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October 18, 1996

Docket No. 50-423
B15910

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Millstone Nuclear Power Station, Unit 3
Response to Request for Additional Information
Related to Alternate AC Power Source Requirements
(TAC No. M96054)

Northeast Nuclear Energy Company (NNECo) provides in Attachment 1 the response to a request from the NRC Staff⁽¹⁾ for additional information concerning the design of the Millstone Unit 3 Station Blackout (SBO) systems. NNECo has reviewed its original SBO design assumptions and has determined that the design and/or operation requires modification to ensure the availability of the SBO generator for a period of not less than eight hours following a postulated Loss of Off-site Power (LOOP) event regardless of the relative timing of an Emergency Diesel Generator (EDG) failure or occurrence of an inoperable condition. Attachment 2 lists NNECo's commitments made within this letter.

If there are any further questions regarding this matter, please contact Mr. James Peschel at (860) 437-5840.

⁽¹⁾ V.L. Rooney letter to T.C. Feigenbaum, "Request for Additional Information Related to Alternate AC Power Source Requirements (TAC No. M96054)," dated August 27, 1996.

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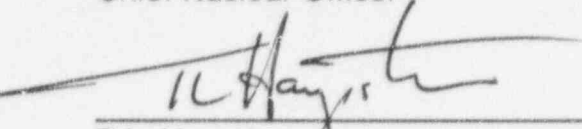
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Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

FOR: T. C. Feigenbaum
Executive Vice President and
Chief Nuclear Officer

BY:



T.L. Harpster
Director, Nuclear Licensing

Attachments

cc: H. J. Miller, Region I Administrator
V. L. Rooney, NRC Project Manager, Millstone Unit No. 3
A. C. Cerne, Senior Resident Inspector, Millstone Unit No. 3

Attachment 1

Millstone Nuclear Power Station, Unit No. 3
Response to Request for Additional Information
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(TAC No. M96054)

October 1996

Millstone Nuclear Power Station, Unit No. 3
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Question

1. NUMARC 87-00, Appendix B, Criterion B.8(f) states that Alternate AC (AAC) power system shall be capable of operating during and after a station blackout without any support systems powered from the preferred or blacked out unit's Class 1E power source. The Staff understands that the battery chargers for the AAC power system are fed from the preferred power system. Address how this requirement for the batteries and chargers is met.

Response

The Millstone Unit 3 Station Black-out (SBO) diesel generator was designed to be manually started within one hour of a station blackout, and to be capable of operating through the 8-hour SBO coping period. This design was based on the understanding that NUMARC 87-00 defined the station blackout event as loss of offsite power (LOOP) with the simultaneous unavailability of both emergency diesel generators (EDGs).

Criterion B.8(f) requires that the SBO generator be capable of operating during and after the station blackout without any support systems powered from the preferred or blacked out unit's Class 1E power source. Given the above design assumption for the initiation of station blackout, the Millstone Unit 3 SBO generator meets this criterion, in that it is capable of being started within one hour of the initiating LOOP (with simultaneous EDG failure as described above) and would be capable of operating throughout and beyond the postulated 8-hour SBO coping period, with its design fuel capacity.

Question

2. NUMARC 87-00, Appendix B, Criterion B.8(e) states that no single point vulnerability shall exist whereby a likely weather-related event or single active failure could disable any portion of the onsite emergency AC power sources or the preferred power sources, and simultaneously fail the AAC power source. The Staff understands that the loss-of-preferred power source will impact the AAC power system batteries and may fail the AAC power source. Address how a weather-related event fails the preferred power source but keeps the AAC power source operable, independent of the loss-of-onsite power system.

Response

Based on the original design assumption for the initiating event, i.e. the SBO generator would be started within one hour of the onset of a station blackout, the design meets NUMARC 87-00 Appendix B, Criterion B.8(e). A Loss of Off-site Power (LOOP) would not simultaneously cause loss of preferred power and failure of the SBO generator, since the SBO generator is capable of starting within its 1-hour designed starting time. With the SBO generator operating and its output breaker closed, it powers its own auxiliary loads, including its battery chargers. No single point vulnerability exists whereby a likely weather-related event or single active failure could prevent the AAC system from performing its design function and simultaneously cause failure of the EDGs or the preferred power source. The AAC system is separate and diverse from both the preferred, offsite power source and the EDGs. The AAC system batteries in the AAC enclosure are designed for one hour capacity, and thus provide independent starting/loading capability of the AAC source during the one hour period following the onset of the LOOP.

Question

3. The licensee is requested to justify the adequacy of its design or provide plans and a schedule to correct the loss of the AAC power source due to depleted SBO battery.

Response

Based on the review of the current Millstone 3 AAC design, NNECO concludes that the SBO generator design/operation should be modified to ensure availability of the SBO generator at any time during the postulated 8-hour (worst-case) LOOP, regardless of the relative timing of EDG failure/unavailability. Several options are under consideration to achieve this. NNECO will identify a design or operation modification and notify the NRC Staff by December 31, 1996.

Question

4. Address how NUMARC 87-00, Appendix B criteria are met.

Response

This item addresses how the present Millstone 3 SBO generator design meets the NUMARC 87-00, Appendix B criteria. The original AAC project design and Plant Design Change Record provide the basis for this item. The numbering format in the NUMARC document is followed.

AAC Power Source Criteria

- B.1** As allowed by these criteria, the Millstone 3 AAC system is not designed to meet Class 1E requirements.
- B.2** As allowed by these criteria, the Millstone 3 AAC system is not designed for protection against the effects of jet impingement, radiation, pressurization, high energy pipe breaks, etc.
- B.3** By design, the Millstone 3 SBO generator is protected against likely weather-related events that may initiate a LOOP. The AAC system comprises five sub-structures: the diesel generator enclosure; the switchgear enclosure; a hallway enclosure; a fuel bunker; an exhaust stack. Each structure is constructed and anchored in accordance with the Uniform Building Code.
- B.4** By design, the SBO generator required physical separation of AAC components from safety related components in accordance with applicable separation criteria.

Connectability to AC Power Systems

- B.5** The B.5 criterion encompasses component independence, separation and electrical isolation. These attributes are discussed in B.4 and B.6.
- B.6** The AAC system is connected to the non-1E system rather than directly to the class 1E system. The AAC system has a non-Class 1E supply breaker at the AAC generator. The output from this breaker can be connected to either of two non-Class 1E busses (bus "34A" or "34B") by two corresponding non-Class 1E breakers. The connection to the Class 1E busses (34C/34D) is made via Class 1E bus tie breakers: one between busses 34A and 34C; one between busses 34B and 34D.

- B.7** The AAC supply breaker is interlocked with the normal station service transformer (NSST) breakers, the reserve station service transformer (RSST) breakers, and the bus tie breakers. The AAC generator is not normally connected to the preferred power system. The interlocks prevent paralleling the AAC generator with either EDG. During a SBO, the SBO diesel generator is manually loaded.

Minimal Potential for Common Cause Failure

- B.8** The AAC system has minimal potential for common cause failure by virtue of the following design features:

- (a) The AAC power system has independent batteries sized for one hour.
- (b) The AAC power system has an independent air start system.
- (c) The AAC power system has a separate fuel oil supply.
- (d) The AAC machine is not identical to the EDGs.

The AAC system is designed to be started and loaded within one hour of a station blackout. The AAC system is designed to accommodate the SBO scenario wherein the EDGs are not available at the time of the initiating event, i.e. the LOOP. Based on this design assumption, the AAC system meets criterion B.8(e). No single point vulnerability exists whereby a likely weather-related event or single active failure could prevent the AAC system from performing its design function and simultaneously cause failure of the EDGs or the preferred power source. The AAC system is separate and diverse from both the preferred, offsite power source and the EDGs. The AAC system batteries in the AAC enclosure are designed for one hour capacity, and thus provide independent starting/loading capability of the AAC source during the one hour period following the onset of the LOOP.

- e) The Millstone Unit 3 SBO diesel generator was designed to be manually started within one hour of a station blackout, and to be capable of operating through the 8-hour SBO coping period. This design was based on the understanding that NUMARC 87-00 defined the station blackout event as loss of offsite power (LOOP) with simultaneous unavailability of both emergency diesel generators (EDGs). With the SBO diesel started as designed within the first hour of the LOOP, it powers its own auxiliary loads, including its battery chargers. It is capable of operating during and

after the station blackout without any support systems powered from the preferred power supply or the 1E power sources.

Criterion B.8(f) requires that the SBO generator be capable of operating during and after the station blackout without any support systems powered from the preferred or blacked out unit's Class 1E power source. Given the above design assumption for the initiation of station blackout, the Millstone Unit 3 SBO generator meets this criterion, in that it is capable of being started within one hour of the initiating LOOP (with simultaneous EDG failure as described above) and would be capable of operating throughout and beyond the postulated 8-hour SBO coping period, with its design fuel capacity.

- g) Maintenance activities that affect the operation of the SBO diesel are scheduled for performance before the quarterly operational test of the SBO diesel. The maintenance activities and the operational test are coordinated such that maintenance activities immediately precede the operational test.

Availability After Onset of Station Blackout

- B.9** The Millstone 3 coping duration is defined as 8 hours with an AAC activation within one hour of an SBO event. The SBO required loads are approximately 2200 kW while the SBO diesel generator is capable of supplying over 2500 kW.

Technical Specification Section 4.8.1.1.2 for the EDGs specifies that "the generator voltage and frequency shall be 4160 ± 420 volts" and frequency of " 60 ± 0.8 Hz." The AAC voltage is regulated within $4160 \pm 1\%$ volts, with frequency regulated from no load to full load at $60 \text{ Hz} \pm 0.25\%$. Thus, the AAC source is regulated to 4160 ± 41.6 volts and 60 ± 0.15 Hz which is within the Technical Specification requirements for the EDGs. Therefore, the AAC source will not degrade the performance of any shutdown system or component.

Capacity and Reliability

- B.10** The SBO diesel generator is subjected to surveillance testing every 3 months as required by criterion B.10. It is started and brought to rated load capacity. The plant procedures for this testing were developed considering the manufacturer's recommendations.
- B.11** The existing surveillance and maintenance procedures are consistent with the manufacturer's recommendations.

- B.12** The AAC system was demonstrated by test to be capable of powering safe shutdown loads within one hour of a station blackout event. Since the one-hour capability to start and load the SBO diesel generator is primarily dependent on human performance during a blackout condition, this timing is verified by Job Performance Measures (JPMs) and performance utilizing the Simulator.
- B.13** The target reliability and availability figures for the AAC system are 95% reliability and 97.5% availability.

Millstone 3 System Engineering records and tracks data on availability, start demands and load demands. There have been no start demand failures or load demand failures since initial system installation. Additionally, the SBO diesel system falls under the Maintenance Rule. There are two criteria monitored: functional failures and unavailability. Functional failures include start demand and load demand failures that have relevance to the SBO diesel's intended function as well as conditions found while in standby, that would affect the SBO diesel's intended function.

Although NUMARC 87-00 does not specify an availability criterion for a "standby system", Millstone 3 does track availability of the SBO diesel. The 97.5% availability criterion has been specified under the Maintenance Rule program at Millstone 3.

Attachment 2

Millstone Nuclear Power Station, Unit No. 3
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(TAC No. M96054)

October 1996

The following are NNECO's commitments made within this letter:

- B15910-01: The SBO generator design and/or operation will be modified as necessary to ensure availability of the SBO generator at any time during a postulated 8 hour Loss of Off-site Power event regardless of the relative timing of EDG failure/unavailability.
- B15910-02: The specific design/operation modification required to be made to ensure availability of the SBO generator at any time during the postulated 8 hour Loss of Off-site Power event will be identified to the NRC Staff not later than December 31, 1996.
- B15910-03: SBO generator design and procedural modifications required to ensure availability during a postulated 8 hour Loss of Off-site Power event will be implemented prior to entry into Mode 4 from the current extended shutdown.