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INPUT FOR SAFETY EVALUATION REPORT BEAVER VALLEY POWER STATION UNIT 1 BEAVER VALLEY POWER STATION UNIT 2 BRAIDWOOD STATION UNITS 1 AND 2 BYRON STATION UNITS 1 AND 2 CALLAWAY PLANT UNIT 1 CATAWBA NUCLEAR STATION UNITS 1 AND 2 COMANCHE PEAK STEAM ELECTRIC STATION UNITS 1 AND 2 DONALD C. COOK NUCLEAR PLANT UNITS 1 AND 2 DIABLO CANYON UNITS 1 AND 2 REACTOR TRIP SYSTEM RELIABILITY ITEM 4.5.2 OF GENERIC LETTER 83-28

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ABSTRACT

This EG&G Idaho, Inc. report provides a review of the submittals for some of the Westinghouse (W) nuclear plants for conformance to Generic Letter 83-28, Item 4.5.2. The report includes the following plants, all Westinghouse, and is in partial fulfillment of the following TAC Nos.:

Plant	Docket Number	TAC Number
Beaver Valley Power Station Unit 1	50-334	53962
Beaver Valley Power Station Unit 2 (OL)	50-412	62958
Braidwood Station Unit 1 (OL)	50-456	N/A
Braidwood Station Unit 2 (OL)	50-457	N/A
Byron Station Unit 1	50-454	56288
Byron Station Unit 2 (OL)	50-455	63254
Callaway Plant Unit 1	50-483	55206
Catawba Nuclear Station Unit 1	50-413	57744
Catawba Nuclear Station Unit 2 (OL)	50-414	N/A
Comanche Peak Steam Electric Station Unit 1 (OL)	50-445	N/A
Comanche Peak Steam Electric Station Unit 2 (OL)	50-446	N/A
Donald C. Cook Nuclear Plant Unit 1	50-315	53971
Donald C. Cook Nuclear Plant Unit 2	50-316	53972
Diablo Canyon Unit 1	50-275	53976
Diablo Canyon Unit 2 (OL)	50-323	61723

FOREWORD

This report is provided as part of the program for evaluating licensee/applicant conformance to Generic Letter 83-28, "Required Actions Based on Generic Implications of Salem ATWS Events." This work is conducted for the U. S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of PWR Licensing-A by EG&G Idaho, Inc.

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1. INTRODUCTION

On July 8, 1983, Generic Letter 83-28[1] was issued by D. G. Eisenhut, Director of the Division of Licensing, Office of Nuclear Reactor Regulation, to all licensees of operating reactors, applicants for operating licenses, and holders of construction permits. This letter included required actions based on generic implications of the Salem ATWS events. These requirements have been published in Volume 2 of NUREG-1000, "Generic Implications of ATWS Events at the Salem Nuclear Power Plant."[2]

This report documents the EG&G Idaho, Inc. review of the submittals of some of the Westinghouse plants including Beaver Valley Units 1 and 2, Braidwood Units 1 and 2, Byron Units 1 and 2, Callaway Unit 1, Catawba Units 1 and 2, Comanche Peak Units 1 and 2, D. C. Cook Units 1 and 2 and Diablo Canyon Units 1 and 2 for conformance to Item 4.5.2 of Generic Letter 83-28. The submittals from the licensees utilized in these evaluations are referenced in Section 14 of this report.

2. REVIEW REQUIREMENTS

Item 4.5.2 (Reactor Trip System Reliability - System Functional Testing - On-Line Testing) requires licensees and applicants with plants not currently designed to permit on-line testing to justify not making 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 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, B&W and CE plants; the silicon controlled rectifiers in the CRDCS on B&W plants; and the scram pilot and backup scram valves on GE plants will only be confirmed here since they 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 Reactor Trip System that are not on-line testable. If the entire Reactor Trip System 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 Reactor Trip 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 Reactor Trip System 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. GROUP REVIEW RESULTS

The relevant submittals from each of the Westinghouse reactor plants were reviewed to determine compliance with Item 4.5.2. First, the submittals from each plant were reviewed to establish that Item 4.5.2 was specifically addressed. Second, the submittals were evaluated to determine the extent to which each of the Westinghouse plants complies with the staff guidelines for Item 4.5.2.

4. REVIEW RESULTS FOR BEAVER VALLEY POWER STATION, UNIT 1

4.1 Evaluation

Duquesne Light, the licensee for Beaver Valley 1, provided their response to Item 4.5.2 of the Generic Letter on November 4, 1983. In that response, the licensee states that Beaver Valley 1 performs on-line testing of the Reactor Trip System, with the exceptions of independent on-line testing of the shunt trip attachment and on-line testing of the reactor trip bypass breakers.

The licensee states that performance of independent on-line testing of the shunt trip attachment is contingent on implementation of an automatic shunt trip modification (Item 4.3 of the Generic Letter), which is scheduled to be installed and tested by June 3, 1986.

The licensee states that on-line testing of the bypass breakers during power operation is not justified because only one bypass breaker can be in service at a time (for less than two hours per month), and that when a bypass breaker is in service the RTS will initiate a trip signal to one of the trip breakers which is tested bimonthly. Also, the addition of components necessary to eliminate the need to lift leads and install jumpers (currently required to test the bypass breakers) could decrease the reliability of the bypass breaker system.

4.2 Conclusion

The staff finds the licensee's statement of the extent to which they currently perform on-line testing of the RTS meets the staff position on Item 4.5.2 of the Generic Letter and is, therefore, acceptable; however, the licensee should confirm that Beaver Valley 1 has the capability to perform independent on-line testing of the shunt trip attachment. The staff finds the licensee justification for not performing on-line testing of the bypass breakers sufficient and acceptable.

5. REVIEW RESULTS FOR BEAVER VALLEY POWER STATION, UNIT 2

5.1 Evaluation

Duquesne Light, the applicant for Beaver Valley 2, provided their response to Item 4.5.2 of the Generic Letter on March 30, 1983. In that response, the applicant states that Beaver Valley 2 will perform on-line testing of the Reactor Trip System, with the exception of on-line testing of the reactor trip bypass breakers.

The applicant states that on-line testing of the bypass breakers during power operation is not justified because only one bypass breaker can be in service at a time (for less than two hours per month), and that when a bypass breaker is in service the RTS will initiate a trip signal to one of the trip breakers which is tested bimonthly. Also, the addition of components necessary to eliminate the need to lift leads and install jumpers (currently required to test the bypass breakers) could decrease the reliability of the bypass breaker system.

5.2 Conclusion

The staff finds the applicant's statement of the extent to which they will perform on-line testing of the RTS meets the staff position on Item 4.5.2 of the Generic Letter and is, therefore, acceptable. The staff also finds the applicant's justification for not performing on-line testing of the bypass breakers sufficient and acceptable.

6. REVIEW RESULTS FOR BRAIDWOOD STATION UNITS 1 AND 2

6.1 Evaluation

Commonwealth Edison, the applicant for Braidwood, responded to Item 4.5.2 of the Generic Letter on November 5, 1983. In that response, the applicant states that Braidwood will be modified to permit performance of on-line testing of the Reactor Trip System, and that verification of the undervoltage and shunt trip features will be performed during the preoperational testing of these components. It is not clear from this response that Braidwood will have the capability to perform independent on-line verification of operability of the shunt and undervoltage trips.

6.2 Conclusion

The staff finds the applicant's statement that they will perform on-line testing of the RTS meets the staff position on Item 4.5.2 of the Generic Letter and is, therefore, acceptable; however, the applicant should confirm that Braidwood will have the capability to perform independent on-line verification of operability of the shunt and undervoltage trips.

7. REVIEW RESULTS FOR BYRON STATION UNITS 1 AND 2

7.1 Evaluation

Commonwealth Edison, the licensee for Byron, responded to Item 4.5.2 of the Generic Letter on November 5, 1983. In that response, the licensee states that Byron will be modified to permit performance of on-line testing of the Reactor Trip System. It is not clear from the response that independent on-line testing of the shunt and undervoltage attachments to the Reactor Trip Breakers will be possible following the modifications.

7.2 Conclusion

The staff finds the licensee's statement that they perform on-line testing of the RTS meets the staff position on Item 4.5.2 of the Generic Letter and is, therefore, acceptable; however, the licensee should confirm that the shunt and undervoltage attachments can be independently tested on-line.

8. REVIEW RESULTS FOR CALLAWAY PLANT UNIT 1

8.1 Evaluation

Union Electric Company, the licensee for Callaway, responded to Item 4.5.2 of the Generic Letter on November 18, 1983. In that response the licensee states that Callaway is designed to permit performance of on-line testing of the Reactor Trip System and commits to on-line testing of the reactor protection system, including independent verification of operability of the diverse trip features.

8.2 Conclusion

The staff finds the licensee's statement that they will perform on-line testing of the RTS and independent verification of operability of the diverse trip features meets the staff position on Item 4.5.2 of the Generic Letter and is, therefore, acceptable.

9. REVIEW RESULTS FOR CATAWBA NUCLEAR STATION UNITS 1 AND 2

9.1 Evaluation

Duke Power Company, the licensee/applicant for Catawba Units 1 and 2, responded to Item 4.5.2 of the Generic Letter on November 4, 1983. In that response, the licensee/applicant states that the Catawba design allows performance of on-line testing of the Reactor Trip System, including independent testing of the reactor trip breaker shunt and undervoltage trip attachments.

9.2 Conclusion

The staff finds the licensee's/applicant's statement that the Catawba design permits performance of on-line testing of the RTS meets the staff position on Item 4.5.2 of the Generic Letter and is, therefore, acceptable.

10. REVIEW RESULTS FOR COMANCHE PEAK STEAM ELECTRIC STATION UNITS 1 AND 2

10.1 Evaluation

Texas Utilities Generating Company, the applicant for Comanche Peak Units 1 and 2, responded to Item 4.5.2 of the Generic Letter on November 3, 1983. In that response, the applicant states that the Comanche Peak design is being modified to allow performance of on-line testing of the Reactor Trip System, that on-line testing of the RTS will be performed at Comanche Peak and that such testing will include independent testing of the reactor trip breaker shunt and undervoltage trip attachments.

10.2 Conclusion

The staff finds the applicant's statement of the extent to which they will perform on-line testing of the RTS meets the staff position on Item 4.5.2 of the Generic Letter and is, therefore, acceptable.

11. REVIEW RESULTS FOR DONALD C. COOK NUCLEAR STATION UNITS 1 AND 2

11.1 Evaluation

Indiana and Michigan Electric Company, the licensee for D. C. Cook Units 1 and 2, responded to the Generic Letter on November 4, 1983. The licensee's response confirms that both Cook units perform on-line testing of the Reactor Trip System, with the exception of the diverse trip feature, and that the shunt and undervoltage trip attachments will be independently tested on-line as soon as a pending modification is incorporated.

11.2 Conclusion

The staff finds the licensee's statement that they currently perform on-line testing of the RTS and their commitment to perform independent on-line testing of the shunt and undervoltage trip attachments meet the staff position on Item 4.5.2 of the Generic Letter and is, therefore, acceptable.

12. REVIEW RESULTS FOR DIABLO CANYON UNITS 1 AND 2

12.1 Evaluation

Pacific Gas and Electric Company, the licensee for Diablo Canyon Units 1 and 2 submitted a response to Item 4.5.2 of the Generic Letter on November 7, 1983. In that response, the licensee states that Diablo Canyon is designed to permit on-line testing of the Reactor Trip System, and that the applicable procedures are being revised to include the required on-line functional testing of the diverse trip features. The licensee's letter of June 27, 1984 confirms revision of those procedures; the procedures, which were included, establish that the shunt and undervoltage trips are tested independently.

12.2 Conclusion

The staff finds the licensee's statement that Diablo Canyon Units 1 and 2 are designed to permit on-line testing of the RTS and independent verification of operability of the diverse trip features meets the staff position on Item 4.5.2 of the Generic Letter and is, therefore, acceptable.

12. REVIEW RESULTS FOR DIABLO CANYON UNITS 1 AND 2

12.1 Evaluation

Pacific Gas and Electric Company, the licensee for Diablo Canyon Units 1 and 2 submitted a response to Item 4.5.2 of the Generic Letter on November 7, 1983. In that response, the licensee states that Diablo Canyon is designed to permit on-line testing of the Reactor Trip System, and that the applicable procedures are being revised to include the required on-line functional testing of the diverse trip features. The licensee's letter of June 27, 1984 confirms revision of those procedures; the procedures, which were included, establish that the shunt and undervoltage trips are tested independently.

12.2 Conclusion

The staff finds the licensee's statement that Diablo Canyon Units 1 and 2 are designed to permit on-line testing of the RTS and independent verification of operability of the diverse trip features meets the staff position on Item 4.5.2 of the Generic Letter and is, therefore, acceptable.

13. GROUP CONCLUSION

The staff concludes that the licensee/applicant responses for the listed Westinghouse plants for Item 4.5.2 of Generic Letter 83-28 are acceptable, with the exception of those for Beaver Valley Unit 1, Braidwood Units 1 and 2 and Byron Units 1 and 2, which were found to be incomplete as indicated in the plant specific review results.

14. REFERENCES

1. 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.

2. Generic Implications of ATWS Events at the Salem Nuclear Power Plant NUREG-1000, Volume 1, April 1983; Volume 2, July 1983.

3. Duquesne Light letter to NRC, J. J. Carey to D. G. Eisenhut, Director, Division of Licensing, NRC, "Response to Generic Letter 83-28," November 4, 1983.

4. Duquesne Light letter to NRC, E. J. Woolever to D. G. Eisenhut, Director, Division of Licensing, NRC, "Response to Generic Letter 83-28," March 30, 1984.

5. Commonwealth Edison letter to NRC, P. L. Barnes to Harold R. Denton, Director, Office of Nuclear Reactor Regulation, November 5, 1983.

6. Union Electric Company letter to NRC, D. F. Schnell to Harold R. Denton, Director of Nuclear Reactor Regulation, NRC, "Response to Generic Letter 83-28," November 18, 1983.

7. Duke Power Company letter to NRC, H. B. Tucker to D. G. Eisenhut, Director, Division of Licensing, November 4, 1983.

8. Texas Utilities Generating Company letter to NRC, Billy R. Clements to D. G. Eisenhut, Director, Division of Licensing, "Response to Generic Letter 83-28," November 3, 1983.

9. Indiana and Michigan Electric Company letter to NRC, M. P. Alexich to D. G. Eisenhut, Director, Division of Licensing, "Required Actions Based on Generic Implications of Salem ATWS Events (Generic Letter 83-28)," November 4, 1983.

10. Pacific Gas and Electric Company letter to NRC, J. O. Schuyler, to D. G. Eisenhut, Director, Division of Licensing, "Generic Letter 83-28 Required Actions Based on Generic Implications of ATWS Events," November 7, 1983.

11. Pacific Gas and Electric Company letter to NRC, J. O. Schuyler, to G. W. Knighton, Chief, Division of Licensing, "Generic Letter 83-28 Required Actions Based on Generic Implications of ATWS Events," June 27, 1984.

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