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G. CARL ANDOGNINI
MANAGER
NUCLEAR OPERATIONS DEPARTMENT

October 5, 1978

BECo Ltr. #78-175

Mr. Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

License No. DPR-35
Docket No. 50-293

Reference (1) Letter to Mr. G. C. Andognini from Mr. T. A. Ippolito dated August 7, 1978

Evaluation of the Pilgrim Reactor Protection System Power Supply

Dear Sir:

In Reference (1), Boston Edison Company was requested to evaluate the reactor protection system (RPS) power supply for Pilgrim Nuclear Power Station. The evaluation included a comparison to Criterion 21, with regards to the potential occurrence of undetected single failures, and to Criterion 2 for determining the potential for a postulated sequence of events initiated by an earthquake which could adversely affect the reactor protection system. Additionally, certain interim surveillance requirements of the RPS power supply were outlined in your letter. Accordingly, Boston Edison Company has reviewed the concerns and requirements as set forth in the transmittal and concludes that no facility or Technical Specification changes are necessary at this time.

The Pilgrim Nuclear Power Station (PNPS) Unit #1 RPS power supply is of the type generically supplied by General Electric (GE) Company and hence is similar in design to that installed at Hatch Unit #2. Based on discussions with General Electric Company and in conjunction with the recommended surveillance program that Boston Edison Company implemented promptly following the receipt of your letter, we believe that adequate justification exists to support the continued safe operation of Pilgrim Station.

Discussion

Criterion 21 requires, in part, that no single failure results in a loss of the protective function. As described in Reference (1), potential safety problems associated with the postulated single failure in the RPS

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motor-generator sets could be detected in a timely manner by additional surveillance, specifically, by assuring that the output voltage of each reactor protection system motor-generator is checked to be within ± 10% of the nominal value approximately every eight hours. With these surveillance requirements there is reasonable assurance that a facility utilizing a system similar to that of Hatch 2, can be operated without endangering public health and safety.

Nuclear Operations Department Directive 78-7, "Interim Surveillance Requirements on RPS Power Supply," dated August 11, 1978, imposed the surveillance requirements, as were outlined in Reference (1), on Pilgrim Station with the further requirements that the surveillance shall be considered as if it were required by Technical Specifications. This program was immediately implemented and will continue in effect until otherwise directed by the Nuclear Operations Manager. It is the Boston Edison Company's position that Criterion 21 is adequately met by this means.

Criterion 2 of the General Design Criteria requires in part that systems important to safety, such as the reactor protection system, be designed to withstand the effects of earthquakes. In Reference (1) you indicated that a certain sequence of events could occur that would result in damage to non-seismically qualified RPS components with the attendant potential loss of the capability to scram the reactor. This sequence of events included (a) the occurrence of an earthquake that would cause the undetected failure of a voltage sensor, (b) the failure of the motor-generator set resulting in abnormal output voltage, (c) persistence of the abnormal output voltage undetected by visual observation and surveillance testing for a time sufficient to damage reactor protection system components, and (d) failure of these components in such a manner that results in loss of scram capability (instead of in the fail-safe mode).

Boston Edison Company supports the General Electric Company's position, as put forth in a generic presentation to the NRC on this subject on September 14, 1978, that the probability of the occurrence of the unique combination and sequence of events to cause such a failure is extremely low. In addition, accumulated operating experience supports the GE position that concern with this issue is not justified. As testimony to this, GE emphasizes that the industry has experienced 134 reactor years of operation with the standard MG set equipment since 1970 with no reported failures. This operating experience includes three (3) BWR's operating during severe (7.5 Richter) earthquakes.

To further ensure the operability of the RPS power supply following an earthquake, Boston Edison offers the following additional justification:

PNPS Emergency Procedure No. 5.2.1, "Earthquake", requires inspections and evaluations of various equipment, systems and structures to establish their functional capability immediately following seismic events. Since the occurrence of a design basis earthquake would be readily known via various informational sources, the probability is extremely small that a sustained "undetected" failure, resulting in a significant degrading of the RPS trip function could develop. Procedure No. 5.2.1 will include an inspection of the RPS motor-generator sets to assure the operability of the equipment. Further, the surveillance requirements that have been established with regard to output voltage and current are conducted once per eight-hour shift, thus providing additional checks to assure that any degradation of the RPS power supply following a postulated design basis earthquake will be discovered within a short period of time.

Boston Edison Company has further determined that any reasonable common mode failure of the Reactor Protection System active components that would render the system unable to de-energize (the fail-safe mode) can be rectified by the manual tripping of the RPS circuit breakers in the Control Room. These manual breakers would remove all power from the Reactor Protection System Trip Channels A and B.

Therefore, based upon the committed continued surveillance program, the low probability for "undetected" failures during seismic events and the redundant (manual) means of quickly removing RPS power from the Main Control Room, we believe that continued reactor operation is justified and that the health and safety of the public is not endangered.

General Electric Company is continuing to review this matter and currently anticipates that a failure modes and effects analysis will be completed and available to utilities by mid November. Boston Edison Company will be kept informed by GE of any new generic issues regarding RPS motor-generators and will inform the Commission if any future plant modifications are deemed necessary as a result of the on-going evaluation.

Should you require additional information pertaining to this subject, please contact us.

Very truly yours,

G. Carl Andognini

Commonwealth of Massachusetts)
County of Suffolk)

Then personally appeared before me G. Carl Andognini, who, being duly sworn, did state that he is Manager - Nuclear Operations Department of Boston Edison Company, the applicant herein, and that he is duly authorized to execute and and file the submittal contained herein in the name and on behalf of Boston Edison Company and that the statements in said submittal are true to the best of his knowledge and belief.

My Commission expires: July 6 1984

Dorothy M. Lopes
Notary Public