50-245
50-336
50-423

B. Millstone Point, Unit 2: Inoperability of Safety-Related Equipment Following Load Shedding

G. D. McDonald, Jr., discussed the inoperability of certain safety-related equipment following load shedding in the Connecticut power grid (see Appendix XXVIII). He completed the report on this matter which he began at the 197th Meeting, discussing the circuitry of the Millstone 345 kv switchyard, a summary of the July 5 events resulting in low grid voltage and blown control circuit fuses, a summary of the July 21 events resulting in the failure of diesel generator load sequencing, the corrective actions and changes proposed by the operator, the generic considerations and NRC Staff actions, the equipment protective trips that can result in inoperable diesel generators,

1. General Design Criteria -- Criterion 17 (GDC-17) - Mr. Case presented the majority and minority Staff positions on the GDC-17 statement regarding off-site power requirements, ". . . preferably by two physically independent transmission lines." DRS has determined that most power stations have two transmission lines, but it was not clear whether these were importing or exporting power. An examination of the reliability gained by having two versus one off-site transmission line results in a reliability improvement factor of two. However, the unreliability of the off-site power grid is 10^{-4}/time; the unreliability of the incoming power lines is 10^{-6}/time; therefore, the majority of the Staff believes that one off-site transmission line is sufficient.

Mr. Levine, speaking as the minority, stated that he believes the loss of all ac power for several hours can result in worse core melting than could occur from a DBA. He questions the on-site ac power capability. His survey reveals that 90% of the 51 nuclear power plants have more than two off-site power lines, and 70% have more than two rights-of-way. He mentioned, as examples, that Commonwealth Edison and Philadelphia Electric believe that there should be two transmission lines, two rights-of-way, and two start-up transformers. He believes that, if the off-site power reliability of 10^{-4} obtained by the Staff is valid, this is unacceptable to the utilities.

Mr. Case noted that a change in Criterion 17 is planned to require at least one, separate incoming power line at each facility in addition to the line that is exporting power.

The Committee decided to refer the GDC-17 question regarding off-site emergency power supply requirements back to the Reactor Design and Operating Subcommittee for further review.

(A Subcommittee meeting has been tentatively set for November 5, 1969, in Washington, D. C.)

EXCERPTS FROM ACRS LETTERS WHICH RELATE TO CRITERION NO. 17

1. Report on Maine Yankee Atomic Power Station - July 19, 1968.

   "The Committee believes that the system for supplying off-site electrical power to the engineered safeguards equipment should be modified so that no single failure will prevent power from being available from this source."

2. Report on Crystal River Unit 3 Nuclear Generating Plant - May 15, 1968.

   "The Committee believes that the proposed off-site power system should be modified to fulfill Criterion 39 so that no single failure will prevent the operation of minimum electrically-powered safety features necessary to protect the core."

3. Report on Oconee Nuclear Station, Units 1, 2 and 3 - July 11, 1967.

   "Emergency power sources for the ECCS and other safeguards are: (a) the other Oconee units (each unit can withstand and will be tested to withstand instantaneous loss of load without a reactor trip or a turbine trip); (b) two hydro-electric units at Keowee Station less than one mile away, with independent overhead and underground transmission lines; and (c) a gas-turbine unit thirty miles away with independent transmission line, transformer, and switchyard -- all in addition to the usual multiple ties to the power transmission grid. The applicant stated that switching and sequencing of sources, buses, and loads would be such that no single failure would impair system availability."