North Atlantic

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The Northeast Utilities System

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United States Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

References: (a) Facility Operating License No. NPF-86, Docket No. 50-443

(b) USNRC Letter dated August 26, 1994, "Inspection Report No. 50-443/94-16," M. C. Modes to T. C. Feigenbaum

(c) Teleconference between USNRC (A. R. Blough et. al.) and North Atlantic (R. M. Cooney, et. al.) on September 15, 1994, regarding operability of the Seabrook Station Service Water System

Subject: Service Water System Operability

Gentlemen:

On June 27-July 1, 1994, and July 11-15, Ms. C. D. Beardslee of the USNRC conducted an inspection of the Seabrook Station Service Water System. The inspection report [Reference (b)] noted that North Atlantic Energy Service Corporation (North Atlantic) recently identified discrepancies with the methodology previously used to inspect Service Water System piping. Specifically, North Atlantic's prior reliance on the presence of corrosion nodules as the sole criteria for identifying corrosion was called into question during recent licensee initiated inspections where corrosion had been found without the presence of the telltale nodules. The above referenced NRC inspection report also noted North Atlantic's bases for concluding that the Service Water System was operable and that North Atlantic was in the process of evaluating this issue to develop appropriate corrective actions.

On September 15, 1994, North Atlantic participated in a teleconference [Reference (c)] with USNRC personnel to further discuss this issue and to reaffirm the bases for concluding that the Service Water System was operable. At that time, it was requested that North Atlantic submit a letter conta ning the following information: 1) the basis for operability of the Service Water System; 2) the date that the evaluation of this issue will be completed; and, 3) the date when a new inspection strategy will be developed for the Service Water System. Accordingly, the following addresses each of these topics.

North Atlantic has observed limited corrosion in the cement lined above ground Service Water piping. During the third refueling outage (ORO3), corrosion was identified in field welded joints where the joint sealing compound was improperly installed between welded pipe sections. North Atlantic has evaluated the observed degradation and believes that the Service Water System is currently operable for the following reasons:

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1. Video inspection of the interior of the Train "A" underground Service Water piping during ORO3 did not indicate the presence of corrosion nodules. While North Atlantic has determined that it is not appropriate to exclude the potential for corrosion solely on the lack of nodules, the converse is still true, that the presence of nodules does indicate corrosion. Hence, the lack of nodules indicates that there are no certain locations in the underground Service Water piping with base metal corrosion. Similarly, previous video inspections of portions of the Train "B" underground SW piping provided the same conclusion.

2. During ORO3, North Atlantic performed internal inspections of portions of the Train "A" above ground piping located in the Service Water Pump House. Three field welds exhibited rust stains on the cement lining, one of which also revealed a slight gap between the cement lining and the joint sealing compound. This latter field weld was found to exhibit base metal corrosion while the former welds did not exhibit any damage.

Following the Train "A" inspection, five Train "B" field welds in the Service Water Pump House were inspected. Four joints exhibited rust stains and all were found to have base metal corrosion. As a result, an expanded evaluation was conducted to include field welds located in the above ground Service Water piping in the Primary Auxiliary Building and the Cooling Tower. Ultrasonic testing (UT) was utilized on a total of 49 Train "A" field welds. Eight joints were found to have wall thicknesses less than 0.295 inches, which is the minimum acceptable wall thickness specified in the original piping purchase/construction specification. Of these eight joints, two were found to be related to the inner diameter, and hence indicative of pipe corrosion. The remaining six joints were determined to be due to the counterbore of the pipe, and hence, caused by the initial pipe fabrication and not corrosion.

Of the set of above ground field welds that exhibited corrosion, none that were evaluated were below the acceptable minimum pipe wall thickness for the piping location. This is based on the UT inspection of the above mentioned 49 Train "A" field welds and 8 welds where the lining was removed. It should be noted that 5 of the 8 field welds underwent base metal repair without prior evaluation of minimum wall, since, at the time of their discovery the expanded piping review had not been initiated and it was deemed apropriate to expeditiously repair any questionable locations.

Based on the aforementioned inspection results, North Atlantic concludes that the general condition of the cement lining in the Service Water System piping is acceptable, base metal corrosion is not widespread, and the actual pipe wall thickness exceeds the minimum pipe wall thickness.

3. Observed corrosion in the above ground piping has been linked to improper installation of the joint sealing compound used to seal the cement pipe lining between welded pipe sections. During construction, application and inspection of the joint compound in the underground piping was the least challenging of all other piping since it was performed from inside the pipe after the joint was welded. Based on this, it is expected that the underground pipe joints are in the best condition relative to other Service Water piping.

4. An engineering evaluation was previously performed to determine if localized corrosion of the underground Service Water System piping could lead to unexpected loss of Service Water. The results of this evaluation demonstrate that the leakage resulting from localized corrosion would be evident on plant instrumentation long before system structural integrity would be jeopardized. Specifically, the minimum detectable flow loss from the Service Water System is 300 - 600 gpm. Leakage would be detected through quarterly Service Water and Cooling Tower pump tests. This testing covers all of the underground Service Water piping. The most recent quarterly test results for all Service Water System pumps were acceptable, with no identified reduction in flow.

The engineering evaluation also correlated leakage to system degradation. Specifically, this evaluation determined that approximately 30 weeks would elapse from the initial detection of a 500 gpm leak (1.8 inch diameter hole) to the time when the hole had degraded such that it caused a 1000 gpm leak (2.5 inch diameter hole). The 1000 gpm leakage is the maximum allowed by ASME Section XI Quarterly Testing Acceptance Criteria. Similarly, it would take approximately an additional 49 weeks (79 weeks total) for the 1000 gpm leak to degrade further to produce a leak in excess of 2000 gpm. The evaluation demonstrates that even a 4 inch diameter hole results in local and general pipe stresses well below piping yield stress, thus ensuring structural integrity.

This engineering evaluation also addressed the possibility of an undetected leak eroding away the supporting soil around the pipe and determined that this would not compromise the pipe's structural integrity. This conclusion considered the loading expected during a design basis seismic event.

With regard to the second request, North Atlantic has documented the recent Service Water System piping inspection findings in a Station Information Report (SIR) to determine the cause of the observed degradation and to develop appropriate corrective actions. This SIR is currently undergoing review by the Station Operation Review Committee, and it is anticipated that it will be issued by October 31, 1994. This SIR will be made available to the NRC Resident Inspectors when it has been completed.

With regard to the third request, North Atlantic recognizes the need to evaluate and develop revised inspection methodologies that do not rely solely on the presence of nodules as an indication of pipe wall corrosion. Current options being evaluated include local visual inspection and UT inspection through the pipe lining. In addition to an inspection program, North Atlantic is also evaluating piping or pipe lining refurbishment. The process evaluation and selection is projected to be completed by June 30, 1995 to support development of an inspection or refurbishment program before the start of ORO4, which is tentatively scheduled to begin on January 6, 1996. The program will be implemented for the Train "B" underground Service Water piping during the same outage. North Atlantic also intends to conduct UT examinations on the above ground Train "B" Service Water piping field welded joints during ORO4.

In conclusion, based on the above, North Atlantic is confident that base metal corrosion in the Service Water System is not widespread and that the system is fully operable.

Should you have any questions concerning this response, please contact Mr. James M. Peschel, Regulatory Compliance Manager, at (603) 474-9521, extension 3772.

Very truly yours,

Ted C. Feigenbaum

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