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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION SUPPORTING

AN EXEMPTION FROM 10 CFR PART 50, APPENDIX J REQUIREMENTS FOR

CONTAINMENT LEAK RATE TESTING

PHILADELPHIA ELECTRIC COMPANY
PUBLIC SERVICE ELECTRIC AND GAS COMPANY
DELMARVA POWER AND LIGHT COMPANY
ATLANTIC CITY ELECTRIC COMPANY

PEACH BOTTOM ATOMIC POWER STATION, UNIT NOS. 2 AND 3

DOCKET NOS. 50-277 AND 50-278

1.0 INTRODUCTION

On May 15, 1981, Philadelphia Electric Company submitted a request for exemption from certain 10 CFR Part 50, Appendix J requirements for primary reactor containment leakage testing. On August 19, 1987, the NRC requested that the submittal be revised to specifically address the exemption criteria stated in 10 CFR 50.12 which was amended subsequent to the filing of the initial request.

By letters dated April 21 and June 23, 1988, the licensee submitted revised requests for exemption from certain requirements of 10 CFR Part 50, Appendix J. The staff has reviewed the licensee's submittals, and the results of our evaluation are presented below.

2.0 EVALUATION

2.1 Main Steam Isolation Valves

The licensee requested exemptions from the requirements of Appendix J, Sections II.H.4, III.C.2 and III.C.3 for local leakage rate testing of the main steam isolation valves (MSIVs). Sections II.H.4 and III.C.2 require leak rate testing of the MSIVs at the peak calculated containment pressure related to the design basis accident. Section III.C.3 requires that the measured leakage be included in the summation of the local leak rate test (LLRT) results. The licensee requested that leak testing of the MSIVs be conducted at reduced pressure and that measured leakage be excluded from the combined LLRT results.

Each main steam line is provided with two globe type MSIVs that are angled in order to afford better sealing in the direction of the post-accident pressure. The orientation of the inboard MSIV is such that testing the valve in the reverse direction tends to unseat the valve disc. Testing of the inboard and

outboard MSIVs by pressurizing the volume between the valves at full test pressure would lift the disc of the inboard valve, resulting in a meaningless test. The licensee proposed to test the MSIVs by pressurizing the space between the MSIVs at about one-half of the peak post-accident pressure (25 psig) to avoid lifting the disc of the inboard valve. This approach ensures a satisfactory test of the outboard MSIV in the same direction as under LOCA conditions to confirm that the leak rate is within the maximum pathway leakage limit. Therefore, the staff finds the licensee proposed test pressure to be acceptable. It is noted that the staff has previously approved testing of the MSIVs at reduced pressure for other BWR plants.

The measured leakage rate for any one main steam line through the MSIVs is limited to a maximum pathway leakage of 11.5 standard cubic feet per hour (SCFH) as specified in the Technical Specifications (TS). As stated above, the MSIVs in some boiling water reactor (BWR) plants are angled in the main steam lines in order to afford better sealing in the direction of accident pressure. This condition was considered when the test pressure of 25 psig was initially established for the MSIVs of many BWRs. Subsequently, industry experience in testing these valves at a pressure of 25 psig and with an acceptance criterion of 11.5 SCFH has been shown to be effective in determining the condition of these valves.

Based on the above considerations, the proposed Appendix J exemption that leak testing of the MSIVs be conducted at reduced pressure is acceptable. Staff review of the exclusion of measured main steam isolation valve leakage rates from the combined LLRT limit of 0.60 La is continuing and will be handled as a separate licensing issue.

2.2 Traversing In-Core Probe System Shear Valves

The licensee requested an exemption from the requirements of Appendix J, Sections II.H.1 and III.C for Type C testing on the Traversing In-Core Probe (TIP) system shear valves. The licensee proposed to exclude the TIP shear valves from Type C testing requirements.

Each of the five TIP guide tubes is equipped with two isolation valves, a ball valve that provides the primary means of containment isolation, and a shear valve that cuts the cable and isolates the guide tube in the event that isolation is required and the drive cable can not be withdrawn. The shear valve is an explosive-type valve, direct current-operated, with monitoring of each actuating circuit provided. The ball valve is Type C tested in accordance with Appendix J. It is impractical to test the shear valves since they require testing to destruction. In lieu of leak testing and ultimate destruction of the shear valves, the licensee committed to the following actions to ensure the shear valves will perform their intended function:

(1) Verification of the continuity of the explosive charge circuit which is monitored by an alarm in the control room.

(2) Initiation of one explosive squib charge at least once per operating cycle. The replacement charge for the explosive valve shall be from the same manufactured batch as the one fired or from another batch that has been certified by having one of that batch successfully fired.

(3) Replacement of all explosive charges in accordance with the manufacturer's recommended lifetime.

Based on the above justification, the staff finds that the proposed exemption for the shear valves from Type C testing will not increase radioactive leakage from the penetration because the valves will be used only when the TIP cable fails to withdraw or the ball valve fails to close. Further, the functional capability of the TIP shear valve will be periodically checked as described above. Therefore, the proposed exemption from Appendix J Type C testing for the TIP shear valves is acceptable.

2.3 Containment Isolation Valves for Torus Piping Penetrations

(1) The licensee requested an exemption from the requirements of Appendix J, Sections II.H.4 and III.C for Type C testing of the containment isolation valves associated with the following penetrations on the basis that these lines terminate below the minimum suppression pool water level:

Penetration No.	System Description	Valve No.
210A,B	RHR Test & Pool Cooling Return	10-19A,B,C,D
216	HPCI Min. Flow	23-62
224	Core Spray Test Line, Unit 2	MO-14-26A 14-66A,C (3) MK-223
226A-D	RHR Pump Suction	MO-10-13A-D RV-10-72A-D
228A-D	Core Spray Pump Suction	MO-14-7A-D
229	Core Spray Pump Min. Flow, Unit 2	14-66B,D (2) MK-223
230	RCIC Pump Min. Flow	13-29
234	Core Spray Test Line, Unit 2	MO-14-26B (2) MK-223
234A	Core Spray Test Line, Unit 3	MO-14-26B (3) MK-223
234B	Core Spray Test Line, Unit 3	MO-14-26A (2) MK-223
236A	Core Spray Pump Min. Flow, Unit 3	14-66B,D
236B	Core Spray Pump Min. Flow, Unit 3	14-66A,C (2) MK-233

Since the lines listed above terminate below the minimum suppression pool water level, they do not constitute a potential atmospheric leak pathway. Consequently, Type C testing is not required, and no Appendix J exemption is required. The staff notes, however, that applicable test requirements specified in ASME Code, Section XI need to be followed.

(2) The licensee requested an exemption from the requirements of Appendix J for testing certain small manually operated globe valves that serve as either vent, drain or sample element root valves. These valves are located between the torus penetrations and the first containment isolation

valves. The licensee stated that these valves are not containment isolation valves and are currently not Type C tested, but are a part of the containment isolation boundary. In lieu of Type C testing, the licensee proposed the following alternatives:

(a) The valves are located on lines which discharge below the minimum torus water level and will be water filled after an accident, which would prevent the release of gaseous fission products.
(b) The integrity of these systems is assured by the leakage reduction and maintenance program developed in response to the requirements of NUREG-0737, Item III.D.1.1.
(c) Any leakage out of these systems which occurs outside primary containment will be into the reactor building (secondary containment) which facilitates collection and treatment.

The staff notes that Appendix J does not specifically address leak testing of vent, drain and sample root valves provided on fluid systems to facilitate system maintenance operations. The staff finds these valves need not be Type C tested because they are located on lines which terminate below the minimum suppression pool water level, and thus do not constitute a potential atmospheric leak pathway. Consequently, Type C testing is not required, and no Appendix J exemption is required.

2.4 Containment Isolation Valve Testing In The Reverse Direction:

(1) The licensee requested an exemption from the requirements of Appendix J, Section III.C.1 to allow Type C testing of the following containment isolation valves in the reverse direction:

Penetration No.	System Description	Valve No.
10	Steam to RCIC Turbine	MO-13-15
11	Steam to HPCI Turbine	MO-23-15
12	RHR Shutdown Cooling Suction	MO-10-18
14	RWCU Pump Suction	MO-12-15 (Unit 2)
212,214	HPCI & RCIC Turbine Exhaust	MO-4244, 4244A (Unit 2)
217B	HPCI & RCIC Turbine Exhaust	MO-5244,5244A (Unit 3)
233	HPCI Test Line	MO-23-31 (Unit 2)
235	HPCI Test Line	MO-23-31 (Unit 3)

Appendix J, Section III.C.1 states that the test pressure shall be applied in the same direction as that when the valve would be required to perform its safety function, unless it can be shown that applying the test pressure in a different direction will yield equivalent or more conservative results. The licensee's basis for the requested exemption is that normal force between the seat and the disc generated by the stem force alone is greater than ten times the post-accident normal force induced by peak containment differential pressure, Pa (49.1 psig). Therefore, it is unlikely that the 49.1 psig test pressure will lift the valve disc off its seat during the LLRT due to the magnitude of the thrust generated. The sealing capabilities are essentially equivalent regardless of the direction in which the test pressure is applied.

Since the licensee has justified that equivalent leakage measurements will result from applying the test pressure in either direction, the staff finds the reverse direction testing for these valves acceptable, as permitted by Appendix J, and therefore, no Appendix J exemption is required.

(2) The licensee requested an exemption from the requirements of Appendix J, Section III.C.1 to allow testing of the following containment isolation gate valves in the reverse direction: valves MO-10-31 A,B (RHR Containment Spray); MO-14-70, MO-13-41 (RCIC & Torus Water Cleanup Suction); and MO-23-58 (HPCI Pump Suction).

The licensee's basis for the exemption request for MO-14-70, MO-13-41, and MO-23-58 is that a reverse flow test would equally demonstrate the valves sealing capabilities as the forward flow test, and further these valves will remain water filled following design basis accidents. Since the associated lines will be water filled following an accident, the valves do not constitute a potential atmospheric leak pathway.

Consequently, Appendix J does not require Type C testing of these valves, and therefore, no Appendix J exemption is required.

With respect to Penetration No. [illegible]. B for valves MO-10-31A/B, the licensee concluded that reverse [illegible]sting would provide equivalent results to a flow test in the accid[illegible]tion. Consequently, Section III.C.1 of Appendix J appears to be sati[illegible]ed, and no exemption appears necessary. In its April 21 and June 23, 1988 submittals, the licensee did not provide the bases to support its conclusion on valves MO-10-31A/B, and thus staff review was not performed. The licensee's supporting evaluation should be retained in accordance with facility recordkeeping requirements and available for future staff audits.

(3) The licensee requested an exemption from the requirements of Appendix J, Section III.C.1 to test the containment isolation gate valve MO-2-74 (Main Steam Drain) in the reverse direction.

The unique design of this double disc parallel wedge assembly gate valve permits sufficient thrust to be transmitted to each disc to maintain low pressure sealing. This valve can seal against an operating differential pressure of 1100 psig which is more than twenty times the Appendix J test pressure of 49.1 psig. As the differential pressure across the disc increases, the seating load also increases resulting in a tighter seal throughout the entire range of operating differential pressures. Thus, the staff finds testing in the reverse flow direction acceptable, since reverse direction testing will provide equivalent test results to that from forward flow testing, and therefore, no Appendix J exemption is required.

(4) The licensee requested an exemption from the requirements of Appendix J, Section III.C.1 to test the following containment isolation globe valves in the reverse direction: valves MK-130 (ILRT Test Connection) in penetrations 32C,D and 218C. These valves are oriented such that the leakage test

pressure is applied in the reverse direction and tends to push the valve disc into the valve seat. The valve manufacturer stated that the test pressure applied at 50 psig either over or under the disc of the valve will yield equivalent leakage results.

Based on the information supplied by the vendor, the staff finds testing these valves in the reverse direction acceptable, and therefore, no Appendix J exemption is required.

2.5 Control Rod Drive Hydraulic Control Units

The licensee requested an exemption from the requirements of Appendix J, Sections II.H.4 and III.C for Type C testing of individual isolation valves in the control rod drive (CRD) insert and withdrawal lines to the CRD hydraulic units.

The insert and withdrawal lines to the CRD hydraulic units are of small size and terminate in a system outside containment designed to prevent out-leakage thus resulting in a closed system. Leakage is tested during Type A testing and reactor vessel hydrostatic testing. Inside containment, the lines penetrate the reactor vessel through the reactor pressure vessel bottom head. The insert and withdrawal lines are constantly water covered and under water pressure from reactor vessel liquid level at reactor vessel pressure. Consequently, these lines provide a continuous water seal and do not constitute a potential atmospheric leak pathway and Appendix J does not require Type C testing of the associated isolation valves. No Appendix J exemption is required.

2.6 Breathing Air System

The licensee requested an exemption from the requirements of Appendix J, Section III.C.1 to allow Type C testing of the breathing air system gate valve, HV-3-36E-33043 (in penetration 102B for Unit 3), in the reverse direction.

The 3-inch line in Unit 3 is used to supply breathing air to the drywell during an outage. The valve is designed such that the normal force between the seat and the disc generated by stem force alone is greater than ten times the normal force induced by the test differential pressure of 49.1 psig. Therefore, the sealing capabilities are essentially equivalent regardless of the direction the test pressure is applied.

The staff finds that reverse direction testing is acceptable since it conforms with Appendix J, Section III.C.1, and therefore, no exemption from Appendix J is required.

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Pricipal Contributors:

J. Guo
G. Suh