

April 11, 2001

Mr. Robert G. Byram
Senior Vice President
and Chief Nuclear Officer
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2 North Ninth Street
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SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 - RELIEF
REQUESTS FOR EXCESS FLOW CHECK VALVES IN THE PUMP AND VALVE
INSERVICE TESTING PROGRAM (TAC NOS. MB0424 AND MB0426)

Dear Mr. Byram:

By letter dated October 4, 2000, PPL Susquehanna, LLC (the licensee), submitted revisions to Refueling Outage Test Justifications 1RJ20 and 2RJ20 and Relief Requests 1RR23 and 2RR23 for the second 10-year interval inservice testing program for pumps and valves for the Susquehanna Steam Electric Station, Units 1 and 2. By letters dated March 12, April 2, and April 5, 2001, the licensee revised the request to delete 1RJ20 and 2RJ20 and revise 1RR23 and 2RR23. The NRC staff has reviewed the proposed alternative testing interval contained in the relief requests against the requirements of the 1989 edition of the American Society of Mechanical Engineers' Boiler and Pressure Vessel Code pursuant to Section 50.55a of Part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR 50.55a). The associated technical specification amendment requests are being reviewed separately under TAC Nos. MB0425 and MB0427.

The proposed alternatives to the Code requirements described in 1RR23 and 2RR23 are authorized for the remainder of the current operating license term pursuant to 10 CFR 50.55a(a)(3)(i) based on the alternatives providing an acceptable level of quality and safety.

A copy of the staff's safety evaluation is enclosed.

Sincerely,

/RA/

Maitri Banerjee, Acting Chief, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF FROM ASME CODE, SECTION XI, REQUIREMENTS

FOR EXCESS FLOW CHECK VALVES

PPL SUSQUEHANNA, LLC

SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2

DOCKET NOS. 50-387 AND 50-388

1.0 INTRODUCTION

Section 50.55a of Part 50 of Title 10 of 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; or (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 that 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 October 4, 2000, PPL Susquehanna, LLC, the licensee for the Susquehanna Steam Electric Station (SSES), Units 1 and 2, submitted revisions to Refueling Outage Test Justifications 1RJ20 and 2RJ20, and revisions to Relief Requests 1RR23 and

Enclosure

2RR23 related to the inservice testing program requirements for the excess flow check valves (EFCVs). By supplemental letter dated April 2, 2001, the licensee revised the request to delete 1RJ20 and 2RJ20 and revise 1RR23 and 2 RR23. Relief request 1RR23 is for Unit 1 and the affected valves are listed in the 1RR23 table provided in the licensee's April 2, 2001, letter. Relief request 2RR23 is for Unit 2 and the affected valves are listed in the 2RR23 table provided in the licensee's April 2, 2001, letter. The NRC's findings with respect to authorizing the alternative proposed in the relief requests are given below.

2.0 EVALUATION

The licensee requests relief from the position indication verification frequency and exercise frequency requirements of the Code (OM-10, paragraphs 4.1 and 4.3.2, respectively) for the EFCVs. The licensee proposes that proper operation of the valves and position indication be demonstrated during technical specification (TS) operability testing.

2.1 Background

EFCVs are provided in each instrument process line at SSES Units 1 and 2 that is part of the reactor coolant pressure boundary. The EFCVs are designed so that they will not close accidentally during normal operation and will close if a rupture of the instrument line occurs downstream of the valve. Each EFCV has its position indicated in the control room.

As detailed in Sections 6.2.4.3.5 and 15.6.2 of the SSES Units 1 and 2 Updated Final Safety Analysis Report (UFSAR), the licensee has incorporated into the design of each source line containing an EFCV the equivalent of a 0.375-inch restricting orifice. This was typically accomplished by installation of an orifice in the sensing line. If an EFCV fails to close, the restriction in the associated source line limits leakage to a level where the integrity and functional performance of secondary containment and associated safety systems are maintained. The coolant loss is well within the capabilities of the reactor coolant make-up system, and the potential offsite exposure is substantially below the guidelines of 10 CFR Part 100.

Additionally, the UFSAR indicates that the design and installation of the EFCVs at SSES Units 1 and 2 follow the guidance of Regulatory Guide 1.11.

2.2 Licensee's Basis for Requesting Relief

The licensee states:

The excess flow check valve is a simple device; the major components are a poppet and spring. The spring holds the poppet open under static conditions. The valve will close upon sufficient differential pressure across the poppet. Functional testing of the valve is accomplished by venting the instrument side of the tube. The resultant increase in flow imposes a differential pressure across the poppet, which compresses the spring and decreases flow through the valve. Functional testing is required by Technical Specification SR [surveillance requirement] 3.6.1.3.9. Systems design does not include test taps upstream of the Excess Flow Check Valves. For this reason, the EFCV's cannot be isolated and tested using a pressure source other than reactor pressure.

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 of any of these instruments from service may cause a spurious signal which could result in a plant trip or an unnecessary challenge to safety systems. Additionally, process liquid will be contaminated to some degree, requiring special measures to collect flow from the vented instrument side and also will contribute to an increase in personnel radiation exposure.

Industry experience as documented in NEDO-32977-A indicates that EFCVs have a very low failure rate. At Susquehanna the SR failure rate has been approximately 1%. Only half of these SR failures have resulted in replacement of the EFCV. The Susquehanna test history shows no evidence of common mode failure. This Susquehanna test experience is consistent with the findings of the NEDO. The NEDO indicates similarly that many reported test failures at other plants were related to test methodologies and not actual EFCV failures. Thus, the EFCVs at Susquehanna, consistent with the industry, have exhibited a high degree of reliability, availability, and provide an acceptable level of quality and safety.

Therefore, PPL Susquehanna LLC requests relief pursuant to 10CFR50.55a(a)(3)(i) to test excess flow check valves at the frequency specified in the Susquehanna Technical Specifications Surveillance Requirements (SR) 3.6.1.3.9. As discussed in the Technical Specification Bases for this SR, this test provides assurance that each valve actuates to check flow on a simulated instrument line break.

2.3 Alternative Testing

The licensee proposes:

Functional testing with verification that flow is checked will be performed per TS 3.6.1.3.9, either immediately preceding a planned Refueling Outage or during the Refueling Outage. For those valves tested prior to the Refueling Outage appropriate administrative and scheduling controls will be established.

SR 3.6.1.3.9 allows a "representative sample" of EFCVs to be tested every 24 months, such that each EFCV will be tested at least once every 10 years (nominal).

The remote position indication will be verified in the closed direction at the same frequency as the exercise test, which will be performed at the frequency prescribed in Technical Specification Surveillance Requirement 3.6.1.3.9. After the close position test, the valves will be reset, and the remote open position indication will be verified. Although inadvertent actuation of an EFCV during operation is highly unlikely due to the spring-poppet design, Susquehanna verifies by surveillance procedure that the EFCVs indicate open in the control room at a frequency greater than once every 2 years.

To address the staff's concerns regarding the estimated EFCV failure rate, the licensee committed to the following corrective actions:

1. Should a test failure occur, PPL will test an additional representative sample.

2. Should a test failure occur in the additional representative sample, PPL will test all remaining representative valves.
3. For each test failure, PPL will re-test the affected valve during the subsequent test interval. This test will be in addition to the number of tests required to be performed during that interval.

The licensee defined "test failure" as failure of the valve to check flow during the as-found test.

2.4 Evaluation

OM-10, paragraph 4.1, requires that remote position indicators be observed locally at least once every 2 years to verify that valve operation is accurately indicated. OM-10, paragraph 4.3.2 requires that check valves be exercised every 3 months to verify that they fulfill their safety function. The licensee proposes to demonstrate the proper operation of each valve and its position indicator during the TS-required operability testing.

In its October 4, 2000, letter, as supplemented by its March 12, April 2, and April 5, 2001, letters, the licensee requested a change to the frequency of the TS-required operability testing from testing all EFCVs every 24 months to testing a representative sample (approximately 20-percent) of the EFCVs every 24 months such that all EFCVs are tested at least once every 10 years. In order to fully implement this TS change, the licensee also requested relief from the associated Code requirements for exercising these valves and locally observing the operation of the remote position indicators.

In evaluating the TS change, the NRC staff concluded that the impact of the increase in EFCV surveillance test intervals to 10 years would result in an increase in the release frequency of about $2.02E-04$ /year from the current release frequency estimate (for a 24-month surveillance test interval) of about $5.07E-05$ /year. The NRC staff considered this estimate to be sufficiently low when considered in conjunction with the corrective actions committed to by the licensee, especially since such an accident is unlikely to lead to core damage. The staff also concluded that the consequences of the steam release from the postulated event is bounded by an existing FSAR analysis. Based on the acceptability of the methods applied to estimate the release frequency, a relatively low release frequency estimate in conjunction with corrective action commitments and the unlikely impact on core damage, and the negligible consequences of a release in the reactor building, the NRC staff concluded that the increase in risk associated with the licensee's request for relaxation of EFCV surveillance testing is sufficiently low and acceptable. Furthermore, the NRC staff concluded that the alternative testing, in conjunction with the corrective action plan, provides a high degree of valve reliability and operability.

The intent of both the TS surveillance requirement and the Code requirement for exercising the EFCVs is to ensure that there is reasonable assurance that the EFCVs will perform their design function if they are called upon. In its evaluation of the TS change, the NRC staff has concluded that testing at the revised frequency will continue to provide this assurance. Therefore, the licensee's proposed alternative in the relief request will continue to provide an acceptable level of quality and safety and the relief is authorized.

3.0 CONCLUSION

The licensee's proposed alternative to the valve position indicator verification frequency requirement of OM-10, paragraph 4.1, and the exercise frequency requirement of OM-10, paragraph 4.3.2, for the EFCVs is authorized for the remainder of the current operating license term pursuant to 10 CFR 50.55a(a)(3)(i) based on the alternative providing an acceptable level of quality and safety.

Principal Contributor: R. Schaaf

Date: April 11, 2001

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