

**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
UNITED STATES ATOMIC ENERGY COMMISSION**

WASHINGTON, D.C. 20545

August 17, 1972

Honorable James R. Schlesinger
Chairman
U. S. Atomic Energy Commission
Washington, D. C. 20545

Subject: REPORT ON ZION STATION UNITS 1 AND 2

Dear Dr. Schlesinger:

At its 148th Meeting, August 10-12, 1972, the Advisory Committee on Reactor Safeguards completed its review of the application of Commonwealth Edison Company for authorization to operate Zion Station Units 1 and 2 at power levels up to 3250 MW(t). This project had been considered previously at the Committee's 147th Meeting, July 13-15, 1972, and at Subcommittee meetings at the site on June 1, 1972, and in Washington, D.C. on July 6, July 12, and August 9, 1972. Unit 2 is expected to be ready for operation in slightly less than one year after Unit 1. During its review, the Committee had the benefit of discussions with representatives of Commonwealth Edison Company, Westinghouse Electric Corporation, Sargent and Lundy, the AEC Regulatory Staff, and their consultants. The Committee also had the benefit of the documents listed. The Committee reported to the Commission on the construction of these units in its report of July 24, 1968.

The Waukegan Memorial Airport is about $3\frac{1}{2}$ miles from the plant, and activity has increased since the Construction Permit was issued. There are plans for enlarging the airport for greater usage and larger aircraft. The applicant should, on a continuing basis, appraise the potential effect on his plant of the changing airport operations, including the probabilities of crashes by the various categories of aircraft, the vulnerability of the plant structures, and measures that might be taken to minimize the effect of impact on critical structures. The Regulatory Staff is currently discussing with the applicant measures that can be taken to minimize the effect of fires arising from spillage of aircraft fuel in the event of an airplane crash. The Committee believes that the applicant should take measures to limit the consequences of such fuel spillage and believes that this matter can be resolved between the applicant and the Regulatory Staff prior to commencement of operation. In the event of any major change in the character of the airport usage that may affect the safety of the plant, the Committee recommends that the Regulatory Staff review the situation.

The Committee's report of July 24, 1968, called attention to specific matters of ACRS concern, including the need for adequate reliability of the protection system and adequate independence of protection and control systems; the need for prompt detection of gross fuel failure and primary coolant leakage; the importance of quality assurance and of testing engineered safety features; and other matters identified as being significant for all large water reactors. Most of these items are generic, not unique to Zion. During the four years that have elapsed since the Zion construction permit review, much progress has been made in resolving such problems. AEC Regulations and Safety Guides and industry codes and standards have formalized positions on many items of immediate concern, and additional work is in progress on these problems. The Committee recommends that as the results of additional research, analyses, and design studies become available, they should be used by the applicant for evaluation and possible improvement of the existing Emergency Core Cooling System. The Committee wishes to be kept informed.

The applicant should assure himself that instrumentation for determining the course of postulated accidents is on hand at the station and that appropriate calibration methods and calculated bases for interpreting instrument responses are available.

The Committee recommends that the Regulatory Staff confirm the adequacy of the applicant's analysis of peak overall accident pressures during postulated loss-of-coolant accidents, as well as the response of compartment walls within the containment to dynamic forces during such events.

In its report of July 24, 1968, the Committee called attention to the possibility of reactor vessel failure, during the later part of the reactor life, as a result of thermal shock caused by emergency core cooling system action in the unlikely event of a loss-of-coolant accident. This possibility could materialize only after many years of vessel irradiation, and the Heavy Section Steel Technology Program should yield data that will show whether the possibility is real. The applicant has made provision, as suggested in the Committee letter of July 24, 1968, for installing a reactor cavity flooding system if this should prove desirable. The Committee believes it is satisfactory to defer a decision on installation of this system.

In the unlikely event of a loss-of-coolant accident, hydrogen buildup in the containment would be controlled on an interim basis by purging through a filter system. The applicant is committed to add a hydrogen recombining system, as recommended by Safety Guide No. 7, within one year after initial criticality. The Committee finds this satisfactory.

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The Committee reiterates its previous comments concerning the need to study further means of preventing common mode failures from negating reactor scram action, and 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.

Defects have developed in unpressurized fuel in some plants. The Zion fuel is pre-pressurized and there is reason to expect improved performance with such fuel. However, the phenomena are not fully understood, and some effects on fuel performance are anticipated. The applicant will submit further information with regard to this matter and will propose acceptable upper limits for linear power and procedures for adequate surveillance of core power distribution and fuel condition. The Regulatory Staff and the ACRS should review these proposals prior to operation at appreciable power.

Because of limited experience with very large high power density reactors such as Zion, and residual uncertainty relating to other matters mentioned, the Committee believes it would be prudent to restrict initial operation to somewhat below full power. The Committee recommends operation at power levels not exceeding 2760 MW(t) (85 percent of full power) until the first refueling of Zion Unit 1, at which time operating experience will have been gained and the condition of the fuel can be observed visually. The Regulatory Staff and the ACRS should review the matter prior to operation at higher power.

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 the Zion Station Units 1 and 2 can be operated initially at power levels up to 2760 MW(t) without undue risk to the health and safety of the public. Subsequent to the first refueling of Unit 1 and satisfactory operation up to that time, and subject to review by the Regulatory Staff and the ACRS, the Committee believes there will be reasonable assurance that the units can be operated at power levels up to 3250 MW(t) without undue risk to the health and safety of the public.

Sincerely yours,



C. P. Siess
Chairman

References attached

References - Zion

1. Commonwealth Edison letter dated 12/1/70 (Amendment 12) transmitting Final Safety Analysis Report (FSAR) for the Zion Station Units 1 and 2 and the Technical Specifications
2. Amendments 13-21 to the Application for Construction Permits and Operating Licenses