November 1, 2000

Mr. Ted C. Feigenbaum
Executive Vice President and
Chief Nuclear Officer
North Atlantic Energy Service Corporation
c/o Mr. James M. Peschel
P.O. Box 300
Seabrook, NH 03874

SUBJECT: SAFETY EVALUATION OF RELIEF REQUESTS FOR THE SECOND 10-YEAR INTERVAL INSERVICE TEST PROGRAM PLAN, SEABROOK STATION, UNIT NO. 1 (TAC NO. MA8532)

Dear Mr. Feigenbaum:

In a letter dated March 21, 2000, North Atlantic Energy Service Corporation, licensee for the Seabrook Station, submitted the second 10-year interval inservice test (IST) program plan for pumps and valves. The IST program was developed in accordance with the requirements of the 1995 Edition, including the 1996 Addenda, of the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance (OM Code) of Nuclear Power Plants. The staff reviewed the submittal and in a letter dated August 9, 2000, requested that the licensee provide additional information. The licensee responded in letters dated August 18 and September 8, 2000.

The regulations, 10 CFR 50.55a(f)(4)(ii), state that inservice tests must comply with the requirements of the latest edition and addenda of the Code incorporated by reference in the regulations 12 months prior to the start of the 120-month interval. For Seabrook, this would be the 1989 Edition of the Code. However, the licensee requested approval to implement the IST program in accordance with the 1995 Edition and 1996 Addenda of the OM Code. The staff's safety evaluation dated May 8, 2000, approved the request.

Pursuant to 10 CFR 50.55a, the Nuclear Regulatory Commission (NRC) staff has reviewed the proposed relief requests against the requirements of the 1995 Edition of the ASME OM Code. The results are provided in the enclosed safety evaluation.

The proposed alternatives to the Code requirements described in PG-1, VG-1, VG-3, and AG-1 are authorized pursuant to 10 CFR 50.55a(a)(3)(i) based on the alternatives providing an acceptable level of quality and safety. The alternatives are authorized for the second 10-year interval.

The proposed alternative to the Code requirements described in VG-2 is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for an interim period of 2 years based on the alternative providing an acceptable level of quality and safety.

The proposed alternative to the Code requirements described in PR-1 is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for an interim period of 2 years based on the alternative providing an acceptable level of quality and safety.

The proposed alternative to the Code requirements described in PR-2 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the second 10-year interval. Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The proposed alternative to the Code requirements described in PR-3 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for an interim period of 2 years. Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

This completes the staff's review under TAC Number MA8532.

Sincerely,

/RA/

James W. Clifford, Chief, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosure: Safety Evaluation

cc w/encl: See next page

The proposed alternative to the Code requirements described in PR-1 is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for an interim period of 2 years based on the alternative providing an acceptable level of quality and safety.

The proposed alternative to the Code requirements described in PR-2 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the second 10-year interval. Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The proposed alternative to the Code requirements described in PR-3 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for an interim period of 2 years. Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

This completes the staff's review under TAC Number MA8532.

Sincerely,
/RA/

James W. Clifford, Chief, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-443
Enclosure: Safety Evaluation
cc w/encl: See next page
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PUBLIC	ACRS	TClark	JShea, EDO
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*Input provided on October 16, 2000. No major changes made.
ACCESSION NO. ML 003760787 ** See previous concurrence.

OFFICE	PDI-2/PM	PDI-2/LA	EMEB*	OGC**	PDI-2/SC
NAME	RPulsifer	TLClark	DTerao	RHoefling	JClifford
DATE	10/31/00	11/1/00	10/16/00	10/25/00	11/1/00

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM, SECOND 10-YEAR INTERVAL

NORTH ATLANTIC ENERGY SERVICE CORPORATION

SEABROOK STATION, UNIT NO. 1

DOCKET NO. 50-443

1.0 INTRODUCTION

Title 10 of the *Code of Federal Regulations*, (10 CFR) Section 50.55a, requires that inservice testing (IST) of certain American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME *Boiler and Pressure Vessel Code* (the Code) and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance is impractical for its facility. Section 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME Code requirements upon making the necessary findings. Nuclear Regulatory Commission (NRC) guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to the Code requirements which are acceptable. Further guidance is given in GL 89-04, Supplement 1, and NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants."

In a letter dated March 21, 2000, North Atlantic Energy Service Corporation, licensee for the Seabrook Station, submitted the second 10-year interval inservice test (IST) program plan for pumps and valves. The staff reviewed the submittal and in a letter dated August 9, 2000, requested that the licensee provide additional information. The licensee responded in letters dated August 18 and September 8, 2000.

The second 10-year IST interval for Seabrook Station began on August 18, 2000, and is scheduled to end August 17, 2010. The IST program was developed in accordance with the requirements of the 1995 Edition, including the 1996 Addenda, of the ASME Code for Operation and Maintenance (OM Code) of Nuclear Power Plants.

The regulations, 10 CFR 50.55a(f)(4)(ii), state that inservice tests must comply with the requirements of the latest edition and addenda of the Code incorporated by reference in the regulations 12 months prior to the start of the 120-month interval. For Seabrook, this would be the 1989 Edition of the Code. However, the licensee requested approval to implement the IST program in accordance with the 1995 Edition and 1996 Addenda of the OM Code. The staff's safety evaluation dated May 8, 2000, approved the request.

Enclosure

The NRC's findings with respect to authorizing alternatives and granting or denying the IST program relief requests are given below.

2.0 PUMP RELIEF REQUESTS

2.1 Relief Request PG-1

The licensee has requested relief from the loop accuracy requirements of ISTB 4.7.1(a), for the component cooling and residual heat removal system flow instruments. For Group A and Group B tests, the Code states that the flow rate determination shall be accurate to within ±2% of full scale. The licensee proposes to use the installed instrumentation.

2.1.1 Licensee's Basis for Requesting Relief

The licensee states:

> Seabrook Station uses flow measuring instrumentation which meets the acceptable instrument accuracies defined in Table ISTB 4.7.1-1. However, the total flow element loop accuracy was calculated from the flow device to the indicator readout device. The loop accuracies do not meet the instrument accuracies of Table ISTB 4.7.1-1, but the instruments are well within the table limits for flow rate.
>
> Flow Measurement Instrument Accuracies
> (% of Full Scale)

System	Instrument Accuracy	Loop Accuracy
CC	0.50%	2.20%
RH	2.00%	3.00%

In its August 18, 2000, RAI response, the licensee states:

> The Component Cooling (CC) flow instrument full-scale range is 0-13,000 gallons per minute (gpm). The Residual Heat Removal (RHR) flow instrument full-scale range is 0-700 gpm.
>
> Three of four CC pumps have reference flow values of 11,600 gpm. The other CC pump has a reference flow rate of 11,700 gpm. One RHR pump has a reference flow value of 605.4 gpm. The other RHR pump has a reference flow rate of 559.44 gpm.

2.1.2 Alternative Testing

The licensee proposes no additional testing.

2.1.3 Evaluation

The licensee requests relief from the loop accuracy requirements of ISTB 4.7.1(a), for the component cooling and residual heat removal system flow instruments. For Group A and Group B tests, the Code states that the flow rate instrumentation shall be accurate to within ±2% of full scale. The Code also states in paragraph ISTB 4.7.1(b)(1) that the full-scale range of each analog instrument shall not be greater than three times the reference value. The combination of these two requirements results in an effective accuracy requirement of ±6% of the reference value.

The loop accuracy for the four component cooling flow instruments is 2.2% and its full-scale range is 0-13,000 gpm. Three of the component cooling pumps have reference flow rates of 11,600 gpm. The other pump has a reference flow rate of 11,700 gpm. The flow indicators, therefore, have effective accuracies of 2.5% and 2.4%.

The loop accuracy for the 2 RHR flow instruments is 3.0% and its full-scale range is 0-700 gpm. One of the RHR pumps has a reference flow rate of 605.4 gpm while the other has a reference flow rate of 559.4 gpm. The flow indicators, therefore, have effective accuracies of 3.5% and 3.8%.

The licensee's proposal to use the installed instrumentation does not meet the Code requirements. However, these flow instruments yield readings at least equivalent to the reading achieved from instruments that meet Code requirements (i.e., up to ±6%) and, thus, provide an acceptable level of quality and safety.

2.1.4 Conclusion

The proposed alternative to the loop accuracy requirements of ISTB 4.7.1(a) is authorized pursuant to 10 CFR 50.55a(a)(3)(i) based on the alternative providing an acceptable level of quality and safety.

2.2 Relief Request PR-1

The licensee requests relief from the provisions of ISTB 4.3.e.1 which requires reference values to be established within ±20% of design flow rate for the comprehensive test. For the comprehensive test of the containment spray pumps, the licensee proposes to use the current bypass loop at a flow rate of approximately 1,900 gpm which is approximately 63% of the best efficiency point of each pump.

2.2.1 Licensee's Basis for Requesting Relief

The licensee states:

> 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 (during pre-operational test 1PT-11, Containment Recirculation Sump Operability Demonstration) but 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 [net positive suction head] 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 [emergency core cooling system] 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.
>
> The recirculation flow path provides for substantial flow testing in a stable, non-flat region of the pump curve, well above the minimum continuous flow rate specified by the pump OEM (original equipment manufacturer). Testing the CBS pumps at reference values established in this region of the pump curve will not damage the pumps and will provide meaningful data to assess pump operational readiness.

In its August 18, 2000, request for additional information (RAI) response, the licensee states:

> The current CBS pump test is conducted at one point on the pump curve. The current pump test data has been at or above the pre-operational test data curve for each pump. The current pump test data shows no appreciable degradation in performance from the pre-operational test. These pumps experience very little operating time (about 10-15 hours) each cycle and this is primarily due to surveillance testing. The anticipated level of degradation from this amount of use is minimal and this is supported by the past test results.

The licensee provided additional information in a submittal dated September 8, 2000, concerning the ability to test the containment spray pumps at design conditions using the available flow paths:

> 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 a 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. These valves were recently overhauled during the last refueling outage to correct minor seat leakage issues, so it is not preferable to utilize these valves as throttle valves.

2.2.2 Alternative Testing

The licensee proposes to use the current reference values for testing the containment spray pumps while operating on the installed bypass loop for the comprehensive test.

2.2.3 Evaluation

There are two horizontal centrifugal containment spray pumps at Seabrook. According to the Seabrook Updated Final Safety Analysis Report (UFSAR), Section 6.2.2.2.b.2, the containment spray pumps are designed to take suction from the containment sump at the most limiting NPSH condition and pump it back into the containment through the spray nozzles. The UFSAR also states that the system design flow is 3,010 gpm and the minimum calculated containment spray flow rate is 2,808 gpm. According to UFSAR Table 6.2-75, containment spray pumps have a minimum NPSH requirement of 21 feet.

The Code requires in ISTB 4.2 that a comprehensive test be conducted in accordance with ISTB 5.2.3. The inservice test parameters which are required to be measured during the comprehensive test for the Seabrook containment spray pumps, as specified in Table ISTB 4.1-1, are differential pressure, flow rate, and overall vibration. Reference values for the comprehensive test, as specified in ISTB 4.3(e)(1), are required to be established in regions of relatively stable pump flow and within ±20% of the pump design flow rate. Table ISTB 5.1-1 specifies that the comprehensive test be conducted biennially for each pump in the IST program.

The licensee considers the containment spray system a fixed resistance system because they state that the flow cannot be varied by use of any of the installed valves. In their submittal of

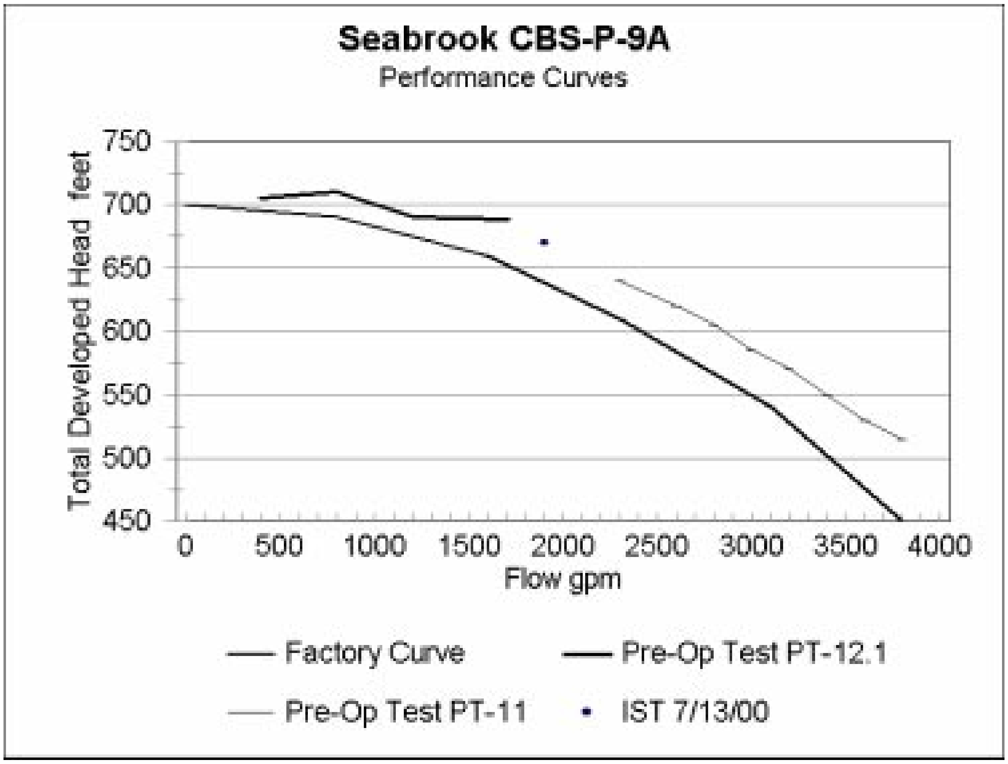
March 21, 2000, the licensee states that the required (system) design flow is 2,808 gpm and the pump BEP is 3,000 gpm. The current bypass loop capacity for both pumps is approximately 1,900 gpm to 1,950 gpm based on test data provided by the licensee. Therefore, the test flow rate is approximately 68% of the minimum system design flow and approximately 63% of pump flow at the BEP. Although the Code does not define pump design flow, the intent of ISTB, as stated in ISTB 1.1, is to assess the operational readiness of safety-related pumps. Assessing pump performance by using overall system parameters would be inappropriate. Therefore, in order to meet the Code requirements, the test would have to be conducted at 2,400 gpm which is 80% of the flow at the BEP of the containment spray pumps.

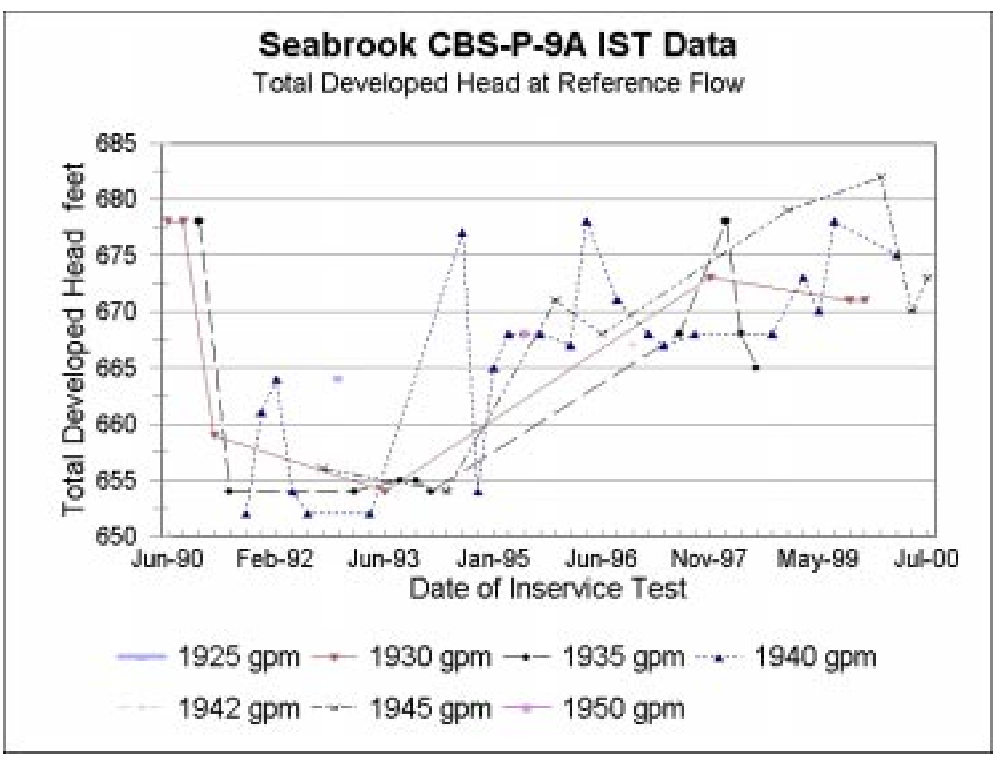
The licensee stated in its relief request that in order to test the containment spray pumps to obtain the pump flow required by the Code, a dyke of approximately 3 feet in height would have to be temporarily erected around the top of the sump in order to maintain sufficient pump head to provide adequate NPSH to the pump. In addition, a spool piece would have to be removed and temporary piping installed and routed back to the sump. The licensee has also investigated using the existing flow loop to obtain additional data to validate some of the pre-operational test data, but concluded that using the installed flow control butterfly valves may damage the soft seats which were recently installed to address leakage issues.

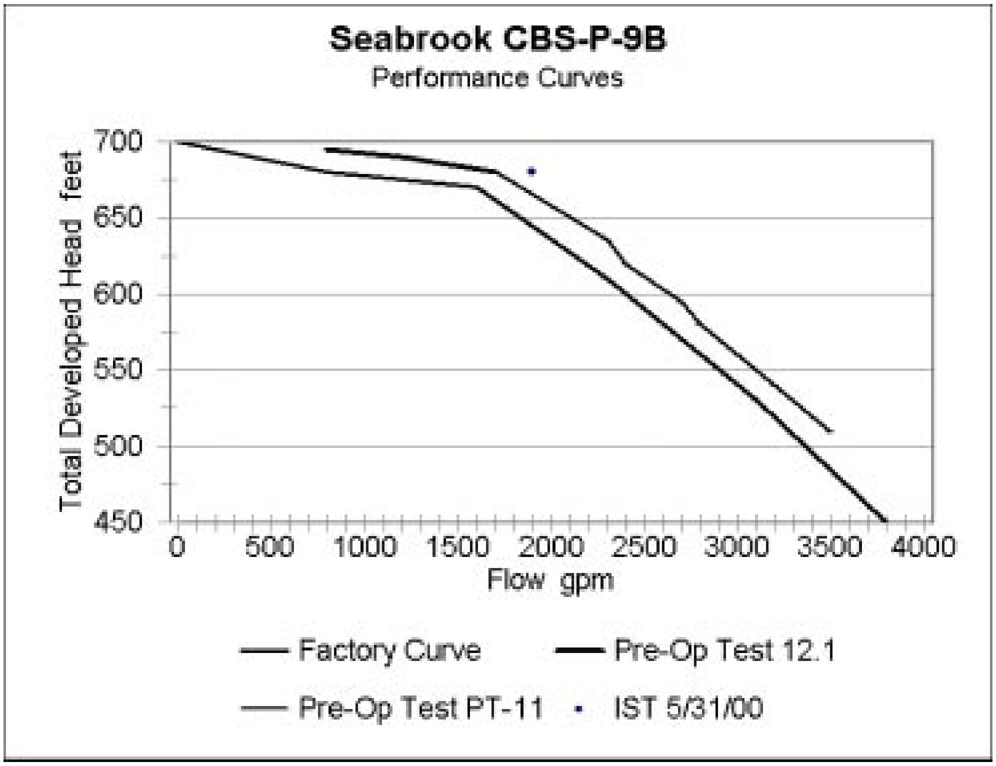
The licensee has proposed to perform the comprehensive pump test at the current test conditions. Since the licensee did not propose an alternative test for Group B testing for pumps in standby systems that are not routinely operated, the containment spray pumps will be tested in accordance with those requirements. The requirements for Group B tests are contained in ISTB 5.2.2. At Seabrook, this test is also performed at the same point as the comprehensive test because it is a fixed resistance system. As specified in Table ISTB 4.1-1, quarterly vibration testing is not required. The required hydraulic acceptance criteria, as specified in Table ISTB 5.2.2-1, for the containment spray pumps includes either flow or pressure measurement. This testing is less stringent than the current Code requirements. The licensee has not proposed any additional compensatory actions to offset the limited testing of the containment spray pumps during the comprehensive test.

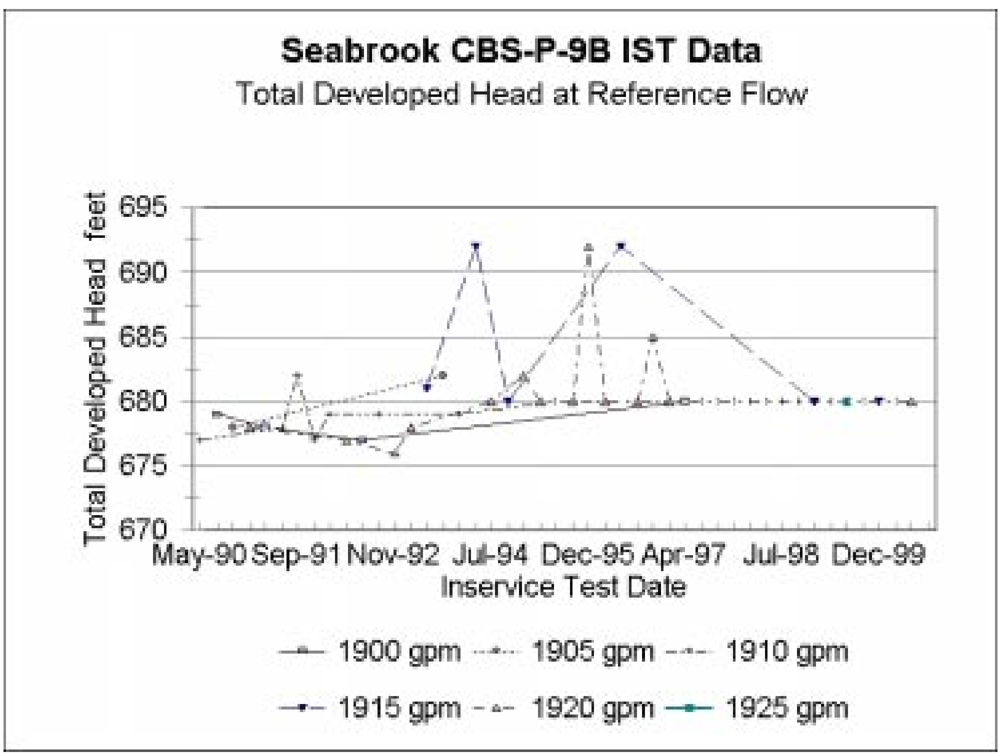
A paper included in NUREG/CP-0137, Proceedings of the Third NRC/ASME Symposium on Valve and Pump Testing, entitled “Development of Comprehensive Pump Test Change to ASME OM Code, Subsection ISTB” provides guidance on the intent of the Code. The author is a member of the Working Group on Pumps that revised the Code to include the comprehensive test. The paper states that the comprehensive pump test was developed to ensure a better evaluation of pump performance characteristics at a reduced frequency. This test is intended to be conducted at or near the pump’s design flow rate because this area of the pump curve is considered to be the most representative of the pump’s design performance characteristics. The quarterly Group B test for standby pumps is intended as a largely qualitative test to allow for detection of gross mechanical or hydraulic failures and not for determination of hydraulic performance capabilities or to detect minor imbalances through vibration measurements. The resultant implementation of the comprehensive test for the containment spray pumps at Seabrook would be a reduction in testing requirements during the quarterly test without a more intensive assessment of the pump during the biennial test. Therefore, the proposed testing appears to be contrary to the intent of the Code.

The intent of the comprehensive pump test is to test a pump at substantial flow rates such that significant changes in pump developed head or flow will be detected more readily than they would be if they were tested at low flow rates. In order to make an assessment of the current testing performed on the containment spray pumps, the staff requested that the licensee provide any performance and test data that was available. The licensee provided in the additional submittals previously referenced, factory and pre-operational test data on these pumps as well as IST data taken since the start of plant operation. This information is presented below.


Seabrook CBS-P-9A
Performance Curves
Total Developed Head feet
750
700
650
600
550
500
450
0
500
1000
1500
2000
2500
3000
3500
4000
Flow gpm
Factory Curve
Pre-Op Test PT-12.1
Pre-Op Test PT-11
IST 7/13/00


Seabrook CBS-P-9A IST Data
Total Developed Head at Reference Flow
Total Developed Head feet
685
680
675
670
665
660
655
650
Jun-90
Feb-92
Jun-93
Jan-95
Jun-96
Nov-97
May-99
Jul-00
Date of Inservice Test
1925 gpm
1930 gpm
1935 gpm
1940 gpm
1942 gpm
1945 gpm
1950 gpm


Seabrook CBS-P-9B
Performance Curves
Total Developed Head feet
700
650
600
550
500
450
0
500
1000
1500
2000
2500
3000
3500
4000
Flow gpm
Factory Curve
Pre-Op Test 12.1
Pre-Op Test PT-11
IST 5/31/00


Seabrook CBS-P-9B IST Data
Total Developed Head at Reference Flow
Total Developed Head feet
695
690
685
680
675
670
May-90
Sep-91
Nov-92
Jul-94
Dec-95
Apr-97
Jul-98
Dec-99
Inservice Test Date
1900 gpm
1905 gpm
1910 gpm
1915 gpm
1920 gpm
1925 gpm

The first graph, reproduced from curves provided by the licensee in its submittal dated August 18, 2000, compares performance data for pump CBS-P-9A taken both at the factory and during pre-operational testing with a recent inservice test hydraulic data point. The second graph, plotted from data provided in the licensee's submittal dated September 8, 2000, consists of performance data taken from all inservice tests performed on CBS-P-9A. Different reference flow rates are plotted on the same graph according to the date the test was performed. At higher flow rates, a lower pump head is expected. The next two graphs provide similar data for containment spray pump CBS-P-9B.

In order for the licensee's proposed alternative to provide an acceptable level of quality and safety, the pump test performed at 63% of the pump BEP must be able to demonstrate that degradation will be readily detected. The optimum performance point to detect pump degradation is near the pump's design flow rate because, as previously stated, this area of the pump curve is considered to be the most representative of the pump's design performance characteristics. Changes in hydraulic performance near the design point would not be as readily masked as they would be at conditions near the shutoff head of a centrifugal pump.

Based on the factory curves, the shutoff head of both containment spray pumps is 700 gpm. It is also noted that the pre-operational performance curves are offset from the factory curve, possibly due to higher system resistance and methods of collecting and reducing the performance data. The representative IST points plotted on these two curves either coincide or are above the pre-operational performance curves. Another observation regarding the performance curves is that the slope of the pump/head curve measured at the factory and the pre-operational test curves are very small at flow rates up to 2,000 gpm. As an example, for CBS-P-9B, the total developed head at approximately 1,900 gpm is 680 feet. This is less than 1% of the shutoff head of the pump. At 2,400 gpm, the curve plotted using data from pre-operational test PT-11 shows that the total developed head is approximately 620 feet or 12% below the shutoff head of the pump. At 3,000 gpm, the total developed head drops to approximately 560 feet or 20% below the shutoff head.

Because the system is considered by the licensee to be a fixed resistance system, there is no fixed reference value. To evaluate the performance of each containment spray pump against the Code acceptance criteria, each pump is started, the system flow is allowed to stabilize, and pressure and flow measurements are recorded and compared with their respective acceptance criteria. Using the IST data provided by the licensee, the staff noted that the measured flow rate for both pumps has a total variation of approximately 1.3% while the total developed head variation for pump 9A is approximately 4.6% for pump CBS-P-9A and 2.4% for CBS-P-9B. These values appear to be well within the acceptable Code required action limits. In addition, the repeatability of the test flow rate appears to be consistent with the guidance in NUREG-1482, Section 5.3, which refers to pump testing in earlier editions of the ASME OM Code.

As stated above, the IST data for both pumps was graphed such that for a particular flow rate, the corresponding total developed head was plotted on the date of the test. The intent of the plot is to provide trend data of total developed head at each measured flow rate for both containment spray pumps. The expected result was that at higher flow rates, there would be a lower pump total developed head. This would provide an indication that the pumps were being tested in an area of the curve such that the intent of the comprehensive test would be satisfied. In examining the IST data graphs for both CBS-P-9A and CBS-P-9B, the only trend that can be inferred is that the variation in pump total developed head decreases significantly in tests after 1995. The plot of CBS-P-9A yielded no similarity in pump head at constant flow rates. In addition, in testing since 1997 for CBS-P-9B, despite a variation in the measured flow rate of 15 gpm, the total developed head is a constant 680 feet. These results may be due to instrument accuracy. Another possible explanation is the region in which the pump is being tested is insensitive to small variations in pump flow because the pump is operating near its shutoff head.

Based on its analysis of the IST data, the staff finds that containment spray pump testing using the bypass line does not provide any additional information when compared to pump testing at much lower flow rates. In addition, the licensee has not proposed any compensatory actions to supplement the testing strategy for the containment spray pumps. Therefore, the staff does not find an adequate basis exists to authorize the alternative as proposed by the licensee. However, considering that an evaluation of the containment spray pump testing shows repeatable results using the current Code test strategy using a flow test loop which allows pump testing at significant flow rates (albeit at a performance point that is approximately within 1% of pump shutoff head), the staff finds that the licensee’s alternative provides sufficient assurance of operational readiness of the pumps to authorize the alternative for an interim period to allow time for the licensee to reevaluate its proposed alternative testing. The proposed alternative provides sufficient assurance of operational readiness during the interim period because flow testing of the containment spray pumps will be performed quarterly at significant flow rates and that the licensee has not identified any recent maintenance or testing issues with these pumps.

During the interim period, the licensee should reevaluate the current testing to assess the ability to detect degradation as was intended by the OM Code-1995 pump test strategy. This may entail more detailed analysis of the IST data, consultation with the manufacturer, or running additional tests as appropriate. If the licensee cannot further demonstrate that the proposed testing is an acceptable alternative, then appropriate compensatory actions should be proposed to supplement the alternative testing. Possible strategies or combinations of strategies include: 1) testing at the BEP on a much longer interval; 2) commitment to perform additional performance monitoring on the containment spray pumps; 3) adjustment of acceptance criteria; and/or 4) continuation of the current Code testing, including taking overall vibration data quarterly.

2.2.4 Conclusion

The proposed alternative to the Code reference value requirements of ISTB 4.3.e(1) for the containment spray pumps CBS-P-9A and CBS-P-9B is authorized for an interim period of 2 years pursuant to 10 CFR 50.55a(a)(3)(i) based on the alternative providing an acceptable level of quality and safety. During the interim period, the licensee should reevaluate the current testing to assess the ability to detect degradation as was intended by the OM Code-1995 pump test strategy. If the licensee cannot further demonstrate that the proposed testing is an acceptable alternative, then appropriate compensatory actions should be proposed to supplement the alternative testing.

2.3 Relief Request PR-2

The licensee requests relief from the frequency response range requirements for the ocean service water pumps. The Code, ISTB 4.7.1(f), requires the frequency response range of the vibration measuring transducers and their readout system be from one-third minimum pump shaft rotational speed to at least 1,000 Hz. The licensee proposes to use the instrumentation that they currently possess.

2.3.1 Licensee's Basis for Requesting Relief

The licensee states:

> Vibration instrument calibration activities are conducted over a specified frequency range and the calibration accuracy requirements of Table ISTB 4.7.1-1 are applied to both amplitude and frequency. All vibration instruments meet the specified ±5% accuracy limits over a frequency range of 6-1000 Hz. Typically, frequency data below 6 HZ is filtered, since it provides not useful information and is outside the instrument calibration range.
>
> The ocean service water pumps are vertical line shaft pumps which operate at 885 RPM (14.75 Hz). Vibration measurements are taken on the upper motor bearing housing as required by ISTB 4.7.4(b). The minimum required vibration measuring equipment frequency response value for these pumps (⅓ operating speed) is 4.9 Hz. Therefore, the Table ISTB 4.7.1-1 accuracy requirement of ±5% for the ⅓ minimum operating frequency will not be met.
>
> Due to service water pump design and configuration, vibration data at frequencies less than running speed (14.75 Hz) are not expected to be useful for condition monitoring or trending. Therefore, the vibration measuring equipment calibrated range low frequency limit of 6 Hz is adequate.

In its August 18, 2000, RAI response, the licensee states:

> North Atlantic has determined that there are no known degradation mechanisms below 6 Hz for the subject Service Water pumps. Seabrook Station has experienced past failures of these pumps related to the breakdown of the coatings used on the shafts and the clearances at the bearing surfaces. Historically, these failures have been discovered through the use of system operational indicators (e.g., failure of the pumps to start with low system header pressure) and not through the use of vibration monitoring.
>
> The subject pumps are vertical line shaft pumps that are periodically monitored for degradation by the Condition-Based Maintenance (CBM) safety-related program as well as the IST program. The CBM program takes vibration measurements utilizing full spectral analysis and trends the data for the Code required points on the motor bearings. In addition to the Code required points, the CBM program also measures pump shaft vibration. The monitoring of shaft vibration has proven to be a better indicator than the Code required monitoring of the motor bearings only. The CBM program additionally monitors operation of the pump motors by periodically sampling and trending the condition of the motor bearing lubricating oil and utilizing thermography.

> In order to monitor vibration below 6 Hz, additional instrumentation would be required at a significant cost. Currently none of our vibration probes meet the combined range and accuracy requirements required by the Code for the subject pumps. The purchase of new equipment to monitor motor vibration of the subject vertical line shaft pumps for vibration that has not been indicative of pump condition is an unnecessary burden. Additionally, IST vibration monitoring alone has not been adequate to demonstrate continued pump reliability.

2.3.2 Alternative Testing

The licensee proposes:

> Vibration instruments will meet the accuracy requirement of Table ISTB 4.7.1-1 over a frequency range of 6 Hz to 1000 Hz. Vibration data below the calibrated frequency range will be filtered.

2.3.3 Evaluation

The licensee requests relief from the frequency response range requirements for the ocean service water pumps SW-P41A, SW-P41B, SW-P41C, and SW-P41D. The Code, ISTB 4.7.1(f), requires the frequency response range of the vibration measuring transducers and their readout system be from one-third minimum pump shaft rotational speed (4.9 Hz) to at least 1,000 Hz. The licensee proposes to use the instrumentation that they currently possess, and which meets the Code accuracy requirements over a frequency range of 6 Hz to 1,000 Hz.

The frequency spectrum of the signals generated is characteristic of each pump and constitutes a unique pattern. Analysis of the pattern allows identification of vibration sources, and monitoring of the change over time permits evaluation of the mechanical condition of the pump. In order to identify sources of noise and vibration, the peaks of the measured frequency spectra are correlated with data pertaining to the possible vibration source components in the pump. The licensee has determined that there are no known degradation mechanisms in the unmeasured range of 4.9 to 6 Hz.

In addition to Code-required testing, the pumps are monitored for symptoms of degradation under the licensee’s Condition-Based Maintenance (CBM) safety-related program. The CBM program takes vibration measurements utilizing full spectral analysis and trends the data for the Code-required points on the motor bearings. The CBM program additionally monitors the pump shaft vibration, and the operation of the pump motors by periodically sampling and trending the condition of the motor bearing lubricating oil and utilizing thermography. This proposed alternative provides an adequate level of assurance of the operational readiness of the ocean service water pumps.

Imposition of the Code requirements for the vibration instrumentation would be of little to no benefit for assuring operational readiness of the service water pumps. It would create a hardship on the licensee by requiring additional instrumentation be procured, maintained, and operated.

2.3.4 Conclusion

The proposed alternative to the requirements of ISTB 4.7.1(f) is authorized pursuant to 10 CFR 50.55a(a)(3)(ii). Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

2.4 Relief Request PR-3

The licensee requests relief from the instrument accuracy requirements for the comprehensive test of the service water pumps. The Code, Table ISTB 4.7.1-1, requires differential pressure instruments used during comprehensive tests have an accuracy of ±½%. The licensee proposes to calculate the inlet pressure based on water level above the pump inlet and use existing instrumentation with a loop accuracy of 1.90% to measure pump suction pressure.

2.4.1 Licensee's Basis for Requesting Relief

The licensee states:

> The above listed pumps [SW-P41A,SW-PB, SW-P41C, SW-P41D, SW-P110A, and SW-P110B] are vertical line shaft pumps with no direct means to obtain the inlet pressure measurements as required by ISTB 4.7.2(b). However, the inlet pressure can be calculated based on water level above the pump inlet using existing plant level instrumentation to measure pump suction pressure.
>
> Seabrook Station uses level measuring instruments which meet the acceptable instrument accuracies defined in Table ISTB 4.7.1-1 for the Group A test. The installed level instrumentation's total loop accuracy, calculated from the level transmitter to the level indicator is within 2.0% of full scale, which also meets the requirements of Table IST 4.7.1-1 for the Group A test. The total level instrumentation loop accuracy, calculated from the transmitter to the indicator, does not meet the requirements for comprehensive tests. However, the Group A test is performed under basically the same operating conditions (flow and pressure) for these pumps as the Comprehensive test. The total loop accuracies and level indicator accuracy do not meet the instrument accuracies of Table ISTB 4.7.1-1 for Comprehensive tests, but the instruments and loop accuracies are well within the table limits for Group A tests.
>
> Level Measurement Instrument Accuracies
> (% of Full Scale)
>
> | Transmitter Accuracy | Indicator Accuracy | Loop Accuracy |
> |---|---|---|
> | 0.5% | 1.50% | 1.90% |

In its August 18, 2000, RAI response, the licensee states:

> With currently installed instrumentation, it would require a direct readout (e.g., use of a multimeter) to read the output signal on the level transmitter, which has

> an accuracy of 0.5%. This will require lifting leads to place a resistor across the terminals to enable a voltage reading or placing an ammeter in the circuit, in a similar method to the current transmitter calibration activity. There are four pumps that use one level transmitter and two other pumps that use another level transmitter. These tests would not be conducted concurrently; therefore the leads would be lifted from each transmitter numerous times in a two-year period (potentially as many as four times for one transmitter). This increases the chances of personnel error in re-terminating the wiring or potentially damaging the wiring or equipment to which it connects. Also, the instrument accuracy and uncertainty calculation states that the output readout device (voltmeter/ampmeter) and the resistor have additional accuracy ratings, which must be considered when calculating the total accuracy of the instrumentation used to determine level by the direct readout method. Therefore, even by direct readout method off the transmitter, the total accuracy would be > 0.5%.
>
> Pump inlet pressure is calculated by measuring the bay level and then mathematically converting the level to pressure at the pump suction. Differential pressure is then determined by subtracting the calculated suction pressure from the corrected discharge pressure. Therefore, the inlet pressure accuracy is a direct influence on the overall differential. If the inlet pressure accuracy is greater than 0.5%, then the DP accuracy is calculated as being at least that much above 0.5%, unless the discharge pressure accuracy is even greater.

2.4.2 <u>Alternative Testing</u>

The licensee proposes:

> The inlet pressure shall be calculated based on water level above the pump inlet using existing plant instrumentation to measure pump suction pressure.

2.4.3 <u>Evaluation</u>

The Code requires that the accuracy of individual analog instruments used in the comprehensive pump test be ±0.5% of full scale for either pressure or differential pressure measurement. Digital instruments measuring either pressure or differential pressure are required to be accurate to ±0.5% over the calibrated range. When a combination of analog and digital instruments is used, the Code states that the required accuracy is the loop accuracy.

The service water pumps at Seabrook are vertical line shaft pumps and take their suction from the bay in which they are submerged. To determine the inlet pressure, the licensee determines the submerged depth of the pump suction by measuring the level of sea water in the bay in which the service water pumps are located. The depth of the sea water, which is the pump static head, is then converted into pressure. This calculation represents the inlet pressure measurement. Guidance on using a tank or bay level to determine pump inlet pressure has been provided to licensees in NUREG-1482, Section 5.5.3. Differential pressure is determined by subtracting the calculated inlet pressure from the measured discharge pressure.

The licensee has proposed to use the installed bay level indication instrumentation to calculate the pump inlet pressure. The licensee states that the instrument loop associated with this instrumentation has an accuracy of 1.9%. Therefore, the inlet pressure measurement is assumed to have an accuracy of 1.9% which is greater than allowed by the Code for the comprehensive pump test. The licensee stated in their submittal dated August 18, 2000, that the level instrument has an accuracy of 0.5% and could be read directly by lifting leads, placing a resistor across the terminals, and locally measuring a voltage across the resistor. The licensee states that this would require lifting leads at each test and may increase the potential for personnel error and damaging equipment. The licensee also states that if the instrument were read directly, the accuracy of the resistor and voltmeter used in the local measurement would still yield a measurement inaccuracy greater than 0.5%. Requiring the licensee to perform the local measurement would be a hardship without a compensating increase in the level of quality and safety if the actual accuracy provided by the current method was adequate when compared with the actual variance allowed by the Code and the Code acceptance criteria for the service water pumps at Seabrook.

In the licensee's submittal dated August 18, 2000, the licensee provided a typical differential pressure calculation for these pumps. The measured discharge pressure in this calculation was approximately 66 psig while the pump suction was under a static pressure of approximately 17 psig. The actual variance in the differential pressure measurement due to instrument inaccuracies is more sensitive to inaccuracies in the discharge pressure gage rather than the bay level measurement because the discharge pressure is approximately four times the static pressure at the pump suction. Using the numbers provided above, the actual variation in discharge pressure measurement (using the Code-allowed accuracy of ±0.50%) and the suction pressure calculation (using the actual accuracy of ±1.9%) is approximately 0.3 psig for both discharge and suction pressures, respectively. The differential pressure, which is the discharge minus the suction pressure, has an actual allowed variation of approximately 0.2 psid ((66 psig-17psig) 0.005). Therefore, based on the typical numbers provided in the licensee's submittal, the allowed maximum variance for the differential pressure of the service water pumps is approximately 0.2 psid which is approximately 0.1 psi below the actual variance of the calculated service water pump inlet pressure and the measured discharge pressure.

Accurate determination of the pump performance parameters is essential in the determination of pump degradation. The Code provides specific hydraulic acceptance criteria for determining whether vertical line shaft pumps have degraded such that they are considered in either the alert (<0.95 times the reference value) or the required action range (<0.90 times the reference value). OM Code-1995 also requires a comprehensive pump test to ensure that, when tested at or near its design point, that the actual degradation is quantified as accurately as possible. The use of bay or tank level to determine pump inlet pressure is not a new practice as previously stated. However, the licensee's relief request highlights a potential difficulty in obtaining the required accuracy of the instrument used in determining the pump differential pressure during the comprehensive pump test. The licensee has proposed to use the existing bay level instrumentation without any changes to the test method. This evaluation shows that this method, using approximate numbers provided by the licensee, yields an actual instrument accuracy that is almost equivalent to the accuracy required by the Code.

Because of the importance of the comprehensive pump test, the accuracy of the reference values used in the staff's evaluation, and the alternate testing proposed by the licensee, long term relief cannot be authorized for this proposed alternative. The alternative is authorized for an interim period of 2 years for the licensee to evaluate the differential pressure accuracy of the service water pumps and determine if any compensatory actions are necessary to meet the intent of the Code requirements. Compensatory actions may include an adjustment of the Code acceptance criteria to compensate for the accuracy of the differential pressure measurement. The proposed testing provides a reasonable assurance of operational readiness because the licensee had documented the current accuracy of the service water pump differential pressure measurement, the staff has evaluated this accuracy and determined it to be almost equivalent to the Code requirements, and the licensee has not stated that there are currently any performance concerns with these pumps.

2.4.4 Conclusion

The proposed alternative testing from the Code required instrument accuracy instruments used in the comprehensive pump test, as specified in Table ISTB 4.7.1-1 for the bay level instrumentation used to calculate the inlet pressure for service water pumps previously listed, is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for an interim period of 2 years, based on the determination that compliance with the specified requirements results in a hardship without a compensating increase in the level of quality and safety. During the interim period, the licensee should evaluate the differential pressure accuracy of the service water pumps and determine if any compensatory actions are necessary to meet the intent of the Code requirements.

3.0 VALVE RELIEF REQUESTS

3.1 Relief Request VG-1

The licensee has requested relief from the fail-safe valve testing requirements of ISTC 4.2.6. The Code requires valves with fail-safe actuators be tested by observing the operation of the valve actuator upon loss of actuating power. Instead of interrupting power by actuating the circuit breaker, the licensee proposes to perform the fail-safe test by using the control switch to de-energize the solenoid valve.

3.1.1 Licensee's Basis for Requesting Relief

The licensee states:

> Solenoid valves which control the air supply to air-operated valves and direct solenoid-operated valves must stroke to their fail-safe position upon interruption of their electric supply. It is not practical to interrupt power by actuation of the circuit breaker, as some circuits contain multiple valves. Actuation of valves in these circuits, other than the specific valve under test, may place the plant in an undesired condition during operation. De-energizing the solenoid valve has the same effect as a loss of electrical power or control air. Therefore, stroking the valve from the control switch which interrupts power to the solenoid constitutes a fail-safe test.

3.1.2 Alternative Testing

The licensee proposes to verify the fail-safe response of these valves by use of the valve control switch.

3.1.3 Evaluation

The licensee has requested relief from the fail-safe valve testing requirements of ISTC 4.2.6. The Code requires valves with fail-safe actuators be tested by observing the operation of the valve actuator upon loss of actuating power. Instead of interrupting power by actuating the circuit breaker, the licensee proposes to perform the fail-safe test by using the control switch to de-energize the solenoid valve. This alternative has the same effect as a loss of electrical power or control air and provides a functionally equivalent test as that required by the Code.

3.1.4 Conclusion

The proposed alternative to the requirements of ISTC 4.2.6 is authorized pursuant to 10 CFR 50.55a(a)(3)(i) based on the alternative providing an acceptable level of quality and safety.

3.2 Relief Request VG-2

The licensee requests relief from the test frequency requirements of ISTC 4.2.1. For solenoid operated valves with stroke times of less than 2 seconds, the licensee proposes to establish a sampling plan rather than test each valve every 3 months.

3.2.1 Licensee's Basis for Requesting Relief

The licensee states:

> Seabrook Station proposes to utilize diagnostic equipment and techniques capable of measuring actual stroke times with accuracy to fractions of a second. This testing will permit trending of the actual performance of the valves, as well as the actuating and valve position indication circuits, thereby providing for identification of adverse trends and implementation of corrective action before the maximum allowable stroke time is exceeded.

In its August 18, 2000, RAI response, the licensee states:

> North Atlantic currently tests or has tested certain solenoid-operated valves by the use of strip chart recorders measuring the current applied to the coil. This method has proven to be a more accurate indicator of actual valve stroke time and performance than measurement of stroke time with a stop watch.
>
> The valve vendor has recommended the above described time trace method as the way of monitoring the valve's performance. The valve vendor has indicated that stroke time measurement using the reed switches are not indicative of actual disc movement. It is only a go/no-go test that provides little information as it measures reed switch actuation not actual disc position. The time trace method, if performed with the same test equipment demonstrates actual valve stem movement.
>
> The stopwatch method does not actually demonstrate valve position, so augmented position indication tests need to be performed. Stroke time testing

> utilizing a stopwatch is not meaningful. Its performance often requires multiple control room people to monitor switch positions or annunciator lights.
>
> Many of the subject solenoid valves are periodically exercised during plant operation to align sample system flow, to allow the performance of gaseous radiation monitoring, or to makeup nitrogen to the Pressurizer Relief Tank or permit the removal of waste liquid drain flow. The subject valves, with the exception of RC-FV2881, RC-FV2894, and RC-FV2896, are exercised on a quarterly basis during the performance of ESFAS Slave Relay Testing required by the station Technical Specifications. These valves are containment isolation (with the exception [of] RC-FV2881) whose leak tightness is periodically demonstrated as required by 10 CFR 50 Appendix J and the Technical Specifications. Failure of the valves to operate for testing functions or for operational alignment issues would result in corrective action via the corrective action program. North Atlantic does not have any evidence that indicates that periodic exercising of these valves improves their performance. These valves are sealed without means of lubrication. Additionally, these solenoid alves are not like motor-operated valves, which may derive some benefit from exercising testing. However, shifts in the nature of the time trace curve would indicate potentially degrading conditions. Corrective actions would then be initiated to investigate the cause for the change in the shape of the time trace curve.

3.2.2 <u>Alternative Testing</u>

The licensee proposes:

> Solenoid operated valves with stroke times less than 2 seconds will have stroke times measured using diagnostic equipment capable of measuring valve stroke times to a fraction of a second.
>
> The applicable valves will be divided into groups. The grouping will be technically justified and will consider valve manufacturer, design, service, size, materials of construction, orientation, location, etc.
>
> Testing associated with the grouped valves will be on a staggered basis with all valves being tested at least once every 2 years.
>
> Unless otherwise specified in plant specifications, the maximum allowable stroke time will be two seconds, as described in ISTC 4.2.8(e).

3.2.3 <u>Evaluation</u>

The Code requires that Category A and B valves be exercised at a frequency of once every 3 months. If full-stroke exercising is impractical at power, it may be deferred to plant shutdowns or refueling outages. Partial-stroke testing may also be deferred to plant shutdowns or refueling outages based on impracticality. In addition, OM Code-1995, Subsection ISTC 4.2.8(e), specifies that valves with stroke times of less than 2 seconds are not required to have their stroke times compared with a reference value and are instead assigned a limiting stroke time of 2 seconds. These valves are referred to as “rapid-acting valves.” Typically, solenoid-operated valves (SOVs) are designated as rapid acting valves.

The NRC has previously provided guidance on stroke time measurements for rapid acting valves in GL 89-04, Position 6. This guidance was provided because of the problems associated with applying the stroke time acceptance criteria to rapid acting valves. A change of 50% in the reference stroke time, as required in the ASME Code, Section XI, Subsection IWV, would trigger testing at an increased frequency. This would apply even if the referenced stroke time was 1.49 seconds and any one individual inservice test on this valve recorded a stroke time of 1.51 seconds (because the Code requires the valve stroke time to be measured to the nearest second). The staff established the 2-second limiting stroke time for rapid acting valves and allowed licensees to request relief for rapid acting valves provided that the valves were declared inoperable if the 2-second limit was exceeded. Subsequently, the OM Code adopted the 2-second limiting stroke time.

NUREG-1482, Section 4.2.2, provides additional guidance on stroke time testing of rapid acting valves. Specifically, the NUREG discussed the use of new technologies that would enable the stroke time of rapid acting valves to be measured to within milliseconds. This would facilitate the establishment of appropriate acceptance criteria for each valve verses one overall limiting stroke time. The NUREG also discussed the signal processing time, which may not be tracked or trended if valve testing is performed locally. This would not necessarily impact detection of degradation in the valve but may be associated with meeting technical specification stroke time limits. It should be noted that the NUREG does discuss the applicability of the 2-second limiting stroke time limit when the valve could be stroke time tested to within milliseconds. The NUREG suggests that the acceptance criteria should be adjusted.

The licensee has proposed to take a population of solenoid operated valves (SOVs) and categorize them into “technically justified” groups which will consider valve manufacturer, design, service conditions, size, materials of construction, orientation, and other unspecified factors. The language is similar to the requirements in OMa Code-1996, Appendix II, for grouping of check valves included in the condition monitoring program. It is recognized that this language may not require the groups to be identical but the burden is on the licensee to justify why the groups are acceptable. For this alternative, it is not foreseeable that adequate justification could be provided to group valves that are not identical. The only issue that has not been directly addressed is the size of the groups. However, the 2-year maximum test interval may address this issue. From this grouping, one SOV would be tested on a staggered basis with all valves in the group being tested at least once every 2 years. This is similar to check valve testing strategies involving either disassembly and inspection or non-intrusive testing. The licensee’s stroke time test would be a more rigorous test which would have the capability to measure SOV stroke time to fractions of a second.

The testing philosophy proposed by the licensee is consistent with the improved testing methods for other power operated valve types currently being either proposed or implemented. Therefore, there is precedence in the test method proposed by the licensee because the proposed strategy emphasizes a more rigorous test methodology over a longer interval. However, the licensee has not addressed the appropriateness of maintaining the existing 2-second acceptance criterion for the SOVs included in this relief request. Application of the 2-second stroke time acceptance criterion may be contradictory to the intent of providing a more rigorous test to quantify degradation of each SOV. Perhaps, after a period of time in which all the SOVs in this alternative are tested at least once, it may be determined that a more restrictive acceptance criterion is more appropriate for each SOV, such as the acceptance criterion included in the requirements of ISTC 4.2.8 and 4.2.9. In ISTC 4.2.8, a percentage of the reference stroke time is the acceptance criterion. Limiting stroke times are required to be assigned in ISTC 4.2.9.

In the licensee's submittal dated August 18, 2000, the licensee stated that they had no evidence that periodic exercising of SOVs improves their performance. The staff agrees with the licensee that periodic exercising may not improve the performance of an SOV. However, the goal of a periodic exercise of an SOV is not to improve performance, but to demonstrate that it operates and that there has not been a random or age-related failure which seems to be more prevalent in SOVs. If there were a complete failure, this would be identified in an exercise test. This exercise test may be performed by either 1) verifying that current operation outside of inservice testing provides a successful exercise, or 2) using the inservice test for just an exercise and not an exercise and stroke time test. The licensee has stated that most of the SOVs included in this relief request are exercised quarterly as part of a slave relay test which is required by the Seabrook technical specifications. Another issue that would also need to be addressed would be the frequency of exercise testing. The staff continues to favor a quarterly exercise test, but the licensee may be able to provide additional information based on operating experience at Seabrook which would justify a longer interval. Additional information on SOV operating experience is provided in NUREG-1275, Volume 6.

The licensee's proposed alternative test strategy for the SOVs referenced in this relief request has the potential to reduce the burden of stroke time testing while providing more accurate information on SOV degradation. However, the licensee needs to provide additional information before long term relief can be authorized. It is recognized that this additional information may include test data from the more rigorous SOV stroke time test. Therefore, the alternative is authorized for a period of 2 years. During this interim period, the licensee should perform the following: 1) provide information on the specifics on valve group composition; 2) implement more stringent acceptance criteria for the stroke time test or justify the proposed 2-second limiting stroke time based on data collected in the interim period; and 3) provide and justify an exercise strategy for the SOVs in their revised relief request. The proposed testing provides an acceptable level of quality and safety during the interim period because a more rigorous test will be performed on each valve every 2 years and only three of the SOVs are not exercised on a quarterly frequency by some other test method.

3.2.4 Conclusion

The proposed alternative to the Code exercise frequency requirements of OM Code-1995, ISTC 4.2.1, for the SOVs listed in this relief request is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for an interim period of 2 years, based on the alternative providing an acceptable level of quality and safety. During the interim period, the licensee should perform the following: 1) provide information on the specifics on valve group composition; 2) implement more stringent acceptance criteria for the stroke time test or justify the proposed 2-second limiting stroke time based on data collected in the interim period; and 3) provide and justify an exercise strategy for the SOVs in its revised relief request.

3.3 Relief Request VG-3

The licensee requests relief from the 10-minute minimum elapsed time requirements of Appendix I 8.1.1(h), 8.1.2(h), and 8.1.3(g) for all safety and relief valves providing steam service, compressible fluid services other than steam, and liquid service. The licensee proposes a hold time of 5 minutes, as stated in the 1998 ASME OM Code.

3.3.1 Licensee's Basis for Requesting Relief

The licensee states:

> The ASME OMb Code - 1997 Addenda to the 1995 ASME OM Code for Operation and Maintenance of Nuclear Power Plants, Appendix I - 8.1.1h, 8.1.2h and 8.1.3g, Set-pressure testing for valves providing steam service, compressible fluid services other than steam and liquid service, respectively, states that the Time Between Valve Openings is specified as "A minimum of 5 minutes shall elapse between successive openings."
>
> Five minutes elapsed time between valve openings is adequate for the valve, test media and ambient conditions to stabilize to an operating point similar to the conditions present prior to the previous valve opening. Waiting an additional 5 minutes beyond that holding period requires needlessly maintaining valve test conditions for a longer time period with no additional testing benefit.

3.3.2 Alternative Testing

The licensee proposes:

> Set-pressure testing conducted under Appendix I Section 8.1 shall be performed with a minimum of 5 minutes elapsed time between successive valve openings.

3.3.3 Evaluation

The safety and relief valves function to provide over-pressure protection to their associated systems. The Code, Appendix I, 8.1.1(h), 8.1.2(h), and 8.1.3(g), requires that a minimum of 10 minutes elapse between successive valve openings. The licensee proposes an alternative test method in which 5 minutes elapse between successive valve openings.

Modifications were made to the hold time requirements in the 1998 Edition of the OM Code, Appendix I, Paragraphs I-8110(h), I-8120(h), and I-8130(g). The minimum elapsed time between successive valve openings was shortened from 10 to 5 minutes. This change was based on the insignificant effect of reducing the hold time on valve setpoint.

The licensee's alternative test method is consistent with the 1998 Code requirements and will provide an acceptable level of quality and safety. The staff finds this method acceptable in that it offers equivalent protection as provided by Appendix I, 8.1.1(h), 8.1.2(h), and 8.1.3(g).

3.3.4 Conclusion

The proposed alternative to the minimum elapsed time requirements of Appendix I, 8.1.1(h), 8.1.2(h), and 8.1.3(g) for all safety and relief valves providing steam service, compressible fluid services other than steam, and liquid service is authorized pursuant to 10 CFR 50.55a(a)(3)(i). The licensee's alternative test method is consistent with 1998 Code requirements and will provide an acceptable level of quality and safety.

3.4 Relief Request AG-1

The licensee requests relief from the requirements of ISTA 1.5 and 2.1 and proposes to eliminate involvement of the Authorized Nuclear Inservice Inspector (ANII) in the development and implementation of the IST Program.

3.4.1 Licensee's Basis for Requesting Relief

The licensee states:

> The ASME OMb Code - 1997 Addenda to the 1995 ASME OM Code for Operation and Maintenance of Nuclear Power Plants, ISTA 1.5 eliminates reference to access provisions for the Inspector. Requirements for access provisions for examination personnel and equipment remain. ISTA 2.1, detailing specific requirements for access for the Inspector, qualification of the Authorized Inspection Agencies, Inspectors and Supervisors and the duties of the Inspector, has been deleted in its entirety.
>
> Furthermore, ANII review of inservice testing programs is usually far less comprehensive than the inspection performed on inservice inspection activities, for example. Normally, the inspection of inservice test programs consists mainly of a review of the inservice test plan and records review of tests and examinations performed. These inspections are also performed internally to the organization by Seabrook Station's Quality Assurance Program. There is no added quality-related benefit in duplicating these inspection efforts but there is a cost benefit in ensuring these inspection activities are not needlessly duplicated by two separate organizations.

3.4.2 Alternative Testing

The licensee proposes:

> Specific requirements for access for the Inspector, qualification of the Authorized Inspection Agencies, Inspectors and the duties of the Inspector (ANII) shall be eliminated from the Inservice Testing Program.

3.4.3 Evaluation

The 1995 Edition with the 1996 Addenda of the OM Code requires that test activities be verified by an ANII. It is the ANII's duty to verify that the inservice tests required on pumps, valves, and component supports have been completed and the results recorded. ANSI Part N626.1

describes the qualifications and duties for ANIIs which are applicable to Section XI. This part specifically addresses the duties to verify nondestructive tests, welding, heat treatment, and repairs and replacements; but is silent on the responsibilities concerning IST. The licensee proposes to eliminate from the IST Program specific requirements for access for the ANII, qualification of the authorized inspection agencies and inspectors, and duties of the ANII. The licensee states that the IST program is subject to the licensee's quality assurance program and there is no quality-related benefit in duplicating the review efforts.

Utilities have a multi-layered review process that performs the same function as the ANII. ANIIs generally do not have the training or background experience to make determinations of the safety function of components in order to verify the scope of the plan, or assess the operational readiness of components based on test results. In the 1997 OMb Code, the requirement for ANII involvement in IST programs has been removed.

The licensee's own quality assurance process for the IST Program provides an equivalent, or greater, level of quality and safety as the Code requirements for ANII involvement. Therefore, the staff finds the proposed alternative to be acceptable.

3.4.4 Conclusion

The alternative to eliminate from the IST Program specific requirements for access for the ANII, qualification of the authorized inspection agencies and inspectors, and duties of the ANII is authorized pursuant to 10 CFR 50.55a(a)(3)(i) based on an acceptable level of quality and safety that will be provided by the alternative.

4.0 CONCLUSION

The proposed alternatives to the Code requirements described in PG-1, VG-1, VG-3, and AG-1 are authorized pursuant to 10 CFR 50.55a(a)(3)(i) based on the alternatives providing an acceptable level of quality and safety. The alternatives are authorized for the second 10-year interval.

The proposed alternative to the Code requirements described in VG-2 is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for an interim period of 2 years based on the alternative providing an acceptable level of quality and safety.

The proposed alternative to the Code requirements described in PR-1 is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for an interim period of 2 years based on the alternative providing an acceptable level of quality and safety.

The proposed alternative to the Code requirements described in PR-2 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the second 10-year interval. Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The proposed alternative to the Code requirements described in PR-3 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for an interim period of 2 years. Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

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Date: November 1, 2000