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TECHNICAL EVALUATION REPORT

CONFORMANCE TO GENERIC LETTER 83-28

ITEM 4.5.2

SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2

Docket Nos. 50-387 and 50-388

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ABSTRACT

This EG&G Idaho, Inc., report documents the review of the submittals from the Pennsylvania Power & Light Co. regarding conformance to Generic Letter 83-28, Item 4.5.2 for the Susquehanna Steam Electric Station, Units 1 and 2.

Docket Nos. 50-387 and 50-388
TAC Nos. 54033 and 59513

FOREWORD

This report is supplied as part of the program for evaluating licensee/applicant conformance to Generic Letter 83-28, "Required Actions Based on Generic Implications of Salem ATWS Event." This work is being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of Engineering and System Technology, by EG&G Idaho, Inc., Regulatory and Technical Assistance Unit.

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1. INTRODUCTION AND SUMMARY

On February 25, 1983, both of the scram circuit breakers at Unit 1 of the Salem Nuclear Power Plant failed to open upon an automatic reactor trip signal from the reactor protection system. This incident was terminated manually by the operator about 30 seconds after the initiation of the automatic trip signal. It was determined that the failure of the circuit breakers was related to the sticking of the undervoltage trip attachment.

Prior to the incident, on February 22, 1983, an automatic trip signal was generated at Unit 1 of the Salem Nuclear Power Plant based on steam generator low-low level during plant start-up. In this case, the reactor was tripped manually by the operator, almost coincidentally with the automatic trip.

Following these incidents, on February 28, 1983, the NRC Executive Director of Operations (EDO) directed the staff to investigate and report on the generic implications of the occurrences at Unit 1 of the Salem Nuclear Power Plant. The results of the staff's inquiry are reported in NUREG-1000, "Generic Implications of the ATWS Events at the Salem Nuclear Power Plant."¹ As a result of this investigation, the NRC requested (by Generic Letter 83-28, dated July 8, 1983)² all licensees of operating reactors, applicants for an operating license, and holders of construction permits to respond to generic issues raised by the analyses of these two ATWS events.



2. REVIEW REQUIREMENTS

Item 4.5.2 (Reactor Trip System Reliability - System Functional Testing - On-Line Testing) requires licensees and applicants for plants not currently designed to permit on-line testing to justify not making the modifications to permit such testing. Alternatives to on-line testing will be considered where special circumstances exist and where the objective of high reliability can be met in another way. Item 4.5.2 may be interdependent with Item 4.5.3 when there is a need to justify not performing on-line testing because of the peculiarities of a particular design.

All portions of the reactor trip system (RTS) that do not have on-line testing capability will be reviewed under the guidelines for this item. However, the existence of on-line testability for the reactor trip breaker undervoltage and shunt trip attachments on Westinghouse, Babcock & Wilcox (B&W), and Combustion Engineering (CE) plants; the silicon controlled rectifiers in the control rod drive clutch supply (CRDCS) on B&W plants; and the scram pilot and backup scram valves on General Electric (GE) plants will only be confirmed here. These issues are specifically addressed in Items 4.4 and 4.5.1. Maintenance and testing of the reactor trip breakers are also excluded from this review, as they are evaluated under Item 4.2. This review of the licensee/applicant submittals will:

1. Confirm that the licensee/applicant has identified those portions of the RTS that are not on-line testable. If the entire RTS is verified to be on-line testable, with those exceptions addressed above, no further review is required.
2. Evaluate modifications proposed by licensees/applicants to permit on-line testing against the existing criteria for the design of the protection systems for the plant being modified.
3. Evaluate proposed alternatives to on-line testing of the RTS system for acceptability based on the following:

- a. The licensee/applicant submittal substantiates the impracticality of the modifications necessary to permit on-line testing, and
- b. High RTS availability (comparable to that which would be possible with on-line testing) is achieved in another way. Any such proposed alternative must be described in detail sufficient to permit an independent evaluation of the basis and analysis provided in lieu of performing on-line testing. Methods that may be used to demonstrate that the objective of high reliability has been met may include the following:
 - i. Demonstration by systematic analysis that testing at shutdown intervals provides essentially equivalent reliability to that obtained by on-line testing at shorter intervals.
 - ii. Demonstration that reliability equivalent to that obtained by on-line testing is accomplished by additional redundant and diverse components or by other features.
 - iii. Development of a maintenance program based on early replacement of critical components that compensates for the lack of on-line testing. Such a program would require analytical justification supported by test data.
 - iv. Development of a test program that compensates for the lack of on-line testing, e.g., one which uses trend analysis and identification of safety margins for critical parameters of safety-related components. Such a program would require analytical justification supported by test data.

4. Verify the capability to perform independent on-line testing of the reactor trip system breaker undervoltage and shunt trip attachments on CE plants. Information from licensees and applicants with CE plants will be reviewed to verify that they require independent on-line testing of the reactor trip breaker undervoltage and shunt trip attachments.

3. PLANT RESPONSE EVALUATION

The licensee for Susquehanna Units 1 and 2 (Pennsylvania Power and Light Company) provided responses to Item 4.5.2 of Generic Letter 83-28 in submittals dated November 6, 1983,³ March 1, 1984,⁴ and July 21, 1988.⁵

The first submittal states that on-line functional testing of the RTS including independent testing of the diverse trip feature is presently performed, but that on-line functional testing of the backup scram valves is not currently performed.

The second submittal states that the Technical Specifications require response time testing of the RTS, including independence of the scram pilot valves. The licensee's response states that on-line testing of the backup scram valves is not performed at Susquehanna because testing during operation would cause a plant scram, and failure of a valve will not prevent a reactor trip.

The third submittal states that the Preventive Maintenance Program for the backup scram valves has been changed so that these valves are tested every 18 months. Also, additional ac powered solenoid valves have been installed as part of the alternate rod insertion (ARI) system. These ARI valves will be tested at least every 18 months.

4. CONCLUSION

Based on our review of the licensee's submittals, we find that requirements of Item 4.5.2 of Generic Letter 83-28 have been adequately addressed and are, therefore, acceptable. The licensee's justification for not performing periodic on-line testing of the backup scram valves is valid, and the additional solenoid valves also enhance the ARI diverse scram system.

REFERENCES

1. Generic Implications of ATWS Events at the Salem Nuclear Power Plant, NUREG-1000, Volume 1, April 1983; Volume 2, July 1983.
2. NRC Letter, D. G. Eisenhut to All Licensees of Operating Reactors, Applicants for Operating License, and Holders of Construction Permits, "Required Actions Based on Generic Implications of Salem ATWS Events (Generic Letter 83-28)," July 8, 1983.
3. Letter, Pennsylvania Power and Light Co. (N. W. Curtis) to NRC (D. G. Eisenhut), November 6, 1983.
4. Letter Pennsylvania Power and Light Co. (N. W. Curtis) to NRC, (D. G. Eisenhut), March 1, 1984.
5. Letter, Pennsylvania Power and Light Co. (H. W. Keiser) to NRC (W. R. Butler), July 21, 1988.

ENCLOSURE 2

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

FACILITY NAME Susquehanna Steam Electric Station, Units 1 & 2

SUMMARY OF REVIEW/INSPECTION ACTIVITIES

The SICB has reviewed the licensee's responses to Generic Letter 83-28, Item 4.5.2 regarding performance of on-line RTS testing and testing of Backup Scram Valves and made the evaluation in Enclosure 1.

NARRATIVE DISCUSSION OF LICENSEE PERFORMANCE - FUNCTIONAL AREA

Understanding of issues is generally apparent, and approaches are viable and generally sound and thorough. Responses generally are timely and sufficient for our evaluation.

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