

**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 THE BELLEFONTE NUCLEAR PLANT, UNITS 1 AND 2**

**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 Tennessee Valley Authority for a permit to construct the Bellefonte Nuclear Plant, Units 1 and 2. This application had been considered previously during a Subcommittee meeting in Scottsboro, Alabama on June 18, 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 Tennessee Valley Authority, the Babcock and Wilcox Company, and the AEC Regulatory Staff. The Committee also had the benefit of the documents listed.

The site for the Bellefonte Nuclear Plant is a 1,500 acre tract located in Jackson County, Alabama, approximately 38 miles east of Huntsville, Alabama, the nearest population center (reported 1970 population of 146,000). The minimum exclusion area radius will be about 0.6 miles. The radius of the low population zone has been selected to be two miles.

The Bellefonte Nuclear Plant consists of two units, each using a B&W two-loop pressurized water nuclear steam supply system having a design power level of 3600 MW(t). The reactor core will use 205 B&W Mark C (17x17) fuel assemblies. 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 its report of September 10, 1973 on Acceptance Criteria for ECCS. The Mark C fuel assemblies are responsive to this recommendation. 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 improvement in the capability and reliability of the ECCS. The Committee wishes to be kept informed.

The applicant proposes to utilize 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 microcomputer 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 Bellefonte Units 1 and 2. This matter should be resolved in a manner satisfactory to the Regulatory Staff.

The Bellefonte design uses a dual containment system. The inner primary containment is a 135 ft. diameter x 269 ft. high steel lined prestressed concrete structure. The outer, secondary containment is a reinforced concrete structure. The annulus between the two structures will be maintained at a negative pressure continuously. The Committee recommends that the Regulatory Staff review the design of the guard pipes for process lines traversing the annulus.

The vertical tendons of the primary containment structure will connect to the underlying limestone through rock anchors, each consisting of an assembly of 170 1/4-in.-diameter button-headed wires grouted into 48 ft. deep holes bored in the limestone base. The applicant has indicated that he will make thorough tests of the rock anchor system, including investigation of any corrosion control actions that may be appropriate. This matter should be resolved in a manner satisfactory to the Regulatory Staff.

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The limestone has been shown from test borings to be sound and of very high quality in the area designated for the reactor site. A minor fault has been exposed in the vicinity of the water intake structure. Investigations by the U. S. Geological Survey and the applicant indicate the fault to be incapable.

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 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 Bellefonte in this regard. The Committee recommends that resolution of this matter be expedited. The Committee wishes to be kept informed.

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.

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 Bellefonte Nuclear Plant, Units 1 and 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,



W. R. Stratton  
Chairman

References Attached

References

1. Tennessee Valley Authority (TVA) letter, June 19, 1973, to Directorate of Licensing with Application for Construction Permit for Bellefonte Nuclear Plant, Units 1 and 2, and Preliminary Safety Analysis Report (PSAR), Vols. 1 through 6 (Vols. 7, 8, and 9, submitted with Amendments 4 and 9)
2. Amendments 1 through 11 to the Application
3. Directorate of Licensing letter, May 24, 1974, transmitting Safety Evaluation Report
4. Department of the Army, Corps of Engineers letter, June 26, 1974
5. Neva Dawkins letter, July 2, 1974
6. Department of the Interior, U. S. Geological Survey letter, July 9, 1974