



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555-0001
SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO PROPOSED REVISIONS 1G AND 2E TO THE

INSERVICE TESTING PROGRAM

FOR

DUQUESNE LIGHT COMPANY

OHIO EDISON COMPANY

PENNSYLVANIA POWER COMPANY

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

THE TOLEDO EDISON COMPANY

BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-334 AND 50-412

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 and applicable addenda, except where relief has been requested and granted or proposed alternatives have been authorized by the Commission pursuant to 10 CFR 50.55a(f)(6)(i), (a)(3)(i), or (a)(3)(ii). In order to obtain authorization or relief, the licensee must demonstrate that: (1) conformance is impractical for its facility; (2) the proposed alternative provides an acceptable level of quality and safety; or (3) compliance would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety. Section 50.55a (f)(4)(iv) provides that inservice tests of pumps and valves may meet the requirements set forth in subsequent editions and addenda that are incorporated by reference in 10 CFR 50.55a(b), subject to the limitations and modifications listed, and subject to Commission approval. NRC guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provided alternatives to the Code requirements determined to be acceptable to the NRC staff and authorized the use of the alternatives in Positions 1, 2, 6, 7, 9, and 10 provided the licensee follows the guidance delineated in the applicable position. When an alternative is proposed, which is in accordance with GL 89-04 guidance and is documented in the IST program, no further evaluation is required; however, implementation of the alternative is subject to NRC inspection.

Section 50.55a of 10 CFR Part 50 authorizes the Commission to grant relief from ASME Code requirements or to approve proposed alternatives upon making the necessary findings. The NRC staff's findings with respect to granting or not granting the relief requested or authorizing the proposed alternative as part of the licensee's IST program are contained in this safety evaluation (SE).

2.0 BACKGROUND

The current (second) 10-year interval for Beaver Valley Power Station, Unit No. 1 ends on September 30, 1996. The current (first) 10-year interval for Beaver Valley Power Station, Unit No. 2 ends on November 17, 1997. The IST programs for both units are based on the requirements of the 1983 Edition through the Summer 1983 Addenda of ASME Boiler and Pressure Vessel Code, Section XI (the Code), and guidance in GL 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." For inservice testing of pumps in nuclear power plants, IWP-4110, "QUALITY," of the Code requires accuracies within ± 2 percent of full scale for pressure, differential pressure, flow rate, and speed instruments; and within ± 5 percent of full scale for temperature and vibration amplitude instruments. IWP-4120, "RANGE," requires the full-scale range of these instruments to be no more than three times the reference value (expected value of the parameter to be measured). However, for permanently installed instruments, NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," Section 5.5.1, "Range and Accuracy of Analog Instruments," states that the NRC staff will grant relief from the Code requirement for range when the combination of the range and accuracy yields a reading at least equivalent to the reading achieved from instruments that meet the Code (i.e., up to ± 6 percent of the reference value). It is also stated in this section that the use of any available instruments that meet the intent of the Code requirements for the actual reading would yield an acceptable level of quality and safety for testing.

3.0 PUMP RELIEF REQUEST 12 AND 10 FOR UNIT NOS. 1 AND 2 RESPECTIVELY

In a letter dated December 4, 1995, Duquesne Light Company, the licensee for Beaver Valley Power Station, Unit Nos. 1 and 2, submitted Pump Relief Requests 12 (Unit 1) and 10 (Unit 2) to request relief from IWP-4120 for certain instruments to be used for testing pumps in their IST programs. The licensee evaluated the instruments' ranges and accuracies and concluded that though the IWP-4120 criterion was not met (i.e., the full scale of the instruments exceeded the limit of three times the reference value), the overall intent of the Code's requirements were met. In its assessment of the proposed instruments, the licensee stated, "the combination of the higher range and better accuracy for each instrument yields a reading at least equivalent to the reading achieved from instruments that meet the Code requirements."

3.1 Pump Relief Request 12 for Unit No. 1

The basis for relief as stated in the licensee's submittal is as follows:

The pumps listed on the attached table use installed instruments which do not meet the requirements of IWP-4120, however, the accuracies of the installed instruments used are more conservative than the Code requirements of IWP-4110, Table IWP-4110-1. Per the attached table, the combination of the higher range and better accuracy for each instrument yields a reading at least equivalent to the reading achieved from instruments that meet the Code requirements. Therefore, relief is requested in accordance with GL 89-04, Supplement 1 (NUREG-1482), Paragraph 5.5.1.

The licensee's proposed alternate testing, as stated in the submittal is as follows:

Use the installed instruments listed on the attached table as long as the combination of the higher range and better accuracy for each installed instrument yields a reading at least equivalent to the reading achieved from instruments that meet the Code requirements.

The information provided is included in Appendix A, to this SE.

3.2 Pump Relief Request 10 for Unit No. 2

The basis for relief as stated in the licensee's submittal is as follows:

The pumps listed on the attached table use instruments which do not meet the requirements of IWP-4120, however, the accuracies of the instruments used are more conservative than the Code requirements of IWP-4110, Table IWP-4110-1. Per the attached table, the combination of the higher range and better accuracy for each instrument yields a reading at least equivalent to the reading achieved from instruments that meet the Code requirements. Therefore, relief is requested in accordance with GL 89-04, Supplement 1 (NUREG-1482), Paragraph 5.5.1.

The licensee's proposed alternate testing, as stated in the submittal is as follows:

Use the instruments listed on the attached table as long as the combination of the higher range and better accuracy for each instrument yields a reading at least equivalent to the reading achieved from instruments that meet the Code requirements.

The information provided is included in Appendix B, to this SE.

3.3 Evaluation

The licensee proposed to use instruments which, when the combination of the range and accuracy are considered, yield readings at least equivalent to the readings that would be achieved from instruments that meet Code requirements. The licensee presented the reference value for the parameter measured, the instrument range, and instrument calibration accuracy for each instrument. In addition, a licensee evaluation concluded that the proposed instruments meet this criterion. For the tables of Appendices A and B to this SE, the required and actual accuracies were calculated based on these values and included in the last two columns (=Req'd Accuracy and =Actual Accuracy). For all instruments addressed in the relief requests, the actual accuracies were found

to be more conservative than the required accuracy and; therefore, the proposed instruments were determined to provide an acceptable level of quality and safety.

To obtain relief from the Code requirements, the licensee must support at least one of the following requirements: 1) the proposed alternative provides an acceptable level of quality and safety; 2) compliance with the specified requirements would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety; or 3) the Code requirements are impractical. As was previously discussed, and as is shown by the last two columns of the tables in Appendices A and B to this SE, the licensee's relief requests satisfy requirement 1) above. In addition, the licensee's submittal was consistent with the guidance provided in Section 5.5.1 of NUREG-1482. Therefore, the NRC staff has authorized the alternatives to IWP-4120 as requested per Relief Request 12 for Unit No. 1 and Relief Request 10 for Unit No. 2.

4.0 CONCLUSION

The alternatives proposed in Relief Request 12 for Unit No. 1 and Relief Request 10 for Unit No. 2 to Section XI, Paragraph IWP-4120, "RANGE," for the instruments listed in Appendices A and B to this SE are authorized pursuant to 10 CFR 50.55a(a)(3)(i) based on the determination that they provide an acceptable level of quality and safety. The licensee is authorized to implement the alternate testing proposed in these relief requests on the date of issuance of this SE.

Attachment: Appendices A and B

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APPENDIX A - TABLE OF INSTRUMENTS FOR PUMP RELIEF REQUEST 12 FOR UNIT 1

Pump ID	Instrument ID	Condition Requiring Relief	Basis for Relief/Alternate Test	Req'd Accuracy	Actual Accuracy
1CH-P-1A 1CH-P-1B 1CH-P-1C	FI-1CH-122A	The range of this gauge is greater than three times the reference flow, at full flow condition.	The Charging Line Flow Indicator with a range of 0-150 gallons per minute (gpm) is sized for all modes of Charging Pump operation. During the quarterly recirculation flow testing, the Code requirements are met. During Refueling full-flow testing, flow through this line is throttled to between 45-50 gpm, slightly below 1/3 of the range. The calibration accuracy is 1.5%, which would yield a reading more accurate than Code requirements.	±2.7 gpm	±2.25 gpm
	FI-1SI-943	The range of this gauge is greater than three times the reference flow, at full flow conditions.	The Cold Leg Safety Injection Flow Indicator measures total flow to the reactor coolant system (RCS) Cold Leg during an accident. It is sized for all modes of operation with a range of 0-1000 gpm. During the full flow high head safety injection (HHSI) test flow is throttled to approximately 305 gpm which is slightly less than 1/3 of the range. With a calibration accuracy of 0.75%, this would yield a reading more accurate than Code requirements.	±18.3 gpm	±7.5 gpm
1RH-P-1A 1RH-P-1B	PI-1RH-600 PI-1RH-601	The range of the gauges is greater than three times the reference pressure at some operating conditions.	These gauges are the discharge pressure gauges for the residual heat removal (RHR) pumps. They are sized for all modes of pump operation with a range of 0-700 pounds per square inch gauge (psig). The RHR pumps take suction on the RCS, and the discharge pressure is dependent on the RCS pressure, varying between 96-485 psig (typically 420 psig). The calibration accuracy is 0.5%, which would yield a reading more accurate than Code requirements for any operating pressure.	±5.76 psig	±3.5 psig
1SI-P-1A 1SI-P-1B	PI-1SI-943 PI-1SI-944	The range of the gauges is greater than three times the reference pressure, at full flow conditions.	These gauges are the discharge pressure gauges for the low head safety injection (LHSI) pumps. They are sized for all modes of pump operation with a range of 0-200 psig. They meet the criteria for quarterly test, however, at higher flow rates the pressure is approximately 25% of the range. The calibration accuracy is 0.5%, which would yield a reading more accurate than Code requirements.	±6 psig	±2 psig
1CC-P-1A 1CC-P-1B 1CC-P-1C	PI-1CC-100A PI-1CC-100B PI-1CC-100C	The range of the gauges is slightly greater than three times the reference pressure.	These gauges are the discharge pressure gauges for the reactor plant component cooling water (CCR) pumps. The range of the gauges is 0-400 psig. The use of a pump curve is allowed for these pumps per Relief Request 11, and the typical pressure readings are slightly lower than 1/3 the range, varying between 110-132 psig. The calibration accuracy is 1.0%, which would yield a reading more accurate than Code requirements.	±6.6 psig	±4 psig
	FI-1CC-117 FI-1CC-118 FI-1CC-119	The range of the gauges is greater than three times the reference flow.	These flow indicators are in the branch lines of the component cooling water system. They are only used if the installed pressure differential instruments (PDIs) are over-ranged. In that case the typical flow expected would be enough to meet Code requirements, except for [FI-1CC-117], which could be placed in service with a flow of 4000 gpm. [FI-1CC-117] is sized for all flow conditions with a range of 0-14,000 gpm and an accuracy of 1.5%. It is in the 24" CCR header supplying the cooling loads inside containment. When the RHR System is in operation the flow through this line is significantly higher. The calibration accuracy of this gauge would yield a reading more accurate than Code requirements.	±240 gpm	±210 gpm
	PDI-1CC-119	The range of the flow meter is greater than three times the reference flow for normal operations.	This flow indicator in the CCR header supplying the cooling loads in the Auxiliary Building, has a range of 0-150 inches water column (inwc). Since the use of a pump curve is approved per relief, the reference flow may not be at a specific flow point. Typical test flow differential pressure is approximately 19 inwc. The accuracy of the gauge is 0.5%, which would yield a reading more accurate than Code requirements.	±1.14 inwc	±0.75 inwc

1FW-P-2 1FW-P-3A 1FW-P-3B	FI-1FW-100A FI-1FW-100B FI-1FW-100C	The range of the gauges is greater than three times the reference flow for the Motor-Driven auxiliary feedwater (AFW) Pumps.	These flow indicators are in the three lines to the steam generators from the AFW pumps. The flow indicators are sized to measure accident flow from the Turbine-Driven AFW pump as well as the Motor-Driven pumps, with a range of 0-400 gpm. The reference value for the full-flow test is approximately 110 gpm, 27.5% of the range. The calibration accuracy of the flow meters is 1.0%, which would yield a reading more accurate than Code requirements.	±6.6 gpm	±4 gpm
	PI-1FW-156 PI-1FW-156A PI-1FW-156B	The range of the gauges is greater than three times the reference pressure.	These gauges are the suction pressure gauges for the AFW pumps. In 1991, design change package (DCP) 1557 changed the existing 0-160 psig gauges to the present 0-60 psig gauges. This range was selected as a compromise between the inservice testing program requirements and possible accident pressures (i.e., River Water supplying the AFW pumps). The 0-60 psig range will accommodate the accident pressure and typical test pressure of 10 psig. With a calibration accuracy of 0.5%, this results in a reading more accurate than Code requirements.	±0.6 psig	±0.3 psig
1EE-P-1A 1EE-P-1B 1EE-P-1C 1EE-P-1D	PI-1EE-101A PI-1EE-102A	The range of the gauges is greater than three times the reference pressure.	These gauges are the discharge pressure gauges for the diesel generator fuel oil transfer pumps. The reference value is approximately 9 psig, slightly below 1/3 of the range of the gauges (0-30 psig). Their calibration accuracy is 0.5%, which would yield a reading more accurate than Code requirements.	±0.54 psig	±0.15 psig

1. = (Approximate) Required Accuracy is calculated as 6% of the lowest value to be measured during the test.

2. = (Approximate) Actual Accuracy is calculated as the product of the actual instrument calibration accuracy and the high end of the instrument range.

APPENDIX B - TABLE OF INSTRUMENTS FOR PUMP RELIEF REQUEST 10 FOR UNIT 2

Pump ID	Instrument ID	Condition Requiring Relief	Basis for Relief/Alternate Test	Req'd Accuracy	Actual Accuracy
2CHS*P21A 2CHS*P21B 2CHS*P21C	2CHS-P1151A 2CHS-P1152A 2CHS-P1153A	The range of the gauges is greater than 3 times the reference pressures during quarterly recirculation flow testing and during full flow testing at refueling.	These are the suction pressure gaugs for the Charging Pumps. They are sized for all modes of pump operation including accident conditions (i.e., can take suction from the Recirculation Spray Pumps) with a range of 0-160 pounds per square inch gauge (psig). During recirculation flow testing, the suction pressures are approximately 25% of the range. During full flow testing, the suction pressures are approximately 10% of the range. Their calibration accuracy is 0.5%, which would yield a reading more accurate than Code requirements.	±0.96 psig	±0.8 psig
	2CHS-F1122A	The range of the gauge is greater than 3 times the reference flow during testing at refueling.	This Charging Line Flow Indicator is sized for all modes of Charging Pump operation with a range of 0-150 gallons per minute (gpm). It meets the Code requirements during quarterly recirculation flow testing of the Charging Pumps, however, the portion of flow through this line during full flow testing at refueling is throttled to between 45-50 gpm, slightly below 1/3 of the range. Its calibration accuracy is 1.5%, which would yield a reading more accurate than Code Requirements.	±2.7 gpm	±2.25 gpm
	2CHS-F1943	The range of the gauge is greater than 3 times the reference flow during testing at refueling.	The high head safety injection (HHSI) Injection Flow Indicator is sized for full flow Charging Pump operation during an accident with a range of 0-1000 gpm. However, the portion of flow through this line during full flow testing of the Charging Pumps at refueling is throttled to approximately 30% of the range. Its calibration accuracy is 1.0%, which would yield a reading more accurate than Code requirements.	±18 gpm	±10 gpm
2CHS*P22A 2CHS*P22B	2CHS-P1123A 2CHS-P1123B	The range of the gauges is greater than 3 times the reference pressures during quarterly testing.	These are the suction pressure gauges for the Boric Acid Transfer Pumps. They are sized for all modes of pump operation and Boric Acid Storage Tank Levels with a range of 0-30 psig. During quarterly testing, the suction pressures are approximately 10-15% of the range. Their calibration accuracy is 0.5%, which would yield a reading more accurate than Code requirements.	±0.18 psig	±0.15 psig
2SIS*P21A 2SIS*P21B	2SIS-P1938 2SIS-P1939	The range of the gauges is greater than 3 times the reference pressures during quarterly recirculation flow testing and during full flow testing at refueling.	These are the suction pressure gauges for the Low Head Safety Injection Pumps. They are sized for recirculation and full flow testing with a range of 0-160 psig. During recirculation flow testing, the suction pressures are approximately 20% of the range. During full flow testing, the suction pressures are approximately 10% of the range. Their calibration accuracy is 0.5% which would yield a reading more accurate than Code requirements.	±0.96 psig	±0.8 psig
2RSS*P21A 2RSS*P21B 2RSS*P21C 2RSS*P21D	Test Gauges (Suction Pressure)	The range of the gauges may be greater than 3 times the reference pressures during testing at refueling.	A test gauge is installed on the suction line of each Recirculation Spray Pump during testing at refueling. A test dam is erected and filled with water to provide net positive suction head (NPSH). The gauges are sized for varying levels of water in the test dam with suction pressures varying between 10-30 inches water column (IWC). Test gauges of varying ranges and accuracies may be used, however, the combination of range and accuracy would yield a pressure reading within ±0.5 IWC. Therefore, their better calibration accuracy in combination with a larger range would yield a reading more accurate than Code requirements.	±0.6 IWC	±0.5 IWC
2CCP*P21A 2CCP*P21B 2CCP*P21C	2CCP-P1150A 2CCP-P1150B 2CCP-P1150C	The range of the gauges is greater than 3 times the reference pressures during quarterly testing.	These are the suction pressure gauges for the Component Cooling Water Pumps. They are sized for all modes of pump operation with a range of 0-60 psig. A pump curve is used during quarterly testing as approved by Relief Request No. 7. The suction pressures vary between 24-37% of the range. Their calibration accuracy is 0.5%, which would yield a reading more accurate than Code requirements.	±0.864 psig	±0.3 psig

2FME*P23A 2FME*P23B	2FME-F1100A 2FME-F1100B 2FME-F1100C	The range of the gauges is greater than 3 times the reference flows during full flow testing at cold shutdown and refueling.	These flow meters are located in the three lines to the steam generators (SGs) from the Auxiliary Feedwater (AFW) Pumps. They are each sized with a range of 0-400 gpm to measure accident flows from the Turbine-Driven AFW Pump (2FME*P22). They are also used to measure accident flows from the Motor-Driven AFW Pumps (2FME*P23A and B), but at a lower flow rate of approximately 30% of the range. Their calibration accuracy is 1.5%, which would yield a reading more accurate than Code requirements.	±7.2 gpm	±6 gpm
2EGF*P21A 2EGF*P21B 2EGF*P21C 2EGF*P21D	2EGF-P1201A 2EGF-P1201B 2EGF-P1201C 2EGF-P1201D	The range of the gauges is greater than 3 times the reference pressures during bi-monthly testing.	These are the discharge pressure gauges for the Emergency Diesel Generator Fuel Oil Transfer Pumps. They are sized for all modes of pump operation with a range of 0-30 psig. During bi-monthly testing, discharge pressures are between 8.5 to 10.5 psig, slightly below 1/3 of the range. Their calibration accuracy is 1.0%, which would yield a reading more accurate than Code requirements.	±0.51 psig	±0.3 psig
2SMS*P21A 2SMS*P21B 2SMS*P21C	2SMS-P1105A 2SMS-P1105B 2SMS-P1105C	The range of the gauges is greater than 3 times the reference pressures during quarterly testing.	These are the Service Water Pump seal water pressure gauges. They are sized for all modes of pump operation with a range of 0-100 psig. During quarterly testing, the seal water pressures are approximately 10% of the range. Their calibration accuracy is 0.5%, which would yield a reading more accurate than Code requirements.	±0.6 psig	±0.5 psig

1. = (Approximate) Required Accuracy is calculated as 6% of the lowest value to be measured during the test.

2. = (Approximate) Actual Accuracy is calculated as the product of the actual instrument calibration accuracy and the high end of the instrument range.