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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

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

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

HOPE CREEK GENERATING STATION

DOCKET NUMBER 50-354

1.0 INTRODUCTION

Section 50.55a of Title 10 of the Code of Federal Regulations (10 CFR) 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 November 15, 1999, Public Service Electric and Gas Company (the licensee), submitted Valve Relief Request No. V04 for the Hope Creek Generating Station IST Program for the second 10-year IST interval. The first 10-year interval was extended by 1 year from December 20, 1996, to December 20, 1997. The second interval was accordingly reduced to 9 years and encompasses the time period between December 21, 1997, and December 20, 2006. The IST program is based on the requirements of the 1989 Edition of the Code which incorporates *Operations and Maintenance (OM) Standards* Part 1, Part 6, and Part 10 (OM-1, OM-6, and OM-10) for IST of safety and relief devices, pumps, and valves.

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

2.0 VALVE RELIEF REQUEST NO. V04

The licensee's submittal requests relief from the quarterly exercise requirement of OM-10 paragraph 4.3.2.1 for certain excess flow check valves (EFCVs). The licensee proposes to perform the testing at least once every 18 months immediately prior to refueling outages.

2.1 Licensee's Basis for Requesting Relief

The licensee's submittal states:

> Excess flow check valves are installed on instrument lines penetrating containment in accordance with Regulatory Guide 1.11. The lines are sized and/or orificed such that off-site doses will be substantially below 10 CFR 100 limits in the event of a rupture. Therefore, individual leak rate testing of these valves is not required for conformance with 10 CFR 50, Appendix J requirements.
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> Functional testing of valves to verify closure can be accomplished by the process of venting the instrument side of the valve while the process side is under pressure. Such testing is required by Technical Specification 4.6.3.4 at least once per 18 months. System design does not include test taps upstream of the EFCVs. For this reason, the EFCVs cannot be isolated and tested using a pressure source other than reactor pressure.
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> Testing on a frequency greater than once per 18 months is not prudent for several reasons. The testing described above requires the removal of the associated instrument or instruments from service. Since these instruments are in use during plant operation, removal from service may cause a spurious signal that could result in a plant trip or an unnecessary challenge to safety systems. Additionally, process liquid would be contaminated to some degree, requiring special measures to collect flow from the vented instrument side and contributing to an increase in personnel radiation exposure. Therefore, testing on a quarterly basis is deemed impractical since the risk of performing the test quarterly is judged to outweigh the benefit achieved with a quarterly test and will also increase personnel exposure.
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> Testing on a Cold Shutdown frequency is also impractical considering the large number of valves to be tested and the condition that reactor pressure > 500 psig is needed for testing. OMa Part 10 Section 4.2.1.2(e) allows test deferrals to refueling outages if quarterly testing or testing during cold shutdowns is impractical. In this instance, considering the large number of valves and the test conditions required (reactor pressure), testing all of these valves during refueling outages is also a hardship. Recent improvements in refueling outage schedules (i.e. shorter outages) have minimized the planned duration for refueling and testing activities during the outages. The appropriate time for performing these EFCV tests during refueling outages is in conjunction with vessel hydrostatic testing. As a result of shorter outages, decay heat levels during hydrostatic tests are higher than in the past. If the hydrostatic test was extended to test all

EFCVs, the vessel could require depressurization several times to avoid exceeding the maximum bulk coolant temperature limit. This is an evolution that challenges the reactor operators and thermally cycles the reactor vessel and should be avoided if possible. Also, based on past experience, EFCV testing during hydrostatic testing becomes the outage critical path and could possibly extend the outage by one day if all EFCVs were to be tested during the time frame.

A review of the maintenance history for EFCVs has shown that the valves have been extremely reliable over the life of the plant, showing less than a 2% failure rate during testing of these valves. Examples of causes for the failures include alarm problems, indication (limit switch adjustments), and bent instrument tubing. None of the failures resulted in the replacement of the valves. This review of the surveillance test history shows no evidence of time based failure mechanisms or common mode failures associated with the EFCVs.

A proposed alternative to testing during the refueling outage is to test certain EFCVs immediately preceding the refueling outage while the reactor is at power and with the appropriate administrative and scheduling controls instituted. This alternative provides the appropriate conditions for testing (reactor pressure > 500 psig) while also providing an acceptable level of quality and safety. Performance of the EFCV testing prior to the outage will be scheduled such that, in the event of a failure, the resulting action statement and limiting condition of operation will encompass the planned shutdown for the refueling outage. Using this strategy, unplanned, unnecessary plant shutdowns as a result of EFCV testing will be avoided.

In summary, considering the extremely low failure rate, personnel and plant safety concerns, and the hardship of testing during refueling outages, EFCV testing at a frequency greater than once per operating cycle and exclusively during refueling outages is impractical and results in a hardship without a compensating increase in the level of safety.

2.2 Alternative Testing

The licensee's submittal proposes:

> Functional testing with verification that flow is checked will be performed at least once per 18 months per Technical Specification 4.6.3.4, immediately preceding a planned Refueling Outage and with the appropriate administrative and scheduling controls established.

2.3 Evaluation

The EFCVs for which the licensee requests relief are installed in the instrument lines for primary containment isolation. The valves are normally open to provide safety-related instrumentation, indications and control functions. The valves automatically close on rising flow (2-3 gpm) to isolate the instrument line from the reactor vessel in the event of an instrument line break. The

lines are sized and orificed such that off-site doses will be substantially below 10 CFR 100 limits in the event of a rupture and failure of the EFCV to close.

The Code, OM-10 paragraphs 4.3.2.1, 4.3.2.2(a), and 4.3.2.2(e) requires that the valves be exercised quarterly during plant operation, or if valve exercising during plant operation is not practical, testing may be limited to full-stroke during refueling outages. Rather than testing the EFCVs quarterly or during refueling outages, the licensee proposes to perform functional testing at least once every 18 months per Technical Specification 4.6.3.4. The testing would immediately precede a planned refueling outage and would be conducted with the appropriate administrative and scheduling controls established. The licensee would perform testing to verify valve closure by venting the instrument side of the valve while the inlet side of the valve is subject to reactor pressure. Scheduling the tests immediately prior to the refueling outage ensures that, in the event of a failure, the resulting action statement and limiting condition of operation encompasses the planned shutdown for the refueling outage and precludes unplanned and unnecessary shutdowns.

The licensee states that it is a hardship to test the EFCVs quarterly in accordance with the Code because: (1) testing requires removal of associated instruments from service which may cause spurious signals that challenge safety systems, and (2) the resulting contaminated process liquid requires special measures to collect and contributes to an increase in personnel radiation exposure.

The licensee also states that testing all the valves during refueling outages is a hardship because of the large number of valves and the test condition that reactor pressure be greater than 500 psig. Also, extending the hydrostatic test to test all the EFCVs could require depressurization of the vessel several times to avoid exceeding the maximum bulk coolant temperature limit. This could thermally cycle the vessel and challenge the operators.

The licensee reviewed the performance experience of the EFCVs and concludes that the valves have been highly reliable over the life of the plant. The review of the surveillance test history shows no evidence of time-based failure mechanisms or common mode failures associated with the EFCVs.

In considering the reliability record of the EFCVs, the flow restrictive outlet of the instrument lines outside of containment, the hardship of testing a large number of EFCVs quarterly during plant operation or during refueling outages, the staff determines that the proposed alternative provides an adequate means to verify the operational readiness of the EFCVs. Compliance with the specified Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

3.0 CONCLUSION

The proposed alternative to the requirements of OM-10 paragraph 4.3.2.1 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the remainder of the second 10-year interval. Compliance with the specified Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

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