North Atlantic

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The Northeast Utilities System

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NYN-02109

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Seabrook Station
Revision to Inservice Test Program Relief Request PR-1

On March 21, 2000, North Atlantic Energy Services Corporation (North Atlantic) forwarded the 2nd Ten-Year Interval Inservice Test (IST) Program Plan and associated relief requests to the Nuclear Regulatory Commission (NRC) for review and approval. As a result of this submittal, North Atlantic received a request for additional information regarding the subject relief request. The North Atlantic responses to the requested information were provided to the NRC by letter (NYN-00070) dated August 18, 2000. The NRC subsequently approved relief request PR-1 pursuant to 10 CFR 50.55a(a)(3)(i) for an interim period of two years as documented in a letter to North Atlantic dated November 1, 2000.

Relief request PR-1 was submitted by North Atlantic as an alternative to the requirements of the ASME Operations and Maintenance (OM) Code ISTB 4.3(e)(1). Specifically, ISTB 4.3(e)(1) requires that pump reference values be established within ± 20% of pump design flow for the comprehensive pump test. North Atlantic determined that the Containment Spray Pumps (CBS-P9A and CBS-P9B) could only be tested on a recirculation flow path, which is sized for approximately 63% of the best efficiency point flow of 3,000 gpm and approximately 68% of the required design flow of 2808 gpm. During the interim two year period, North Atlantic was requested to reevaluate current testing of the CBS pumps to assess the ability to detect degradation as was intended by the ASME OM Code-1995 pump test strategy. North Atlantic has revised the subject relief request to reflect that the CBS pumps are included within the Predictive Maintenance Monitored Equipment Program. This program includes additional vibration monitoring and analysis and pump lube oil sampling and analysis, to compensate for testing the subject pumps at a reduced flow rate during the comprehensive pump test, as required by ISTB 4.3(e)(1).

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The revision to relief request PR-1 is enclosed. North Atlantic requests the NRC to review and approve the proposed revision to relief request PR-1 by May 1, 2003 to support comprehensive pump testing of the subject pumps in June 2003.

Should you have any questions concerning this issue, please contact Mr. James M. Peschel, Manager - Regulatory Programs, at (603) 773-7194.

Very truly yours,

NORTH ATLANTIC ENERGY SERVICE CORP.

J. M. Vargas
Director of Engineering

cc: H. J. Miller, NRC Region I Administrator
R.D. Starkey, NRC Project Manager, Project Directorate I-2
G.T. Dentel, NRC Senior Resident Inspector

Enclosure to NYN-02109

Relief request: PR-1

Pumps: CBS-P9A, CBS-P9B

Code Class: 2

Function: Pumps required to perform a function in shutting down the reactor or in mitigating the consequences of an accident, and are provided with an emergency power source.

Test Requirements: ISTB 4.3(e)(1) requires reference values to be established within +/- 20% of design flow rate for the comprehensive test.

Basis For Relief: Relief is requested pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternative will provide an acceptable level of quality and safety.

The Containment Building Spray (CBS) system is designed to remove the energy discharged to the containment following a loss-of-coolant accident (LOCA) or main steam line break (MSLB) to prevent the containment pressure from exceeding design pressure and to reduce and maintain containment temperature and pressure within acceptable limits. The CBS pumps are motor-driven, horizontal, centrifugal pumps. The subject pumps are designed to take suction from either the Refueling Water Storage Tank (RWST) in the Emergency Core Cooling System (ECCS) injection mode or the containment recirculation sump in the ECCS recirculation mode. The CBS pump discharges the flow back into the containment through the containment spray nozzles. Each train of the CBS system includes one 100% capacity pump.

As such, the CBS pumps are required to be inservice tested in accordance with Subsection ISTB of the 1995 Edition, (including the 1996 Addenda) of American Society of Mechanical Engineers (ASME) Code for the Operation and Maintenance of Nuclear Power Plants (OM Code). Subsection ISTB 4.3(e)(1) of the OM Code requires that comprehensive tests of pumps be performed on a biennial (2-year) frequency at reference conditions within ± 20% of pump design flow.

The flow path used to perform both the biennial comprehensive pump test and the quarterly Group B test are the same. The CBS pumps take suction from the Refueling Water Storage Tank (RWST) through a series of manual valves and a suction check valve and discharge water back to the RWST. The pump discharge flow path contains a piping run to a heat exchanger (CBS-E-16A or CBS-E-16B) and then continues to the containment spray ring header penetration(s) (X-14 and X-15). Upstream of this penetration is the return line to the RWST. In the return line, there is an air-operated valve (AOV) (open/close type) specific to each train

(CBS-V31 and CBS-V32) with no remote throttling capability. The return lines for each train tie together into a common line that utilizes a similar type AOV (CBS-V33). This common line then connects to the RWST, which is located downstream. The Safety Injection pumps also utilize this common return line to the RWST. CBS pump flow is measured utilizing a flow indicator (FI-2340) located in the common return line to the RWST. Due to the design of the valves, there is no practical method to vary the resistance of test path to adjust flow. IST testing is performed at this fixed reference condition.

During the pre-operational test period, a test (PT-12.1) was performed to verify CBS system performance. PT 12.1 was performed utilizing a temporary manual throttle valve installed in a spool piece (for a temporary strainer) in the common RWST return line. This spool piece still exists as a bolted joint but the manual valves and strainer have been removed. Installation of a similar temporary throttle valve with the plant on-line to achieve additional flow points for the subject pumps is impractical due to the use of this line by other pumps such as the Safety Injection pumps. Installation of a temporary manual throttle valve during shutdown periods would be a substantial burden.

Alternative means to vary system resistance in order to provide additional test data were evaluated. The local manual throttling of either CBS-V31, CBS-V32 or CBS-V33 was eliminated as an option due to the potential for valve damage since these valves incorporate a soft seat type design. Additionally, local manipulation of these valves at power would over ride the automatic signals that these valves receive to close to protect the containment spray flow path to containment.

The potential to vary system resistance utilizing a manual valve located in the pump suction lines was also evaluated. This option was eliminated due to the potential to cavitate the pumps and reduce net positive suction head (NPSH) margin for the pumps. As a result, the Containment Spray Pumps (CBS-P9A, CBS-P9B) can only be tested on a recirculation flow path which is sized for approximately 63% (1900 GPM) of the Best Efficiency Point (BEP) Flow of 3000 GPM and approximately 68% of the required design flow of 2808 GPM.

Full flow testing would require system alignment to the containment spray headers and subsequent discharge to the containment. In order to perform full flow testing without alignment to the spray headers, temporary piping would be required to recirculate water to/from the ECCS Containment Sumps. This was performed one time previously, to verify CBS pump curve data (pre-operational test 1-PT-11, Containment Recirculation Sump Operability Demonstration). 1-PT-11 required modification of the sump by means of building a 2 to 3 foot high steel dyke around the top of the sump (at –26' elev. floor level) in order to hold the volume of water required to achieve the necessary pump NPSH

without flooding the containment. The spray header piping would also require modification by means of removing the spool pieces downstream of valves CBS-V13 and CBS-V19 and connecting temporary pipe (minimum 8" diameter) from the 25' elevation in containment to the ECCS Sumps at –26' elevation. Performing these temporary modifications to the CBS system or enlarging the recirculation piping and components to achieve 80% design flow is not warranted since there will be no benefit in pump testing.

Testing of the subject pumps utilizing the recirculation flow path provides for substantial flow testing in a stable, region of the pump curve, well above the minimum continuous flowrate specified by the pump manufacturer. Testing the CBS pumps at reference values established in this region of the pump curve will not cause damage to the pumps and will provide meaningful data to assess pump operational readiness.

In order to compensate for testing the subject pumps at a reduced flow rate during the comprehensive pump test, as required by ISTB 4.3(e)(1), the CBS pumps are included in the Predictive Maintenance Monitored Equipment Program. This program includes enhanced vibration monitoring and analysis of the pump and periodic sampling and analysis of the lube oil. If additional measured parameters are found to outside of the normal operating range or were determined to be trending toward an unacceptably degraded condition, corrective actions are required. These corrective actions include monitoring additional pump parameters, review of relevant data to determine the cause of the deviation, and potential removal from service.

Alternate Testing:

Reference values for testing the Containment Spray pumps will be established and comprehensive pump testing will be performed while operating on the installed recirculation loop. Additionally, in order to compensate for testing the subject pumps at a reduced flow rate during the comprehensive pump test, as required by ISTB 4.3(e)(1), the CBS pumps are included in the Predictive Maintenance Monitored Equipment Program. This program includes enhanced vibration monitoring and analysis of the pump and periodic sampling and analysis of the lube oil. If additional measured parameters are found to outside of the normal operating range or were determined to be trending toward an unacceptably degraded condition, corrective actions are required. These corrective actions include monitoring additional pump parameters, review of relevant data to determine the cause of the deviation, and potential removal from service. This program contains testing and analysis requirements beyond those required by the 1995 Edition, (including the 1996 Addenda) of the ASME OM Code.