



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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ENCLOSURE

SUPPLEMENTAL SAFETY EVALUATION

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

STATION BLACKOUT RULE (10 CFR 50.63)

PENNSYLVANIA POWER & LIGHT COMPANY

SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 & 2

DOCKET NOS. 50-387/388

1.0 INTRODUCTION

The NRC staff's Safety Evaluation (SE) pertaining to the Pennsylvania Power and Light Company's (the licensee) response to NRC staff's SE pertaining to the Station Blackout (SBO) Rule, 10 CFR 50.63, was transmitted to the licensee by letter dated January 14, 1992. The staff's SE found the licensee's proposed method of coping with an SBO to be incomplete. The licensee responded to the staff's SE by letter from H. W. Keiser, dated March 13, 1992 and supplements dated April 14, 1992 and May 13, 1992.

2.0 EVALUATION

The licensee's responses to the staff's concerns are evaluated below.

2.1 Station Blackout Duration (SE Section 2.1)

SE Recommendation

In the SE, the staff noted that the licensee's classification of the emergency ac (EAC) power configuration as Group "B" was based on four emergency diesel generators (EDGs) at the site, two of which are necessary to achieve and maintain a safe shutdown of both units, whereas the staff analysis concluded that three (out of four) EDGs are required to power the loss of offsite power (LOOP) shutdown loads for both units. The staff's determination was based on the unacceptability of taking credit, in determining the EAC classification, for the use of "staggered operation" of the residual heat removal (RHR) pumps to cool both unit suppression pools.

In the SE, the staff also noted that the calculation performed by the licensee for the extreme severe weather (ESW) classification as Group "2" was based on a normalized height of 30 feet above the ground, whereas the staff determined that the ESW classification based on 30 meters above the ground results in an ESW classification of Group "3." This resulted in an offsite design characteristic of Group "P1" based on the licensee's calculations, versus a

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Group "P2" based on the staff's calculations. The combination of the "EAC" factor and the "P" factor resulted in a 4-hour coping requirement and an EDG target reliability of 0.95 based on the licensee's calculations, versus an 8-hour coping requirement and an EDG target reliability of 0.975 based on the staff's calculations. As a result, the staff recommended that "the licensee needs to change the EDG reliability target from 0.95 to 0.975 and the coping duration from 4 hours to 8 hours."

Licensee Response

With respect to the EDG reliability target issue, the licensee responded that "based on the inability to take credit for staggered operation, PP&L concurs with the staff's position in requiring 3 of 4 EDGs and the reliability target value of 0.975."

With respect to the ESW classification, the licensee referenced the National Bureau of Standards (NBS) publication "NBS Building Science Series 118, Extreme Wind Speeds at 129 Stations in the Contiguous United States," and "NBS Building Science Series 124, Hurricane Wind Speeds in the United States." The licensee stated that it considers Series 118 as more applicable to the Susquehanna site than Series 124 because NBS 124 relies on the extrapolation of coastal weather data to infer wind speeds inland, and the extrapolation assumes intervening terrain to be open and grass covered. The licensee concluded that NBS 124 is not applicable to the Susquehanna site because the site is separated from the coast by approximately 100 miles of hills and forest.

The licensee presented tabulations taken from NBS 118 for Scranton and Harrisburg which the licensee believes provides the best estimates of extreme wind speed returns at the Susquehanna site. The tabulation shows a return frequency for a 107 mph fastest mile wind (107 mph at 10 meters above the ground is equivalent to 125 mph at 30 meters) of less than 0.0001 for Harrisburg and less than 0.000001 for Scranton. The licensee notes that each of these values would result in an ESW classification of "1." Based on this, the licensee claims that an ESW classification of "2" is conservative and is justified.

Staff Evaluation

For coastal sites (plants within 200 km of the coast) which are subject to extreme winds from hurricanes, the staff considers NBS Building Science Series 124 as well as other publications in determining the appropriate ESW classification. The staff is concerned not only with conditions at the plant site, but also the surrounding area where the plant's transmission lines are located. However, the staff notes that if the frequency of the 125 mph winds were an order of magnitude higher than indicated by the Harrisburg and Scranton data, the ESW 2 classification would still be acceptable. Therefore,

in view that Susquehanna is approximately 100 miles inland from the coast with intervening hills and forests, the staff accepts the licensee's ESW classification of "2." This results in a 4-hour coping requirement for the Susquehanna site (based on an 0.975 reliability target).

2.2 Station Blackout Coping Capability (SE Section 2.2)

SE Recommendation

The SE stated that the licensee needs to conform to an 8-hour coping duration and increase the EDG reliability target from 0.95 to 0.975.

Licensee Response and Staff Evaluation

See Section 2.1 above.

2.2.1 Condensate Inventory for Decay Heat Removal (SE Section 2.2.1)

SE Recommendation

In the SE, the staff stated that the plant Technical Specifications (TS) required capacity for condensate inventory exceeded the amount of water necessary for coping with a 4-hour SBO event. Based on its review of the licensee's SBO submittals, the staff determined that the minimum coping duration for an SBO event at the Susquehanna plant was 8 hours. However, during the course of the review, the staff's consultant performed an independent analysis which indicated that there is sufficient water at the Susquehanna plant to cope with an 8-hour SBO event, providing that the licensee will establish a procedure to refill the condensate storage tank (CST) from the refueling water storage tank (RWST) during an SBO event. Accordingly, the staff recommended that "the licensee should provide a procedure to refill the CST from the RWST during an SBO event."

Licensee Response

The licensee did not specifically provide a response for this SE issue.

Staff Evaluation

Based on its final conclusion (as described in the above Section 2.1) that the Susquehanna plant is in a 4-hour coping category, the staff considers this SE issue related to condensate inventory for decay heat removal during an SBO event at the Susquehanna plant resolved.

2.2.2 Class 1E Battery Capacity (SE Section 2.2.2)

SE Recommendation

In the SE, the staff stated that the licensee should add the portable ac generator to the list of SBO equipment, provide procedures for its utilization, and apply to it an appropriate Quality Assurance (QA) program. The portable generator should meet the criteria in Appendix B of NUMARC 87-00. Also, the licensee should replace the battery 1D650 with a higher capacity battery or provide charging capability to the existing battery to extend its support for the 8-hour SBO duration and recovery thereafter. The licensee should include all documentation resulting from these analyses and related information in the supporting documentation that is to be retained by the licensee for staff review.

Licensee Response

The licensee did not specifically respond to this recommendation.

Staff Evaluation

The staff has agreed that Susquehanna is a 4-hour rather than an 8-hour coping plant (see Section 2.1 above). Therefore, the portable ac generator and the larger battery is not needed for the SBO event.

2.2.3 Effects of loss of Ventilation (SE Section 2.2.4)

SE Recommendation

In the SE, the staff recommended that the licensee should: 1) provide additional information and/or technical justification for the initial conditions and assumptions used in heat-up analysis for each area of concern, 2) with regard to the Compartment Temperature Transient Analysis Program (COTTAP) computer code, provide detailed information to address the staff's concerns as discussed in the above evaluation, and 3) re-perform the heat-up analysis for each area of concern and for an 8-hour coping duration taking into account the non-conservatism as identified in the Science Applications International Corporation (SAIC) Technical Evaluation Report (TER).

Licensee Response

In its response, the licensee indicated that the use of the COTTAP computer code was previously presented to the staff as part of its submittals to resolve steam leak detection TS changes and was recently published as a technical paper in Nuclear Technology. The referred paper presents the methodology along with calculations which have been benchmarked against calculations performed with the CONTAIN computer program. In addition, the program and computation package have been independently reviewed by Gilbert Associates. The licensee also maintains a Quality Assurance file/package for the COTTAP computer code.

The licensee further indicated that it, using COTTAP2 and conservative inputs, re-performed the heat-up calculations for the high-pressure coolant injection (HPCI) room, reactor core isolation cooling (RCIC) room, RHR piping area, main team tunnel and the control room. The revised calculated peak temperatures, for an SBO duration of 8 hours, are 114°F, 107°F, 125°F, 150°F, and 111°F, respectively. The input values and their associated justifications are presented in the detailed calculations.

Staff Evaluation

Based on its review, the staff finds the licensee's response acceptable and, therefore, considers this SE issue related to the effects of loss of ventilation during an SBO event at the Susquehanna plant resolved.

2.2.4 Containment Isolation (SE Section 2.2.5)

SE Recommendation

In the SE, the staff reported that during its review, the staff's consultant identified containment isolation valves for penetrations X-203 A, B, C, and D; X-204 A and B; X-205 A and B; X-206 A and B; X-207 A and B; and X-208 A and B as requiring valve position indication under SBO conditions. Accordingly, the staff recommended that "the licensee should list the valves identified above in an appropriate procedure and identify the actions necessary to ensure that these valves can be fully closed, if containment isolation is required during an SBO event. The valve closure should be confirmed by position indication (local, mechanical, remote, process information, etc.)"

Licensee Response

In its response, the licensee indicated that the penetrations identified by the staff as required to be proceduralized are the RHR and core spray (CS) suction lines along with the containment spray line. The lines which are parts of the engineered safety systems are each provided with one remote manually motor operated gate valve external to the containment and use the respective piping systems (closed systems) as the second isolation barrier. In addition, for the RHR and CS valves the hand switches are key locked.

Staff Evaluation

Based on its review, the staff concludes that the containment isolation valves design and operation at the Susquehanna plant have met the intent of the guidance described in Regulatory Guide (RG) 1.155 and will provide assurance of adequate containment integrity for an SBO event. Therefore, the staff considers this SE issue related to the containment isolation resolved.

2.3 Procedures and Training (SE Section 2.4)

SE Statement

In the SE, the staff stated that it expects the licensee to implement the appropriate procedures and training to assure an effective response to an SBO event.

Licensee Response

The licensee responded that appropriate plant personnel will be trained on any new or revised procedures in accordance with the requirements of Initiative 2, NUMARC 87-00 and RG 1.155, section 3.4.

Staff Evaluation

The staff accepts the licensee's commitment.

2.4 Proposed Modifications (SE Section 2.5)

SE Recommendation

In the SE, the staff recommended that the licensee should provide for staff review a full description, including the nature and objectives of any modifications required. The analysis and related information should also be maintained by the licensee in support of the SBO submittals.

Licensee Response

The licensee did not specifically respond to this recommendation.

Staff Evaluation

In view of the staff's acceptance of a 4-hour coping duration rather than an 8-hour coping duration (Section 2.1 above), modifications may not be required. However, if modifications are required, the staff recommendation remains effective.

2.5 Quality Assurance and Technical Specifications (SE Section 2.6)

SE Recommendation

No specific recommendation was included in the staff's SE for Quality Assurance. However, the SE did state that the staff expects that the plant procedures will reflect the appropriate testing and surveillance requirements to ensure the operability of the necessary SBO equipment.

Licensee Response

The licensee stated that it is PP&L's intent to satisfy the QA requirements of RG 1.155 by upgrading an existing procedure to incorporate SBO. This procedure addresses all the Regulatory Guide QA requirements and will require the necessary inspections and tests to be performed in accordance with the Operational Quality Assurance Program.

Staff Evaluation

The staff accepts the licensee's commitment pertaining to QA. With respect to TS, the TS for the SBO equipment is currently being considered generically by the NRC in the context of the Technical Specification Improvement Program. If the staff later determines that TS regarding the SBO equipment is warranted, the licensee will be notified of the implementation requirements.

2.6 Emergency Diesel Generator Reliability Program (SE Section 2.7)

SE Recommendation

In the SE, the staff recommended that the licensee should complete the implementation of an EDG reliability program which meets the guidance of RG 1.155, Section 1.2, and provide a schedule for its completion. Confirmation that such a program is in place or will be implemented should be included in the documentation supporting the SBO submittals that is to be maintained by the licensee.

Licensee Response

The licensee stated that RG 1.155 specifies that each utility establish an EDG performance monitoring program. NUMARC 87-00, Appendix D contains guidance for the development and implementation of such a program. PP&L has committed to implement a program of reliability monitoring and, as indicated above, PP&L must maintain an EDG reliability at or above 97.5% as part of our SBO coping strategy.

The licensee further stated that the RG and NUMARC provide "trigger values" for determining compliance with target reliability. NRC reviewers indicated that lack of this data in our submittal hindered assessment of SSES EDG reliability. At the 97.5% reliability level, compliance is assumed if the failures to start/load are less than or equal to 3, 4, and 5 out of the last 20, 50 and 100 start attempts, respectively. As of February 10, 1992, the failures to start/load in each category were 0, 0, and 3, respectively. Thus, today, PP&L can accept the increased reliability target of 97.5%.

The licensee stated that PP&L's EDG reliability monitoring program has been developed and documented in Nuclear Department Administrative Procedure-QA-0401 entitled "Emergency Diesel Generator Monitoring Program." This procedure complies with the reliability requirements delineated in

Appendix D of NUMARC 87-00, Revision 1. Reliability will be monitored against a set of "trigger values" with actions specified for various levels of trigger value exceedance.

Staff Evaluation

The reliability program described by the licensee appears to follow the guidelines of Generic Issue (GI) B-56 which has not been approved by the NRC. Therefore, in the meantime, the licensee is required to commit to an EDG reliability program which as a minimum contains the five items of RG 1.155, Section 1.2.

3.0 SUMMARY AND CONCLUSION

The staff has reviewed the licensee's response to the staff's January 14, 1992, SE pertaining to the SBO Rule (10 CFR 50.63) and finds the licensee's responses to be acceptable except that until GI B-56 is resolved, the licensee committed, during a telephone conversation on June 12, 1992, to an EDG reliability program which as a minimum contains the five elements of RG 1.155, Section 1.2. This SSE documents the NRC's final regulatory assessment of the licensee's proposed conformance to the SBO Rule. Therefore, no further submittals are required. It is the staff's position that the licensee must be in full compliance with the SBO Rule within 2 years after receipt by the licensee of this SSE in accordance with 10 CFR 50.63(c)(4). Therefore, this requirement should be implemented to ensure complete compliance with the SBO Rule as indicated in the staff's SE and SSE. The licensee should maintain all documentation in support of its SBO submittals in its files for possible future NRC audit.

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