UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE THIRD 10-YEAR INSERVICE TESTING PROGRAM

POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-266 AND 50-301

1.0 INTRODUCTION

The *Code of Federal Regulations,* 10 CFR 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. 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."

By letter dated September 30, 1998, Wisconsin Electric, the licensee for the Point Beach Nuclear Plant, Units 1 and 2 (PBNP), submitted Revision 5 of the PBNP Pump and Valve Inservice Testing Program. A conference call with licensee personnel was conducted on February 18, 1999. As a result, the licensee submitted a letter dated April 19, 1999, clarifying their initial submittal.

PBNP is currently implementing its third 10-year IST interval. This interval began on December 21, 1990, and is scheduled to end on December 20, 2000. The IST program was developed in accordance with the 1986 Edition of ASME Code, Section XI, Subsections IWP and IWV. Per 10 CFR 50.55a(f)(4)(iv), portions of the 1989 Edition of the ASME Code, Section XI have been adopted. The licensee's letter of April 19, 1999, identifies which portions of the 1989 Code are used in the IST program.

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

2.0 VALVE RELIEF REQUESTS

2.1 Relief Request VRR-01

Relief is requested from the quarterly exercising requirements of IWV-3522 for safety injection (SI) check valves 1(2)SI-00842A&B and 1(2)SI-867A. The licensee proposes a sample disassembly and inspection program for these valves.

This relief request was previously numbered VRR-4. The staff's evaluation is contained in safety evaluations dated April 17, 1992, October 28, 1993, February 22, 1996, and January 2, 1998. In addition to renumbering, modifications were made to the relief request which require staff evaluation.

2.1.1 Licensee's Basis for Requesting Relief

The licensee states:

> During normal operation, neither SI pump discharge pressure of 1500 psig nor accumulator pressure of 760 psig is sufficient to overcome RCS pressure. Therefore, full or partial stroke exercising during power operation is not possible.
>
> During cold shutdown, partial or full stroke exercising via the SI pumps or SI accumulators is not permitted due to the potential of creating a low temperature overpressure condition.
>
> A full stroke exercise test by injecting to the RCS could be possible during refueling when the reactor vessel head is removed, but the volume and flow rate required for the test could result in damage to the core internals. There is also the potential of forcing a nitrogen bubble into the RCS piping and refueling cavity resulting in possible safety implications, which makes this testing concept inadvisable. The RHR system serves as the qualified means of heat removal when fuel is in the vessel. Rendering both trains of RHR inoperable would require a complete core off load.

2.1.2 Alternate Testing

The licensee proposes:

> At a minimum for these valves, partial open and closure exercise testing will be done at each refueling outage. In addition, partial open and closure exercise testing will be conducted at each cold shutdown which requires an Event V test. (Re: T.S. 15.3.16)
>
> Valves 1(2)SI-842A and 1(2)SI-867A will each be disassembled, inspected, and manually stroked once every 6 years, rotating the sequence of valves being inspected such that a different one is completed each time until all have been inspected and the sequence repeats. Should a failure be detected, the other valves for that unit (excluding SI-842B if the core is loaded) shall be disassembled and proper operation verified prior

to completion of that outage. The opposite unit's two valves will be disassembled and inspected during that unit's next scheduled refueling outage.

Valves 1(2)SI-842B require a complete core off load in order to disassemble and inspect. All efforts will be made to disassemble, inspect, and manually stroke each valve every 6 years. However, typically this will be done concurrently with reactor vessel inspections which is required to be completed once every 120 months. Should a failure be detected, the other valves (SI-842A and SI-867A) for that unit shall be disassembled and proper operation verified prior to completion of the outage.

In the inspections which result from the detection of a failure, should an additional failure be detected, all remaining valves will be disassembled, inspected, and manually full stroke exercised. Valves associated with the unit in outage will be completed prior to the return of that unit to service, even if it requires an unscheduled core off load to be performed. Valves associated with the opposite unit will be completed during the next scheduled refueling outage, even if a complete core off load was not previously planned.

Basis for Extended Inspection Interval:

The licensee states:

The NRC, in Generic Letter (GL) 89-04, Attachment 1, Position 2, requested information to support the extension of valve disassembly and inspection intervals of greater than once every 6 years. Within the last 6 years, each of the six valves identified in this request for relief and SI-867B have been disassembled, inspected, and manually exercised per the criteria in GL 89-04, Attachment 1, Position 2. To date no degradation of valve operability or performance has been noted in any disassembly and inspection performed on the valves. The following table lists each specific valve, the individual maintenance work request (MWR) under which the inspection was performed, and the completion date.

	UNIT 1	
SI-00842A	WO 45881	4/14/93
	WO 890172	4/11/90
	WO 872759	4/14/88
SI-00842B	WO 45639	4/14/93
	WO 890174	4/21/90
SI-00867A	WO 9703899	4/8/98
	WO 3637	5/1/90
	WO 890176	4/24/90
	WO 872755	4/15/88
SI-00867B	WO 9700761	Spring 97*
	OA 8739	Spring 96*
	OA 8739	Spring 95*
	OA 8739	Spring 94*
	WO 890178	4/21/90

UNIT 2

SI-00842A	WO 9510056	10/17/95
	WO 890173	10/5/89
	WO 872760	10/18/87
SI-00842B	WO9510057	10/17/95
	WO 890175	11/4/89
SI-00867A	WO 9510060	10/21/95
	WO 890177	10/5/89
	WO 872753	10/20/87
SI-00867B	WO 9610739	Fall 96*
	OA 8739	Fall 95*
	OA 8739	Fall 94*
	WO 50730	10/8/93
	WO 890179	11/3/89

*Full Flow Test

An industry-wide search, performed January 2, 1998, utilizing the Nuclear Plant Reliability Data System (NPRDS - a component maintenance/failure database managed by INPO) on similar valves also indicated no failures, although leakage through the seat was reported in 34 instances, including 3 instances at Point Beach. Allowable leakage values are given in TS Table 15.3.16-1.

The request to provide basis for extended inspection interval only applies to SI-00842B as this is the only valve which goes beyond the 6-year period specified in GL 89-04, Attachment 1, Position 2. The maintenance history of all six valves contained in this relief in addition to similar valve SI-867B is provided for completeness to show the trouble-free history of the valves.

Additional justification for the extended inspection interval may be found in NRC Safety Evaluation Reports (SER) on the Inservice Test Program at Point Beach dated April 17, 1992, and October 28, 1993.

Note: This Relief Request was previously approved by the SERs identified above.

2.1.3 Evaluation

The check valves, 1(2)SI-00842A&B and 1(2)SI-867A, are located in the safety injection line to the reactor coolant system (RCS) loop A and B cold legs from the SI accumulators. The valves perform an active safety function in the open direction to provide a flowpath to the RCS for injection of accumulator contents. These valves also perform an active safety function in the closed direction. The valves serve as ASME Class 1 to Class 2 pressure boundary isolation valves. They perform a function to isolate RCS pressure from the lower pressure SI piping and components. Also, upon initiation of high head safety injection, 1(2)SI-00842A&B must close to prevent flow from being diverted to the accumulator instead of the loop B cold leg.

IWV-3522 requires that these valves be exercised every 3 months. The licensee proposes to place the valves in a sample disassembly and inspection program which is designed in accordance with Position 2 of GL 89-04. Valves 1(2)SI-842A and 1(2)SI-867A will each be disassembled, inspected, and manually stroked once every 6 years. Valves 1(2)SI-842B require a complete core off-load in order to disassemble and inspect. For these valves, the licensee proposes an extended inspection interval greater than 6 years.

In addition to disassembly and inspection, the following tests will be performed on the valves:

1. Partial open and closure exercise testing will be done at each refueling outage.

2. Partial open and closure exercise testing will be conducted at each cold shutdown which requires an Event V test .

3. Closure testing will be demonstrated on 1(2)SI-867A by performing seat leakage testing per Technical Specification 15.3.16 during cold shutdown and/or refueling outages. This is described in refueling outage justification (ROJ) 24.

4. Closure testing will be demonstrated on 1(2)SI-842A&B quarterly. This is also described in ROJ-24.

Position 2 of GL 89-04 allows for the employment of a sample disassembly and inspection plan for groups of identical valves in similar applications. This approach is appropriate in the present circumstance where the licensee has determined that it is burdensome to disassemble and inspect all valves each refueling outage.

The sample disassembly and inspection plan involves grouping similar valves and testing one valve in each group during each refueling outage. Guidelines for this plan are stated in Appendix A of NUREG-1482. The sampling technique requires that each valve in the group be the same design and have the same service conditions including valve orientation. Additionally, at each disassembly the licensee must verify that the disassembled valve is capable of full-stroking and that the internals of the valve are structurally sound. Also, if the disassembly is to verify the full-stroke capability of the valve, the disk should be manually exercised.

A different valve of each group is required to be disassembled, inspected, and manually full-stroke exercised at each successive refueling outage, until the entire group has been tested. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valves in that group must also be disassembled, inspected and manually full-stroke exercised during the same outage. Once this is complete, the sequence of disassembly must be repeated.

In order for the licensee to extend the inspection interval to longer than 6 years, extreme hardship must be demonstrated. Extreme hardship is described by the licensee in performing disassembly and inspection of valves 1(2)SI-842B. Plants which do not routinely defuel during refueling outages are required to perform inservice inspection of the reactor vessel in accordance with ASME Section XI at least once every 120 months. Therefore, each of these "B" train valves will be disassembled and inspected at least once every 10 years, as opposed to

once every 6 years for the "A" train valves. Although this is an extended period, the partial-stroke exercising and the Event V leakage testing provide information on the specific valves. The disassembly and inspection of the remaining valves provides a means for monitoring degrading conditions.

This relief request was previously evaluated and approved as VRR-4 in the safety evaluations dated April 17, 1992, and October 28,1993. A revision was made to the original alternative test method due to the development of nonintrusive testing techniques for 1(2)SI-00867B. Relief is no longer needed for these valves. Testing of these valves is described in ROJ-23.

2.1.4 Conclusion

The proposed alternative to the requirements of IWV-3522 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. The proposed alternative provides reasonable assurance of operational readiness.

2.2 Relief Request VRR-02

This relief request was previously evaluated by the staff as VRR-38. The safety evaluation, dated February 7, 1995, authorized an alternative to the testing required by OM-1, Paragraph 8.2. The Code requires that the pressurizer safety valves' seat tightness be performed using the same fluid as for set pressure testing. The licensee's alternative is to use subcooled water instead of saturated steam.

The editorial changes made in renumbering this relief request to VRR-02 do not affect the conclusions of the safety evaluation. Therefore, the alternative continues to be authorized pursuant to 10 CFR 50.55a(a)(3)(i). The proposed alternative provides an acceptable level of quality and safety.

2.3 Refueling Outage Justification ROJ-16

The licensee proposes a sample disassembly and inspection program for the service water check valves as an alternative to the requirements of OM-10 Paragraph 4.3.2.4(c). This refueling outage justification is evaluated as a relief request because it is a deviation from the Code requirements.

2.3.1 Licensee's Basis for Requesting Relief

The licensee states:

> Full-stroke exercising with flow is impractical since flow indication is not provided. Additionally, crediting full stroke capability by monitoring the components' temperature parameters is impractical due to the amount of time required for component operation. Calculations have demonstrated that an extended pump run (≈42 minutes) would be required before pump/turbine bearing temperatures would exceed the maximum

allowables. Therefore, partial stroke capability will be credited during quarterly pump testing by observation of the pump/turbine bearing temperatures.

2.3.2 Alternative Testing

The licensee proposes:

> These valves are verified in the partial open position during quarterly pump testing by observation of the pump/turbine bearing temperatures.
>
> Full stroke capability of the valves will be verified during refueling outages by sample disassembly in accordance with the guidelines provided in the IST Program document. This method of testing and frequency is acceptable per the guidelines provided in Position 2 of GL 89-04.

2.3.3 Evaluation

These check valves, OSW-00112A and OSW-00135A, are located in the service water supply lines to the steam driven auxiliary feedwater pumps and turbines. The 1986 Edition of the Code, IWV-3520, requires the valves to be exercised quarterly. If this is impractical, disassembly and inspection is allowed in accordance with OM-10, Paragraph 4.3.2.4(c). The licensee is using this provision in accordance with 10 CFR 50.55a(f)(4)(iv). However, instead of disassembling each valve every refueling outage, the licensee proposes to employ the sample disassembly and inspection provision as recommended in GL 89-04.

The staff Position 2 of GL 89-04 allows for the use of a sample disassembly and inspection plan for groups of identical valves in similar applications. This approach is appropriate in the present circumstance where the licensee has determined that it is burdensome to disassemble and inspect both valves each refueling outage.

The sample disassembly and inspection plan involves grouping similar valves and testing one in each group during each refueling outage. Guidelines for this plan are stated in Appendix A of NUREG-1482. The sampling technique requires that each valve in the group be the same design and have the same service conditions including valve orientation. Additionally, at each disassembly the licensee must verify that the disassembled valve is capable of full-stroking and that the internals of the valve are structurally sound. Also, if the disassembly is to verify the full-stroke capability of the valve, the disk should be manually exercised.

A different valve of each group is required to be disassembled, inspected, and manually full-stroke exercised at each successive refueling outage, until the entire group has been tested. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valves in that group must also be disassembled, inspected, and manually full-stroke exercised during the same outage. Once this is complete, the sequence of disassembly must be repeated.

As stated on page 28 of the licensee's September 30, 1998, submittal, the proposed alternative is consistent with the guidelines provided in Appendix A of NUREG-1482 and provides

reasonable assurance of the valves' operability. Thus, compliance with the Code would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

2.3.4 Conclusion

The proposed alternative to the requirements of OM-10 Paragraph 4.3.2.4(c) 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. The proposed alternative provides reasonable assurance of operational readiness.

3.0 PUMP RELIEF REQUEST

3.1 Relief Request PRR-01

The licensee has requested relief from the requirements of OM-6, Paragraph 4.6.1.2(a) for instrumentation associated with the component cooling water pumps, residual heat removal pumps, and spent fuel pool cooling pumps. The Code states that the full-scale range of each pump's analog instrument shall not be greater than three times the reference value. The licensee proposes to use the installed instrumentation.

3.1.1 Licensee's Basis for Requesting Relief

The licensee states:

> Various permanently installed pressure instruments have a full scale range that exceeds three times the reference value criteria that is specified by the Code. Although these instruments do not meet the Code requirements, they are able to provide the same or better indication accuracy as an instrument that is allowed by the Code, and to ensure repeatability of test data.
>
> For instruments to be in compliance with OM-6, two requirements must be satisfied. The first requirement states that flow and pressure instrumentation must be accurate to within ±2% of the full scale value; the second requirement states that the full scale range of each instrument shall be three times the reference value or less. Based on these requirements, a maximum indicated accuracy of ±6% can be calculated by comparing the actual tolerance of the instrument to the reference value being measured. An example of calculating indicated instrument accuracy is as follows.
>
> Example:
>
> The following example uses a pressure reference value of 20 psig and a pressure gauge with full scale range of 60 psig that is calibrated to ±2% of full scale.
> Code Requirement:
>
> 3 x reference value (20 psig) = 60 psig
> Instrument tolerance = ±1.2 psig (±2% x 60 psig)

Indicated Accuracy:
±1.2 psig/20 psig x 100% = ±6%

The indicated accuracy for the instruments on the pumps listed are less than or equal to ±6% at the reference value. These accuracies are the same or better than those allowed by the Code. The use of the existing gauges is supported by NUREG-1482, Paragraph 5.5.1 when the combination of range and accuracy yields a reading at least equivalent to the reading achieved from instruments that meet the Code requirements. In addition, all the gauges identified serve as suction pressure gauges. Since suction pressure is subtracted from a much higher discharge pressure to determine differential pressure, the impact of the suction pressure error is minimized.

The following table specifies the instruments where this relief request applies. The indicated accuracy, which is less than ±6% in all cases, is determined by dividing the actual instrument calibration tolerance by the reference value multiplied by 100%.

Pump ID (Freq)	Instrument Number	PPCS Loop Accuracy	Parameter	Reference Value (Baseline)	Instr Range	Instr Accur (Loop)	Instr Cal Tolerance	Indicated Accur @ Ref. Value
1P-11A	1PI-692A	N/A	Suction Pressure	16.2 psig	0-60 psig	±0.5%	±0.3psig	±1.85%
1P-11B	1PI-692B	N/A	Suction Pressure	16.6 psig	0-60 psig	±0.5%	±0.3psig	±1.80%
2P-11A	2PI-692A	N/A	Suction Pressure	16.0 psig	0-60 psig	±0.5%	±0.3psig	±1.88%
2P-11B	2PI-692B	N/A	Suction Pressure	16.7 psig	0-60 psig	±0.5%	±0.3psig	±1.80%
1P-10A (CS)	1PI-653A	N/A	Suction Pressure	7.4 psig	0-60 psig	±0.5%	±0.3psig	±4.05%
1P-10B (CS)	1PI-653B	N/A	Suction Pressure	8.5 psig	0-60 psig	±0.5%	±0.3psig	±3.53%
2P-10A (CS)	2PI-653A	N/A	Suction Pressure	15.5 psig	0-60 psig	±0.5%	±0.3psig	±1.94%
2P-10B (CS)	2PI-653B	N/A	Suction Pressure	17.3 psig	0-60 psig	±0.5%	±0.3psig	±1.73%
0P-12A	PI-658A	N/A	Suction Pressure	4.3 psig	0-15 psig	±1.00%	±0.15psig	±3.49%
0P-12B	PI-658B	N/A	Suction Pressure	4.4 psig	0-15 psig	±1.00%	±0.15psig	±3.41%

3.1.2 Alternative Testing

The licensee proposes:

> The existing permanently installed pump instrumentation is acceptable provided the indicating accuracy is less than or equal to ±6% of the reference value. No alternate testing will be performed. Any changes in the baseline reference value shall be determined acceptable providing the indicated accuracy of the new reference value does not exceed the range or indicated accuracy allowables of OM-6.

3.1.3 Evaluation

The Code requires that instruments used for measuring pump suction pressure have a specified accuracy and full-scale range. The licensee proposes to use the installed instrumentation associated with the component cooling water pumps, residual heat removal pumps, and spent fuel pool cooling pumps. These instruments do not meet the Code requirements for full-scale range.

OM-6 Table 1 requires that instrumentation accuracy be within ±2% of full-scale, while Paragraph 4.6.1.2(a) requires the full-scale range of each instrument be no 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 accuracy of the installed instruments is within ±2%, as required by Code. However, the instrument range exceeds three times the reference value. The calculated effective accuracy for the instruments is listed in the table in Section 3.1.1 of this SE. These instruments yield a reading at least equivalent to the reading achieved from instruments that meet Code requirements (i.e., up to ±6%) and, thus, meet the guidelines of NUREG-1482 Paragraph 5.5.1.

The licensee's proposal to use the installed suction pressure instrumentation does not meet the Code requirements. However, the accuracy of the installed instrumentation is better than that required by the Code. The higher accuracy, in effect, provides an acceptable means of measuring suction pressure. Therefore, the alternative provides an acceptable level of quality and safety.

3.1.4 Conclusion

The proposed alternative to the Code instrument range requirement of OM-6 Paragraph 4.6.1.2(a) is authorized pursuant to 10 CFR 50.55a(a)(3)(i) based on the alternative providing an acceptable level of quality and safety.

4.0 <u>CONCLUSION</u>

The proposed alternatives described in VRR-01 and ROJ-16 are authorized pursuant to 10 CFR 50.55a(a)(3)(ii). Compliance with the specified Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The proposed alternatives to the Code requirements described in PRR-01 and VRR-02 are authorized pursuant to 10 CFR 50.55a(a)(3)(i) based on the alternatives providing an acceptable level of quality and safety.

Principal Contributor: M. Kotzalas

Date: June 30, 1999

are authorized pursuant to 10 CFR 50.55a(a)(3)(i) based on the alternatives providing an acceptable level of quality and safety.

Sincerely,

Original signed by:

Claudia M. Craig, Chief, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-266 and 50-301

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*See memo from DTerao to CThomas dated 5/17/99 with changes

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are authorized pursuant to 10 CFR 50.55a(a)(3)(i) based on the alternatives providing an acceptable level of quality and safety.

Sincerely,

Original signed by:

Claudia M. Craig, Chief, Section 1
Project Directorate III
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Enclosure: Safety Evaluation

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