29, 1968 and December 17, 1971.

The site for the Surry Power Station is an 840-acre tract located in the county of Surry, Virginia. The nearest population center is the city of Newport News, which had a 1970 population of about 138,000 and whose nearest boundary lies 4.5 miles east-southeast of the site. Due to the presence of several places of historical importance, there is a large transient population in the area of the plant during summer months.

Each Nuclear Unit will employ a pressurized water reactor with a two-loop coolant system of essentially the same design as that previously reviewed and approved by the Committee for the North Anna Power Station, Units 3 and 4. Each of the proposed Surry reactors will be designed to operate at a power of 2631 MW(t) with an expected ultimate capability of producing 2763 MW(t).

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The applicant proposes to utilize in Surry Units 3 and 4 a new reactor protection system, designated as RPS-II. The system, a hybrid using both analog and digital techniques, represents an evolution from the analog system, RPS-I, currently in use in the Oconee reactors. RPS-II incorporates a single-chip central processor unit as a micro-computer for the more complex trip functions. The applicant has proposed a series of environmental, reliability, and in situ tests for qualification of this system prior to its use in Surry Units 3 and 4. This matter should be resolved in a manner satisfactory to the Regulatory Staff.

The Committee recommended in its report of January 7, 1972, on Interim Acceptance Criteria for ECCS, that significantly improved ECCS capability should be provided for reactors for which construction permit applications were filed after January 7, 1972. This position was repeated in the Committee's report of September 10, 1973, on Acceptance Criteria for ECCS. The Surry Units 3 and 4 are in this category. The applicant has amended the license application to use the B&W Mark C (17x17) fuel assembly design, instead of the B&W Mark B (15x15) design previously proposed. The new fuel assemblies will be operated at lower linear heat generation rates and are expected to yield greater thermal margins for fuel design limits and improved safety margins in the analyses of the loss-of-coolant accidents. An extensive program has been initiated for determining the mechanical and thermal-hydraulic characteristics of the new fuel assemblies. A program of control rod tests also is proposed, including testing of trip times and control rod wear. Should modifications become necessary as a result of the control rod tests, retesting of the entire control rod drive would be undertaken. While many of the details of the proposed design are available, complete analyses of the performance of the Mark C fuel are not yet available, and the AEC Regulatory Staff has not completed its review. The Committee reserves judgment concerning the final design until the required performance information is presented and has been adequately reviewed. The Committee recommends that the applicant continue studies directed at further improvements in the capability and reliability of the ECCS. The Committee wishes to be kept informed.

The Staff Safety Evaluation Report did not address the matter of turbine missiles. The Committee recommends that the Regulatory Staff review the turbine orientation for Surry Units 3 and 4 to establish that appropriate protection from potential turbine missile damage to safety related equipment will be provided.

The Regulatory Staff has been investigating on a generic basis the problems associated with a potential reactor coolant pump overspeed in the unlikely event of a particular type of rupture at certain locations in a main coolant pipe. Some additional protective measures may be warranted for Surry Units 3 and 4 in this regard. The Committee recommends that resolution of this matter be expedited. The Committee wishes to be kept informed.

The Committee believes the applicant should address more attention to instrumentation for the determination of the course of potentially serious accidents, particularly with regard to upper range limits to fully encompass the spectrum of possible accidents. The instrumentation system should respond on a time scale which would permit necessary emergency action. The applicant should assure himself that appropriate calibration methods and calculated bases for interpreting instrument responses are available.

The applicant has made progress in arrangements for offsite emergency procedures to be followed in case of an accidental release of radioactive materials to the environment. Yet to be confirmed, however, are modifications in the plans of the State agency whose actions would be important in dealing with the population in the unlikely event of a major release. The Committee recommends that the applicant and the AEC Staff continue to collaborate with the State in moving ahead to complete development of an emergency action plan, and that the adequacy of arrangements for implementing such a plan be confirmed as soon as feasible. Also important is the planning for the protection of construction workers at Surry Units 3 and 4 in case of an unexpected release of radioactive materials from operating Units 1 and 2.

The Committee believes it is desirable for the applicant and the Regulatory Staff to continue to review Surry Units 3 and 4 for design features that could reduce the possibility and consequences of sabotage, in accordance with Regulatory Guide 1.17, "Protection of Nuclear Plants Against Industrial Sabotage."

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 appropriately by the Regulatory Staff and the applicant.

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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, Surry Power Station, Units 3 and 4, can be constructed with reasonable assurance that they can be operated without undue risk to the health and safety of the public.

Sincerely yours,

A handwritten signature in cursive script, reading "W. R. Stratton".

W. R. Stratton
Chairman

References

1. Virginia Electric and Power Company (VEPCO) Application for a Construction Permit for the Surry Power Station, Units 3 and 4, with Preliminary Safety Analysis Report (PSAR), Vols. 1-10.
2. Amendments 1-13 and 15-17 to the Application.
3. VEPCO letter, dated December 17, 1973, transmitting Report Concerning the Analysis of Postulated High Energy Line Failures Outside Containment.
4. Directorate of Licensing letter, dated May 23, 1974, transmitting Safety Evaluation Report.
5. Directorate of Licensing letter, dated June 14, 1974, regarding Design Safety Factors and Subcompartment Pressure Analyses.