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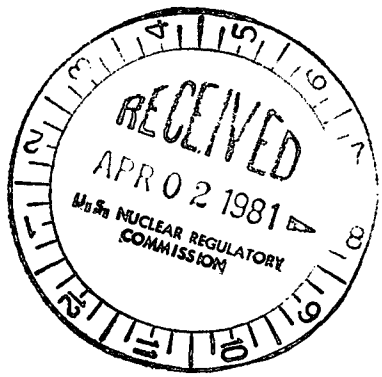

MEMORANDUM FOR: Raymond Fraley, Executive Director, ACRS

FROM: Gary G. Zech, Chief
Technical Support Branch
Planning and Program Analysis Staff

SUBJECT: REPORTS ON THE SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3 AND VIRGIL C. SUMMER, UNIT 1

In letters dated March 17 and 18, 1981, the ACRS provided its comments and recommendations following its review of the applications for licenses to operate San Onofre, Units 2 and 3 and Virgil C. Summer, Unit 1. This is to advise you that each of the recommendations is being considered by the staff and/or licensees and will be addressed in the staff's SER supplements scheduled to be issued in May 1981.

Original Signed by
Gary G. Zech

Gary G. Zech, Chief
Technical Support Branch
Planning and Program Analysis Staff
Office of Nuclear Reactor Regulation

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Memo

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

March 17, 1981

The Honorable Joseph M. Hendrie
Chairman
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: REPORT ON THE SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 AND 3

Dear Dr. Hendrie:

During its 251st meeting, March 12-14, 1981, the Advisory Committee on Reactor Safeguards completed its review of the application of Southern California Edison Company, et al, for licenses to operate the San Onofre Nuclear Generating Station Units 2 and 3 (SONGS 2 and 3). The Committee considered related seismic and geologic issues during its 250th meeting, February 5-7, 1981, and reported on these matters in its letter of February 10, 1981. Plant features were considered during Subcommittee meetings in Washington, DC on February 18, 1981 and March 11, 1981. During its review, the Committee had the benefit of discussions with the Applicant, Combustion Engineering, Inc. (CE), Bechtel Power Corporation, and the Nuclear Regulatory Commission Staff. The Committee also had the benefit of the documents listed.

SONGS Units 2 and 3 utilize CE Nuclear Steam Supply Systems with design power levels of 3410 MWt each. Control of both units will be accomplished from separate facilities within a shared control room. SONGS Unit 2 is the second CE plant to utilize 16x16 fuel. The containment buildings are pre-stressed concrete with a design pressure of 60 psig and a volume of 2.3 million cubic feet.

SONGS Unit 2 is the second CE-designed nuclear plant to use a digital computer as part of the reactor protection system. The computerized portion of the system was reviewed extensively by the NRC Staff and by the Committee during the review of Arkansas Nuclear One Unit 2 (ANO-2). The operating experience at ANO-2 and modifications to the software since the ANO-2 review were the subject of a Subcommittee meeting held on February 24, 1981. The ACRS believes the operating experience to date has been favorable. A data tie between the plant safety computer and the plant process computer has been provided, and its safety value is under review by the NRC Staff. The ACRS believes this feature is an asset to safety and recommends that it be retained on a permanent basis.

The Applicant described the organization of the plant staff, including the number of individuals engaged in the startup program, maintenance, engineering, operations, and health-physics. The compositions, duties, and interrelationships of the Safety Review Groups were reviewed. Training programs

were also discussed. The Committee believes the Applicant is emphasizing plant staffing and personnel training, but that extensive further effort will be required to have staffing completed in accord with the Applicant's proposed operating schedule. The Committee further notes that the NRC criteria for staffing and training of operational support personnel are inadequately defined. The Committee recommends that the NRC Staff develop improved bases for judging the adequacy of the qualifications, training, and organizational structure for support personnel, especially in the areas of maintenance and water chemistry control.

The Applicant presented information on operating procedures for plant accidents. The procedures are organized by logic diagrams to aid the operators in diagnosing the accident and in providing instructions for corrective actions. The Committee notes that the SONGS Units 2 and 3 procedures represent a significant improvement over previous standard practice, but the Committee encourages continuing efforts to improve further the manner in which guidance is provided to operators in emergencies. We also recommend that the Applicant review procedures and training provided to deal with the occurrence of an earthquake to confirm that the guidance provided is adequate. We recommend that the NRC Staff include this matter in its reviews of emergency procedures.

NUREG-0737, "Clarification of TMI Action Plan Requirements," requires an unambiguous, easy to interpret indication of inadequate core cooling in nuclear plants. Core exit thermocouples and heated junction thermocouples located at discrete axial locations are part of the system proposed to meet this requirement. The proposed method looks promising and should be given appropriate attention by the NRC Staff. The Committee will review this proposal, along with other proposals, on a generic basis.

The Applicant is still engaged in preparation and submittal of emergency plans to the surrounding communities. When all the final plans are available, they will be reviewed by the Federal Emergency Management Agency. A test exercise is planned to evaluate the plans' effectiveness. Some questions exist concerning the ability of certain systems to function after a major seismic event. These include emergency alarm features to alert the public to an accident in the plant, meteorological and field radiation monitoring, communications, and emergency evacuation.

The ACRS has previously recommended that probabilistic safety analyses be performed for all plants in operation or under construction. The Committee believes that this recommendation is applicable to SONGS Units 2 and 3, but that such studies need not be performed prior to licensing of the plant.

The plants are still being reviewed for conformance with NUREG-0737. The resolution of four items remains open. The Committee believes these items should be resolved in a manner acceptable to the NRC Staff. The Committee wishes to be kept informed.

The Committee recommends that SONGS Units 2 and 3 employ a seismic scram such as is installed at Diablo Canyon, set to actuate at 50% to 60% of the safe shutdown earthquake acceleration.

The ACRS believes that, if due consideration is given to the recommendations above, and subject to satisfactory completion of construction and preoperational testing, there is reasonable assurance that San Onofre Nuclear Generating Station, Units 2 and 3 can each be operated at power levels up to 3410 MWt without undue risk to the health and safety of the public.

Sincerely,

J. Carson Mark

J. Carson Mark
Chairman

References:

1. Southern California Edison Company, et al, "San Onfore Nuclear Generating Station, Units 2 and 3 Final Safety Analysis Report," Vols. 1-23, with Amendments 1 through 22.
2. U. S. Nuclear Regulatory Commission, "Safety Evaluation Report Related to the Operation of San Onofre Nuclear Generating Station, Units 2 and 3, Docket Nos. 50-361 and 50-362," USNRC Report NUREG-0712, February, 1981.
3. U. S. Nuclear Regulatory Commission, "Supplement No. 1 to the Safety Evaluation Report Related to the Operation of San Onofre Nuclear Generating Station, Units 2 and 3, Docket Nos. 50-361 and 50-362," USNRC Report NUREG-0712, February, 1981.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

INC

March 18, 1981

Honorable Joseph M. Hendrie
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: REPORT ON VIRGIL C. SUMMER NUCLEAR STATION UNIT 1

Dear Dr. Hendrie:

During its 251st meeting, March 12-14, 1981, the ACRS completed its review of the application of the South Carolina Electric and Gas Company for a license to operate the Virgil C. Summer Nuclear Station Unit 1. This project was considered at subcommittee meetings on February 26-27, 1981 in Columbia, South Carolina, and on March 11, 1981 in Washington, D.C. A tour of the facility was made by members of the Subcommittee on February 26, 1981. During its review the Committee had the benefit of discussions with representatives of the Applicant, the NRC Staff, the U.S. Geological Survey, and of the documents listed. The Committee reported on the construction permit application for this plant in a letter to AEC Chairman Schlesinger dated November 15, 1972.

The Summer plant is located in Fairfield County, South Carolina, about 26 miles northwest of Columbia, South Carolina. The nearest community with more than 1000 residents is Winnshore, about 15 miles to the northeast. The plant is adjacent to the Monticello reservoir, which provides cooling water for the main condenser, as well as the ultimate heat sink.

The Summer plant employs a Westinghouse, three-loop, pressurized water, nuclear steam supply system. The containment is a cylindrical, carbon-steel-lined, prestressed concrete structure having a design pressure of 57 psig.

At the construction permit review stage, some of the ACRS consultants were reluctant to accept the position of the Regulatory Staff and its consultants that the 1886 Charleston earthquake could be clearly localized in the Charleston area with regard to recurrence and recommended that a somewhat increased seismic design basis be employed. The ACRS supported the Regulatory Staff position favoring a safe shutdown earthquake (SSE) acceleration of 0.15g. However, in separate reports to the AEC dated May 13, 1971 and May 16, 1973, the ACRS urged initiation of a seismic research program intended to provide a better understanding of the likely causes of earthquakes near Charleston as well as several other areas in the eastern United States. Considerable research has since been undertaken in the Charleston area, and an improved understanding of the possible causes of earthquakes in the eastern United States has been developed. However, there still exists more than one theory with regard to the source of the 1886 Charleston earthquake.

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Since the construction permit stage, a new issue has arisen with regard to the choice of seismic design basis; namely, the potential for a moderate earthquake at the site resulting from reservoir-induced seismicity. The Applicant has studied seismic activity in the vicinity of the Monticello reservoir since it was filled in 1977, and combined the results of those studies with information about the local geology and hydrology in arriving at the conclusion that a maximum near-field earthquake magnitude of 4.0 should be considered in evaluating plant safety. The NRC Staff and its consultants have concluded that a near-field magnitude of 4.5 should be used. However, one member of the NRC Staff disagrees with the majority Staff position, suggesting that the available information does not rule out a somewhat larger reservoir-induced earthquake, and that a near-field earthquake having a magnitude of 5.0 to 5.3 should be used for assessing seismic safety.

The ACRS consultants agree that there does not exist a very good basis for choosing a specific near-field event, and generally support the use of a near-field magnitude of about five for evaluation of the plant.

Because it is difficult to judge that the probability of significant exceedence of the original SSE is sufficiently small, the ACRS has requested, and the Applicant has provided, information that indicates there is sufficient margin in the original design to cope safely with accelerations considerably larger than the SSE of 0.15g, including those which might arise from a near-field, magnitude 5 earthquake.

The Applicant's results to date regarding seismic design margin are reassuring. The ACRS recommends that these studies by the Applicant be extended to include all systems and components whose function is important to the assurance of the continuing removal of shutdown heat. Such studies need not be completed prior to operation of the Summer plant.

The discussions relative to the seismic issues at the Summer Nuclear Power Station raise certain questions that we believe should be addressed. These questions, which largely pertain to emergency preparedness, include the ability of certain key systems to function after a major seismic event. Included among such systems are the emergency alarm features to alert the public to an accident in the plant, meteorological and field radiation monitoring networks, communications, and emergency evacuation routes.

As a result of the continuing microseismic activity induced by the reservoir, the Applicant has, at NRC request, agreed to continue seismic monitoring for at least the next two years. We recommend that the NRC Staff assure that the monitoring program is not halted prematurely.

In its review of the Applicant's organization and management, the NRC Staff has identified several areas requiring attention, including the size of the engineering organization and the adequacy of experience with nuclear power reactors within the company, including hands-on operating experience within

the operating organization. The Applicant has taken steps to obtain the services of outside groups to provide additional technical capability for the short term while the needed in-house capability is developed. Care should be exercised that, as part of this effort, sufficient technical breadth and independence exists among the members of the Nuclear Safety Review Committee for the plant.

We have previously recommended that probabilistic safety analyses be performed for all plants in operation or under construction. We believe that this recommendation is applicable to this unit, but that such studies need not be performed prior to licensing of the plant.

During construction of the essential service water intake structure and pump house, settlement well beyond that predicted was experienced. While the settlement of the structures appears to have halted, the NRC Staff is still evaluating information addressing the stability of the subsurface materials and foundations of the intake structure and pumphouse. This matter should be resolved in a manner satisfactory to the NRC Staff.

The ACRS believes that, if due consideration is given to the items mentioned above, and subject to satisfactory completion of construction and preoperational testing, there is reasonable assurance that the Virgil C. Summer Nuclear Station Unit 1 can be operated at power levels up to 2775 MWt without undue risk to the health and safety of the public.

Sincerely,

J. Carson Mark

J. Carson Mark
Chairman

References:

1. South Carolina Electric and Gas Company, "Final Safety Analysis Report, Virgil C. Summer Nuclear Station," Volumes I-XX and Amendments 1-22
2. U. S. Nuclear Regulatory Commission, "Safety Evaluation Report Related to the Operation of Virgil C. Summer Nuclear Station, Unit No. 1," USNRC Report NUREG-0717, dated February, 1981
3. Letter from J. Devine, USGS, to R. Jackson, NRC, in response to an NRC request for update on USGS information concerning occurrence of earthquakes similar to the 1886 Charleston event, dated December 30, 1980
4. Memorandum from A. Murphy, Site Safety Research Branch, NRC, to R. Jackson, Chief, Geosciences Branch, NRC, Subject: Recommendation of Maximum Reservoir-Induced Earthquake at the V. C. Summer Nuclear Station, dated February 6, 1980
5. "Comments from the Palmetto Alliance, Inc., by Michael Lowe on V. C. Summer Operating License Application Review by the NRC Advisory Committee on Reactor Safeguards," dated February 26, 1981
6. "Testimony Before the Advisory Committee on Reactor Safeguards Related to the Virgil C. Summer Nuclear Station," Ms. Ruth Thomas, received February 26, 1981