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 DURR, J.P. Region 1 (Post 820201)

SUBJECT: Forwards addl info related to EDG monthly surveillance testing, motor overcurrent alarms & dc sys design basis, per 910930 meeting to discuss findings from Electrical Distribution Sys Functional Insp 50-245/91-81.

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October 7, 1991

Docket No. 50-245
B13942

Re: Inspection No. 50-245/91-81

Mr. Jacques P. Durr, Chief
Engineering Branch
Division of Reactor Safety, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Dear Mr. Durr:

Millstone Nuclear Power Station, Unit No. 1
Electrical Distribution System Functional Inspection
Additional Information

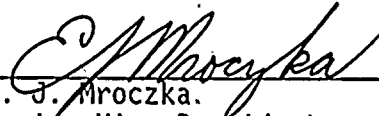
On September 30, 1991, the formal exit meeting for the 'Millstone Unit No. 1 Electrical Distribution System Functional Inspection (EDSFI)' was held at Northeast Utilities' general offices. The EDSFI was conducted by four NRC inspectors from Region I and three NRC contractors from Atomic Energy of Canada Limited during the period August 26 to September 20, 1991.

At the exit meeting the EDSFI team leader presented the inspection findings to Northeast Nuclear Energy Company (NNECO) personnel. Consistent with discussions at the meeting between NRC and NNECO representatives, NNECO hereby submits additional information relating to emergency diesel generator monthly surveillance testing, motor overcurrent alarms, and DC system design basis. This information is included as Attachment No. 1, 2, and 3 to this letter, respectively. NNECO believes that this information may be of assistance to the NRC Staff in further evaluating the current findings.

We trust you will find the attached information satisfactory and we remain available to answer any questions you may have.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY


E. J. Mroczka
Senior Vice President

cc: See attached page

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Q PDR

J. E. C.

Mr. Jacques P. Durr
B13942/Page 2
October 7, 1991

cc: T. T. Martin, Region I Administrator
M. W. Hodges, Director, Division of Reactor Safety, Region I
S. K. Chandhary, Senior Reactor Engineer, Division of Reactor Safety,
Region I
D. H. Jaffe, NRC Project Manager, Millstone Unit Nos. 1 & 3
W. J. Raymond, Senior Resident Inspector, Millstone Unit Nos. 1, 2, and 3

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

Docket No. 50-245
B13942

Attachment No. 1 .

Millstone Nuclear Power Station, Unit No. 1

EDG Monthly Surveillance Testing

Additional Information

October 1991

MILLSTONE UNIT NO. 1
ELECTRICAL DISTRIBUTION SYSTEM FUNCTIONAL INSPECTION
NNECO's POSITION ON APPARENT VIOLATION 1 (EDG TESTING)

Executive Summary

The NRC staff has indicated that MP1 is apparently in violation of Technical Specifications (TS) with respect to EDG surveillance testing. The staff's view is that the EDG system should be loaded with reactive power as well as real power during the monthly test. The NRC interpretation of TS 4.9.A.1.a. is to run the EDG at continuous load output in terms of full KVA rating and not just KW. This was not NNECO's understanding of the NRC/NRR intentions during the initial drafting of TS. It is reasonable to test the EDG with reactive power loading and steps will be taken to do so. It is NNECO's position that this item should not be characterized as an apparent violation.

Discussion

The following discussion expands the response to item number 2 provided in the letter telecopied to the Staff on September 24, 1991 pertaining to the informal exit of September 13, 1991 and verbally during the formal exit of September 30, 1991. NNECO will review (and revise as necessary) the TS, UFSAR, EDG loading calculation and the surveillance procedure. NNECO will modify the surveillance procedure to reflect the addition of reactive power load on the EDG during the monthly surveillance test. The proposed value of reactive loading is under review and will be provided at a later date.

The first part of the discussion will demonstrate that MP1 is not in violation of TS. The second part of the discussion will document to the Staff that additional testing was completed that demonstrates that the KVA capability of the EDG exceeded the worst case accident KVA loading.

EDG Technical Specification Surveillance Testing

MP1 TS 4.9.A.1.a states, "The diesel generator shall be started and run at its continuous rated load output for at least 60 minutes once a month. ..." (Enclosure A)

The TS Bases 4.9.A defines the EDG load as follows, "For the diesel generator, testing is performed at the continuous rated load of 2665 KW, which is greater than the post accident load requirements." (Enclosure B)

Moreover, BWR Standard Technical Specifications do not require demonstration of KVA capability.

The MP1 EDG surveillance procedure (SP668.1 - Diesel Generator

Operational Readiness Demonstration) requires that the EDG be loaded to between 2665 to 2700 KW for 60 minutes. MP1 is testing to a KW load that exceeds the maximum EDG accident load. (Enclosure C)

The MP1 UFSAR and all previous revisions have defined the EDG emergency loads in terms of KW only. This was appropriate as all loads have power factors (pf) greater than the diesel generator. (Enclosure D)

The EDG loading calculation PA 79-126-742-GE which supports the UFSAR loading table only calculates loading in KW and compares it to the EDG continuous KW rating of 2665 KW. The calculation spreadsheet does show a load running power factor of 0.86, however, the power factor was only used during draft calculations to be able to correlate loads in terms of amps for comparison to existing operational data. NNECO will revise the worst case loading calculation to include reactive as well as real power loading. (Enclosure E)

It is understood that the EDG is rated in terms of KVA as well as KW. The MP1 EDG is rated 3330 KVA at 0.8pf (2665KW and 1998KVAR). With an accident loading power factor of 0.86, the KW rating becomes the most limiting parameter, therefore NNECO was not concerned with adversely impacting the KVA rating of the generator.

NRC Regulatory Guide 1.9, Rev. 3(draft) and IEEE Standard 387-1984 do not specifically define the Load-run Test in terms of KW or KVA. In fact, the duration of the test is based on the time for the engine to reach temperature equilibrium (jacket water and lube oil). If the output load of 2665 KW is run at unity or 0.8 power factors, the engine performance is unaffected. The basis for the monthly Load-run test is to check the engine capabilities of the EDG system. The testing of the EDG loaded with reactive power will check the electrical and control capabilities of the EDG system. The basis of the monthly Load-run test does not consider that the stator and field windings should be loaded with rated current to demonstrate their capability.

In addition, by letter dated November 30, 1990,¹ NNECO submitted to the NRC Staff a proposed change to TS 4.9.A.1.a. The change was for clarification of the test requirements/acceptance criteria for the emergency diesel generator and was stated as follows:

"The diesel generator operability surveillance, Section 4.9.A.1.a, will be changed to remove the ambiguity that is inherent in the

¹ E.J. Mroczka letter to the U.S. Nuclear Regulatory Commission, "Proposed Revision to Technical Specifications -- Emergency Power Source Surveillance Requirements", dated November 30, 1990.



present requirement for testing at 'equilibrium temperature at full load output'. The proposed change eliminates this requirement as a means of determining the extent of the surveillance run and substitutes a requirement for a run at 'continuous rated load output for at least 60 minutes'. This provides a more definitive surveillance acceptance criteria. The 60-minute minimum duration will allow equilibrium conditions to be attained and is consistent with the minimum recommendations of the engine manufacturer. A test at the continuous rated load of 2665KW exceeds the current post-accident load requirement of 2632KW and, thus, is conservative in verifying the ability of the diesel generator to perform its intended function."

The NRC Staff issued Amendment No. 50 to the Millstone Unit No. 1 TS (Enclosure F) and concluded that the monthly surveillance testing adequately demonstrates operability of the EDG.

Based on the above mentioned facts, NNECO does not believe a violation is either warranted or valid. NNECO will be revising both the EDG loading calculation and surveillance procedure to include reactive loading of the EDG.

EDG KW and KVAR Capability and Accident Loads

During the formal exit meeting of September 30, 1991, the NRC stated a concern that NNECO has not proved through testing that the EDG could carry the required KW and KVAR loading documented in calculation PA 79-126-742-GE.

During the last refueling outage, the EDG field was rewound. The generator was tested after the rewind. The EDG was loaded to 2665KW and 3058KVA for a 60 minute period. A higher KVA loading could not be attained due to the minimal station loads available during an outage and high system voltage. The field current measured demonstrated that the nameplate 3330KVA rating could have been easily attained if enough reactive load was available. (Enclosure G)

The EDG accident load calculation was formally issued on 7/24/90. Subsequent revisions documented as calculation changes have evaluated the LPCI and CS motor change-outs as well as operator procedures. As of the last change dated 8/9/91, the worst case loading was calculated to be 2508KW. Using a power factor of 0.86 the required KVA load is equal to 2916KVA. This loading was exceeded by the output attained during the generator testing discussed above.

April 5, 1991 .

SURVEILLANCE REQUIREMENT (Continued)

4.9 AUXILIARY ELECTRICAL SYSTEM

Specification:

A. Emergency Power Sources

1. Diesel Generator

- a. The diesel generator shall be started and run at its continuous rated load output for at least 60 minutes once a month. During this test, the diesel starting air compressor will be checked for operation and its ability to recharge air receivers.
- b. During each refueling outage, the conditions under which the diesel generator is required will be simulated and a test conducted to demonstrate that it will start and be ready to accept load within 13 seconds.
- c. During the monthly generator test, the diesel fuel oil transfer pumps shall be operated.

2. Gas Turbine Generator

- a. The gas turbine generator shall be fast started and the output breaker closed within 48 seconds once a month to demonstrate operational readiness. The gas turbine generator is to be loaded at greater than or equal to post accident load requirement for at least 60 minutes.
- b. During each refueling outage, the conditions under which the gas turbine generator is required will be simulated and a test conducted to verify that it will start and be able to accept emergency loads within 48 seconds.

ENCLOSURE B

April 5, 1991

4.9 AUXILIARY ELECTRICAL SYSTEM

BASES

- A. The monthly test of the diesel generator and gas turbine generator is conducted to check for equipment failures and deterioration. The post accident load requirement for the gas turbine is 10,610 kW. For the diesel generator, testing is performed at the continuous rated load of 2665 kW, which is greater than the post accident load requirements. Testing for at least 60 minutes at the post accident load requirement demonstrates proper long-term operation. The units will be manually started, synchronized to the bus, and load picked up. Generator experience at other generating stations indicates that the testing frequency is adequate to assure a high reliability of operation should the system be required. In addition, during the test when the generator is synchronized to the bus it is also synchronized to the off-site power source and thus not completely independent of this source. To maintain the maximum amount of independence, a thirty day testing interval is also desirable.

Both the diesel generator and the gas turbine-generator have air compressors and air receiver tanks for starting. It is expected that the air compressors will run only infrequently. During the monthly check of the units, the receivers will be drawn down below the point at which the compressor automatically starts to check operation and the ability of the compressors to recharge the receivers. Pressure indicators are provided on each of the receivers.

Following the tests or peaking operation, of the unit and at least weekly, the fuel volume remaining will be checked. At the end of the monthly load test of the diesel generator, the fuel oil transfer pump will be operated to refill the day tank and to check the operation of this pump. Peaking operation shall be controlled so that major maintenance operations on the gas turbine will not be scheduled during an operating cycle.

The test of the diesel and gas turbine generators during the refueling outage will be more comprehensive in that it will functionally test the system; i.e., it will check starting and closure of breakers and sequencing of loads. The units will be started by simulation of a loss of coolant accident. In addition, a loss of normal power condition will be imposed to stimulate a loss of off-site power. The timing sequence will be checked to assure proper loading in the time required. Periodic tests between refueling outages check the capability of the units to run at full load. Periodic testing of the various components plus a functional test at a refueling interval are sufficient to maintain adequate reliability.

- B. Although the station batteries will gradually deteriorate with time, the surveillance specified is that which will provide an indication of all degradation long before the battery would have insufficient capacity to meet the design load which could be placed upon it. Battery cell replacements will be made in accordance with Section 6 of IEEE Standard 450-1972, "Battery Replacement Criteria."
- C. Logging the diesel and gas turbine generator fuel supply weekly and after each operation, assures that the minimum fuel supply requirements will be maintained.



Docket No. 50-245
B13942

Attachment No. 1

Millstone Nuclear Power Station, Unit No. 1

EDG Monthly Surveillance Testing

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October 1991

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April 5, 1991

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ENCLOSURE B

April 5, 1991

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