

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

September 11, 1973

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

Subject: REPORT ON RANCHO SECO NUCLEAR GENERATING STATION, UNIT 1

Dear Dr. Ray:

During its 161st meeting, September 6-8, 1973, the Advisory Committee on Reactor Safeguards reviewed the application of the Sacramento Municipal Utility District for a license to operate the Rancho Seco Nuclear Generating Station, Unit 1, at power levels up to 2772 MW(t). This project had been considered previously during the 159th meeting of the ACRS, July 12-14, 1973, by Subcommittee meetings in Sacramento, California, on June 13 and 14, 1973, subsequent to a tour of the site, and in Washington, D. C., on August 22, 1973. In the course of its review, the Committee had the benefit of discussions with representatives and consultants of the Sacramento Municipal Utility District, the Babcock and Wilcox Company, the Bechtel Corporation, and the AEC Regulatory Staff, and of the documents listed. The Committee last reported to the Commission on the construction of this plant in its letter of July 19, 1968.

The Rancho Seco Nuclear Generating Station is located about 25 miles southeast of Sacramento, California. Water for this plant will be supplied from the Folsom South Canal. An on-site reservoir will have a capacity of 2500 acre-feet, and two spray ponds can provide cooling water for decay heat removal for about 30 days.

The Rancho Seco nuclear steam supply system employs a Babcock and Wilcox two-loop, pressurized water reactor essentially identical in design to the Oconee Nuclear Station Unit No. 1, previously reported on by the Committee. However, Rancho Seco will operate at approximately 8% higher power level and will use control of boron concentration in the core cooling water to aid in reactivity control during power maneuvering.

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The application for a construction permit proposed initial operation at power levels up to 2452 MW(t), the same as the construction permit power level of the Oconee Nuclear Station, Unit 1 which employs a similar reactor. The safety analyses have been completed assuming a power of 2568 MW(t). The application for an operating license proposed power levels up to 2772 MW(t) and safety studies have been made at this power. This increase in power is accomplished by utilizing larger primary coolant pumps and by increasing the average coolant temperature rise in the core. The Committee believes that review of the operation of Oconee Nuclear Station, Unit 1 by the Regulatory Staff should be completed and satisfactory performance of Oconee Nuclear Station, Unit 1 should be demonstrated before Rancho Seco Unit 1 is operated at full power. In addition, the Committee agrees with the Regulatory Staff that it would be prudent for Rancho Seco Unit 1 to operate at power levels up to 2568 MW(t) for an appropriate time period and for the Staff and the ACRS to review this experience prior to allowing operation at full power of 2772 MW(t). Independent confirmation by the Regulatory Staff of the applicant's analyses of linear heat generation rates, operating limits, and ECCS efficacy, and submittal of a supplemental Staff Safety Evaluation Report should precede this review for operation at full power.

Fuel for the reactor has been thermally resintered with the purpose of reducing fuel densification under irradiation; furthermore, the fuel assemblies are being classified according to their maximum allowable linear heat rate and are to be loaded into the reactor according to this classification. This matter should be resolved in a manner satisfactory to the Regulatory Staff. The Committee wishes to be kept informed.

The applicant has stated that, under normal conditions, reactor produced radioactive liquid wastes will not be released to the environment. This will be accomplished primarily through processing and reuse of liquids removed from various reactor systems. The Committee believes that the effects of gradual buildup of tritium in liquids within the plant should be carefully evaluated. Factors to be assessed include potential increases in radiation exposures of operating personnel, possible difficulties in proper plant maintenance, and the possible influence of increased tritium concentrations on the consequences of unanticipated releases.

During the hot functional testing of Oconee Nuclear Station, Unit 1 which was conducted in 1972, damage occurred to some components, including reactor vessel internals. The design improvements made to Oconee Nuclear Station, Unit 1 have been made also to Rancho Seco Unit 1. The Committee believes that these changes are acceptable.

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The applicant has been responsive to the Committee's recommendation that suitable instrumentation be sought to monitor for loose parts and for vibration; such instrumentation has been designed and will be utilized.

The applicant has proposed appropriate operating limitations to be applied if, at any time during operation, the moderator temperature coefficient of reactivity is positive. This matter should be resolved in a manner satisfactory to the Regulatory Staff.

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, and this matter should be resolved to the satisfaction of the Regulatory Staff. The Committee wishes to be kept informed.

The Committee reiterates its previous comments on the need for further study of means for preventing common mode failures from negating reactor scram action, and of design features to make tolerable the consequences of failure to scram during anticipated transients. The Committee believes it 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. The Committee wishes to be kept informed of the resolution of this matter.

The applicant should assure himself that instrumentation for determining the course of potentially serious accidents, on a time scale that will permit appropriate emergency action, is provided at the station and that appropriate calibration methods and calculated bases for interpreting instrument responses are available.

In view of the important role of the applicant's Management Safety Review Committee in providing continuing reviews, and in updating and implementing safety measures, the ACRS recommends that the Management Safety Review Committee include additional experienced personnel from outside the corporate structure as voting members.

The applicant has proposed measures, including alarms and administrative procedures, to prevent operating under conditions which might result in exceeding acceptable fuel limits established from accident studies and other considerations. The current review has been confined to the first fuel cycle, and the analyses have been based on the as-built fuel. The ACRS recommends that the Regulatory Staff establish suitable criteria for these measures and provide suitable bases for evaluating future loadings. The Committee wishes to be kept informed.

Honorable Dixy Lee Ray

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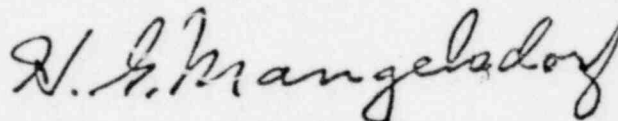
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The Committee recognizes that re-evaluation of operating limits may be necessary as a result of possible changes in the acceptance criteria for emergency core cooling systems. The Committee wishes to be kept informed.

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, 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 Rancho Seco Nuclear Generating Station, Unit 1 can be operated at power levels up to 2772 MW(t) without undue risk to the health and safety of the public.

Sincerely yours,



H. G. Mangelsdorf
Chairman

Attachment: List of References

References

1. Sacramento Municipal Utility District (SMUD) Safety Analysis Report for Rancho Seco Nuclear Generating Station, Unit 1, Vols. I-V, May, 1971 and Vol. VI, June, 1972
2. Amendments 6 through 23 to SMUD License Application for Rancho Seco
3. Letter from E. K. Davis, SMUD, to A. Giambusso, L, dated March 23, 1973, "Final Report on Minor Imperfections Found in Pipe Welds at the Rancho Seco Nuclear Generating Station"
4. Letter from E. K. Davis, SMUD to A. Giambusso, L, dated April 3, 1973, "Interim Report on Fuel Densification"
5. Letter from E. K. Davis, SMUD, to A. Giambusso, L, dated May 1, 1973, "Interim Report on Effects of Piping Break Outside Containment"
6. Letter from E. K. Davis, SMUD, to A. Schwencer, L, dated May 3, 1973, "Review of Control Circuits"
7. Directorate of Licensing Safety Evaluation, June 8, 1973
8. Letter from H. W. Ibser, Professor of Physics, California State University to M. Libarkin, ACRS, dated June 18, 1973, concerning temperature inversions at Rancho Seco
9. Babcock and Wilcox Proprietary Report, BAW-1393, "Rancho Seco Unit 1 Fuel Densification Report," June, 1973 with supplemental information containing as-built data forwarded by letter from E. K. Davis, SMUD, to A. Giambusso, L, dated July 23, 1973
10. Report, "Rancho Seco Nuclear Service Spray Ponds Performance Evaluation," dated June 29, 1973 by the Waste Heat Management Research Project, University of California, Berkeley
11. Directorate of Licensing Technical Report on Densification of B&W Reactor Fuel, dated July 6, 1973
12. Letter from E. K. Davis, SMUD, to A. Giambusso, L, dated August 2, 1973, submitting changes to the FSAR, and the control scheme for emergency diesel engines.