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New York Power Authority

William J. Cahill, Jr.
Chief Nuclear Officer

January 12, 1996
JPN-96-002

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
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Washington, D.C. 20555

SUBJECT: James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
10CFR 50 Appendix J Exemption Request
Local Leak Rate Testing of
Containment Isolation Valves in the Reverse Direction

References:

1. IE Information Notice No. 86-16, "Failures to Identify Containment Leakage Due to Inadequate Local Testing of BWR Vacuum Relief System Valves", dated March 11, 1986.

2. NYPA letter, H. P. Salmon, Jr. to the NRC (JAFP-94-0453), Transmittal of LER-92-008-02, "PCIV Stem Packing not Subjected to LLRT", dated September 14, 1994.

Dear Sir:

In accordance with the provisions of 10 CFR 50.12, the Authority requests an exemption from the requirements of Section III.C.1 of Appendix J to 10 CFR 50 for 17 containment isolation valves to the extent that periodic reverse direction testing of these valves does not expose potential atmospheric leakage paths (e.g., valve stem packing) to test pressure during Local Leak Rate Test (LLRT). Reverse direction testing is required due to the inability to isolate the valves from containment and the lack of test connections. These valves are reverse direction tested in accordance with FitzPatrick Technical Specifications Table 4.7-2, "Exception to Type C Tests".

This exemption will not present an undue risk to the health and safety of the public, and is justifiable under the special circumstances present. Attachment 1 provides the basis for this exemption.

Section III.C.1 (Test Methods) of Appendix J requires that (LLRT) pressure be applied in the same direction as that which would exist when the valve would be required to perform its safety function, unless it can be determined that the results from the tests for a pressure applied in a different direction will provide equivalent or more conservative results. For the 10 globe and seven butterfly valves, LLRT in the reverse direction provides equivalent or more conservative results than testing in the accident direction, with respect to seat leakage.

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For the globe valves, the test pressurization is under the seat, which tends to unseat the valve. For the butterfly valves, measured leakage is independent of the direction of test pressure. However, reverse direction testing during LLRT for these 17 valves does not expose potential atmospheric leakage paths (e.g., valve stem packing) to test pressure. The LLRT method of applying test pressure in the reverse direction cannot be quantitatively determined to yield results that will provide equivalent or more conservative results to testing in the accident direction. However, the Authority is committing to perform a soap bubble test on the potential atmospheric leakage paths of these 17 containment isolation valves during regularly scheduled Integrated Leak Rate Test (ILRT), utilizing the acceptance criteria of zero bubbles. LLRT will be performed, as a post work test, following work activities that affect the potential atmospheric leakage paths on any of the 17 valves. An ILRT will then be performed on the subject valve(s) at regularly scheduled ILRT intervals. The requested exemption will make it clear that the Appendix J exceptions in Technical Specification Table 4-7.2 include valve seat leakage as well as other potential leakage paths.

Modifications to allow testing in the accident direction or to quantitatively determine leakage have been considered but would incur an undue cost without a commensurate improvement in safety. This exemption request is being submitted in lieu of the modifications that would have allowed accident direction testing that the Authority committed to in LER-92-008-02 (Reference 2).

NRC approval of the proposed exemption is requested by April 15, 1996 to facilitate outage design activities, and planning and scheduling for the upcoming Refuel 12/Cycle 13 refueling outage.

Attachment 2 summarizes the commitments made by the Authority in this letter. If you have any questions, please contact Mr. A. Zaremba.

Very Truly Yours,

William J Cahill, Jr.
Chief Nuclear Officer

STATE OF NEW YORK
COUNTY OF WESTCHESTER
Subscribed and sworn to before me
this 12 day of January, 1996.

Geraldine Strand
Notary Public

GERALDINE STRAND
Notary Public, State of New York
No. 4991272
Qualified in Westchester County
Commission Expires Jan. 27, 1996

Attachments: As stated

cc: Regional Administrator
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ATTACHMENT 1 TO JPN-96-002

New York Power Authority
JAMES A. FITZPATRICK NUCLEAR POWER PLANT

10CFR 50 Appendix J Exemption Request
Local Leak Rate Testing of
Containment Isolation Valves in the Reverse Direction

Background

During the evaluation conducted for IE Information Notice 86-16 (Reference 1), the Authority identified seven Fisher Series 9200 butterfly valves where the LLRT method of applying test pressure in the reverse direction cannot be quantitatively determined to yield results that will provide equivalent or more conservative results than testing in the accident direction. For these valves, reverse direction testing does not expose potential leakage paths to atmosphere (e.g., valve stem packing) during LLRT. The current configuration of these valves does not allow LLRT to be performed in the accident direction.

Following the Reference 1 evaluation, the Authority reported (Reference 2) that the valve stem packing leakage characteristics of two out of the seven butterfly valves (27AOV-113 and 27AOV-117) may have changed without an adequate LLRT following a maintenance activity. Since that time, the Authority has identified an additional 10 globe valves, for a total of 17 containment isolation valves, where surveillance testing would not test potential leakage paths to atmosphere. Testing of these 17 valves in the reverse direction is performed in accordance with FitzPatrick Technical Specifications Table 4.7-2, "Exception to Type C Tests".

The Authority committed in Reference 2 to test the valve stem packing on 27AOV-113 and 27AOV-117 during the 1994 refueling outage Integrated Leakage Rate Test (ILRT). The Authority tested the valve stem packing on these 17 valves during this ILRT, and verified that the packing glands were insignificant contributors to the overall integrated leakage rate. The Authority also committed (Reference 2) to schedule a modification of the valve stem packing arrangement for the seven Fisher Series 9200 butterfly valves listed in Table 1 (Page 6 of 9), to allow an adequate LLRT during the Refuel 12/Cycle 13 refueling outage.

The Authority has considered modifications that would allow testing in the accident direction or allow potential leakage to be quantitatively determined. The addition of block valves and test connections to allow accident direction testing would increase design complexity, provide additional potential leakage pathways, and increase loading on piping penetrating primary containment. Valve stem packing modifications to allow potential leakage to atmosphere to be quantitatively determined would increase design complexity, and provide additional potential leakage pathways. For these reasons, compliance with Section III.C.1 (Test Methods) of Appendix J for these 17 valves would incur an undue cost without a commensurate improvement in safety.

Exemption Request

10 CFR 50 Appendix J, Section III.C.1 states, in part:

> "*Test method*. Type C tests shall be performed by local pressurization. The 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 determined that the results from the tests for a pressure applied in a different direction will provide equivalent or more conservative results..."

In accordance with 10 CFR 50.12(a)(2)(ii), the New York Power Authority requests an exemption from the requirements of 10 CFR 50 Appendix J, Section III.C.1. (Test Methods) for 17 primary containment isolation valves.

Discussion

The Authority is requesting an exemption for the 17 valves (7 butterfly and 10 globe valves) listed in Table 1. These valves are not testable in the accident direction due to the inability to isolate the valves from containment and the lack of test connections. Testing of these valves in the reverse direction is performed in accordance with FitzPatrick Technical Specifications Table 4.7-2, "Exception to Type C Tests".

LLRT in the reverse direction for the 10 globe and seven butterfly valves listed in Table 1 provides equivalent or more conservative results than testing in the accident direction, with respect to seat leakage. With respect to the globe valves, the test pressurization is under the seat, which tends to unseat the valve. With respect to the butterfly valves, measured leakage is independent of the direction of test pressure from both a force exerted and seating surface standpoint.

Reverse direction testing of these 17 valves does not expose potential atmospheric leakage paths (e.g., valve stem packing) to test pressure during LLRT. The LLRT method of applying test pressure in the reverse direction cannot be quantitatively determined to yield results that will provide equivalent or more conservative results to testing in the accident direction.

However, the Authority believes that LLRT in the reverse direction is acceptable for these valves, and does not yield significantly different results than what would be expected in the accident direction. The following justification is provided:

1. Testing of these 17 valves (Listed in Table 1) during the 1995 Integrated Leakage Rate Test (ILRT) verified that the packing glands were insignificant contributors to the overall integrated leakage rate. The 1995 as-left ILRT leakage rate was 0.0629% Weight/Day, which is well below the Technical Specification acceptance criteria of 0.5% Weight/Day.

2. Adding the results of the 1995 As-Left Type A, B, and C tests together (Approximately 2188 SCFD) results in a leakage total well below $0.6L_d$ (3216 SCFD). This very conservatively shows that significant margin exists to exceeding Technical Specification or Appendix J limits.

3. Review of past ILRT results indicates that the 17 valves have not been the cause of an ILRT failure. Based on a review of the maintenance history for each valve, recurring packing or body to bonnet leaks are not expected.

4. The valve stem packing and body to bonnet gaskets are resilient materials designed to conform to sealing surfaces. The valves are installed in systems which are not normally subjected to design flows, temperatures, or pressures. During normal operation, the valve stem packing and body to bonnet gaskets are exposed to the primary containment atmosphere, which has a low oxygen content. Based on this, the degradation of the valve stem packing or body to bonnet gaskets due to continuous exposure to a harsh environment is not a concern.

5. Modifications have been considered that would allow testing in the accident direction or allow potential leakage to atmosphere to be quantitatively determined. The addition of block valves and test connections to allow accident direction testing would increase design complexity, provide additional potential leakage pathways, and increase loading on piping penetrating primary containment. Valve stem packing modifications to allow potential leakage to be quantitatively determined would increase design complexity, and provide additional potential leakage pathways. For these reasons, compliance with Appendix J would incur an undue cost without a commensurate improvement in safety.

6. From a risk perspective evaluation, the elimination of modifications that would allow testing in the accident direction or allow potential leakage to atmosphere to be quantitatively determined, can be justified using the technical bases provided for NUREG-1493 (Reference 3). Past studies that consistently show that design basis containment leakage is a relatively minor contributor to accident risk were used as an input to these technical bases. Plant risk is dominated by low probability, high consequence accident scenarios in which containment fails (structurally) or is bypassed with a predicted high probability for BWRs. FitzPatrick IPE results are consistent with these past technical studies (See Table 2 on Page 8 of 9).

   Certain NRC sponsored studies (e.g., at Peach Bottom) indicate that overall plant risk is not sensitive to changes in containment leak rates. From Table 3 (Page 8 of 9) the incremental risk from leakage in the range of 1% to 10% per day is small. FitzPatrick and Peach Bottom are both BWR 4 plants with MARK I containments. Therefore, similar results for FitzPatrick are expected.

   Based on the above, a potential increase in valve stem packing or body to bonnet leakage can be considered inconsequential.

The factors described above provide justification that potential leakage paths to atmosphere for these 17 valves is inconsequential. However, the Authority recognizes that additional actions are necessary to justify an exemption from the "equivalent or more conservative" results requirement of Appendix J. The Authority proposes that a soap bubble test be performed on the pressurized stem/bonnet boundaries of the 17 valves during regularly scheduled ILRT. To provide a direct indication of the leak-tightness of the packing and body to bonnet, the Authority will use the acceptance criteria of zero bubbles for this test. LLRT will be performed, as a post work test, following work activities that affect the potential atmospheric leakage paths on any of the 17 valves. An ILRT will then be performed on the subject valve(s) at regularly scheduled ILRT intervals.

10 CFR 50.12 Analysis

The Authority concludes that the exemption from the requirements of 10 CFR 50, Appendix J, are justified pursuant to 10 CFR 50.12, Sections (a)(1), (a)(2)(ii), (a)(2)(iii), and (a)(2)(v) in that:

- The exemption will not present an undue risk to the public health and safety.

  The proposed exemption does not change, modify, or restrict existing plant safety limits, safety settings, or operations. The exemption does not impact the design basis of containment or significantly modify its response during a design basis accident. The results of LLRT in the reverse direction for these 17 valves provides equivalent or more conservative seat leakage results than testing in the accident direction. From a risk perspective, a potential increase in valve stem packing or body to bonnet leakage will be insignificant. Past ILRT results, and industry experience indicate that valve stem packing or body to bonnet leakage is inconsequential. Therefore, this exemption will not present an undue risk to the public health and safety.

- Application of the regulation in the particular circumstance is not necessary to achieve the underlying purpose of the rule.

  The information associated with LLRT in the reverse direction for these valves demonstrates generally equivalent or more conservative results compared to Appendix J requirements. There is sufficient plant maintenance history to conclude that differences in testing these valves in the accident direction versus reverse direction are not significant, and provides confidence that leakage rates are within Technical Specification limits. Past studies show that a potential increase in valve stem packing or body to bonnet leakage can be considered inconsequential. Thus, the underlying purpose of Appendix J, which is to limit leakage from primary reactor containment through systems and components penetrating primary reactor containment so that allowable leakage rate values, as specified in the Technical Specifications or associated bases are not exceeded, has been met.

  The NRC has evaluated and granted similar exemption requests and had concluded that exemption from the "equivalent or more conservative results" requirement of Appendix J is justified.

- Compliance would result in costs that are significantly in excess of those contemplated when the regulation was adopted.

  An exemption, per Technical Specification Table 4.7-2, allows LLRT in the reverse direction for the 17 valves. The Authority has recently evaluated this testing methodology and determined that reverse direction testing would not identify potential leakage paths through the valve stem packing or body to bonnet. However, as stated above, compliance to Appendix J testing requirements for these valves is not required to demonstrate that the underlying intent of the rule has been met. The addition of block valves and test connections to allow accident direction testing would increase design complexity, provide additional potential leakage pathways, and increase loading on piping penetrating primary containment. Valve stem packing modifications to allow potential leakage to be quantitatively determined would increase design complexity, and provide additional potential leakage pathways. For these reasons, compliance with Appendix J would incur an undue cost without a commensurate improvement in safety.

- The licensee or applicant has made good faith efforts to comply with the regulation.

  Over the years, the Authority has modified primary containment isolation valves and penetrations to correct design deficiencies and to comply with the requirements of Appendix J. The Authority believes that modifications to allow testing in the accident direction or allow potential leakage to atmosphere to be quantitatively determined for the 17 valves identified in this exemption request is not feasible or practicable. The Authority has proposed to perform a soap bubble check on potential leakage paths to atmosphere (e.g., valve stem packing) for these valves during regularly scheduled ILRT, utilizing zero bubble acceptance criteria. This ensures that potential gross leakage paths through these valves are identified and corrected. LLRT will be performed, as a post work test, following work activities that affect the potential atmospheric leakage paths on any of the 17 valves. An ILRT will then be performed on the subject valve(s) at regularly scheduled ILRT intervals. The Authority believes that these actions represent good faith efforts to comply with the regulation.

In summary, the Authority has determined that the exemption for the 17 valves discussed above is warranted under 10 CFR 50.12. Past improvements along with proposed improvements made by the Authority represent prudent steps taken to improve containment integrity testing and demonstrate good faith efforts to satisfy the requirements of Appendix J.

In order to support outage design activities, and planning and scheduling for the upcoming Refuel 12/Cycle 13 refueling outage, the Authority respectfully requests approval of the proposed Appendix J exemption by April 15, 1996.

Table 1
Additional Information on Valves

1.	Valve Number and Title:	27AOV-112 - DRYWELL PURGE AND INERT ISOLATION VALVE
	Description:	24", BUTTERFLY VALVE
	Vendor:	FISHER CONTROLS CO.
2.	Valve Number and Title:	27AOV-113 - DRYWELL VENT AND PURGE EXHAUST INNER ISOLATION VALVE
	Description:	24", BUTTERFLY VALVE
	Vendor:	FISHER CONTROLS CO.
3.	Valve Number and Title:	27AOV-101A - TORUS VACUUM BREAKER VB-6 ISOLATION VALVE
	Description:	20", BUTTERFLY VALVE
	Vendor:	FISHER CONTROLS CO.
4.	Valve Number and Title:	27AOV-101B - TORUS VACUUM BREAKER VB-7 ISOLATION VALVE
	Description:	20", BUTTERFLY VALVE
	Vendor:	FISHER CONTROLS CO.
5.	Valve Number and Title:	27AOV-117 - TORUS EXHAUST INNER ISOLATION VALVE
	Description:	20", BUTTERFLY VALVE
	Vendor:	FISHER CONTROLS CO.
6.	Valve Number and Title:	27MOV-117 - TORUS VENT AND PURGE EXHAUST ISOLATION VALVES (27AOV-117 AND 27AOV-118) INNER BYPASS VALVE
	Description:	3", BUTTERFLY VALVE
	Vendor:	FISHER CONTROLS CO.
7.	Valve Number and Title:	27AOV-116 - TORUS PURGE AND INERT ISOLATION VALVE
	Description:	20", BUTTERFLY VALVE
	Vendor:	FISHER CONTROLS CO.
8.	Valve Number and Title:	27AOV-131A - CAD TRAIN A NITROGEN MAKE-UP ISOLATION VALVE
	Description:	1.5", GLOBE VALVE
	Vendor:	MASONEILAN INTERNATIONAL INC.
9.	Valve Number and Title:	27AOV-131B - CAD TRAIN B NITROGEN MAKE-UP ISOLATION VALVE
	Description:	1.5", GLOBE VALVE
	Vendor:	MASONEILAN INTERNATIONAL INC.

10. Valve Number and Title: 10MOV-31A - RHR A CONTAINMENT SPRAY INBOARD ISOLATION VALVE
Description: 10", GLOBE VALVE
Vendor: ANCHOR-DARLING IND.

11. Valve Number and Title: 10MOV-31B - RHR B CONTAINMENT SPRAY INBOARD ISOLATION VALVE
Description: 10", GLOBE VALVE
Vendor: ANCHOR-DARLING IND.

12. Valve Number and Title: 10MOV-38A - RHR A TO TORUS SPRAY ISOLATION VALVE
Description: 4", GLOBE VALVE
Vendor: WILLIAM POWELL CO.

13. Valve Number and Title: 10MOV-38B - RHR B TO TORUS SPRAY ISOLATION VALVE
Description: 4", GLOBE VALVE
Vendor: WILLIAM POWELL CO.

14. Valve Number and Title: 27AOV-132A - CAD TRAIN A TORUS NITROGEN MAKE-UP ISOLATION VALVE
Description: 1.5", GLOBE VALVE
Vendor: MASONEILAN INTERNATIONAL INC.

15. Valve Number and Title: 27AOV-132B - CAD TRAIN B TORUS NITROGEN MAKE-UP ISOLATION VALVE
Description: 1.5", GLOBE VALVE
Vendor: MASONEILAN INTERNATIONAL INC.

16. Valve Number and Title: 16-1AOV-101A - DRYWELL PRESSURE SENSING
Description: 3/8", PLUG TYPE GLOBE VALVE
Vendor: COPES-VULCAN INC.

17. Valve Number and Title: 16-1AOV-102B - TORUS PRESSURE SENSING
Description: 3/8", PLUG TYPE GLOBE VALVE
Vendor: COPES-VULCAN INC.

Table 2
Conditional Containment Failure Probability Given Core Damage[1]

Time/Containment Location	Conditional Probability
Early/Drywell Failure	0.536
Early/Wetwell Failure	0.068
Late/Drywell Failure	0.116
Late/Wetwell Failure	0.144
No Failure	0.136

Table 3
Post Core Damage (Level 3) Comparison of Results

Leak Rate % /day	Population Dose, person-rem/reactor year			
	Peach Bottom		Grand Gulf	
	NUREG/CR-4330[2]	NUREG-1150[3]	NUREG/CR-4330	NUREG 1150
0.5	151	28.3	250	5.66
1	151		250	
5	153	28.3	254	5.67
10	153		254	
50	174	28.4	288	5.81
100	174		288	

[1]Containment venting considered as failure.

[2]See Reference 4

[3]See Reference 5

References:

1. IE Information Notice No. 86-16, "Failures to Identify Containment Leakage Due to Inadequate Local Testing of BWR Vacuum Relief System Valves", dated March 11, 1986.

2. NYPA letter, H. P. Salmon, Jr. to the NRC (JAFP-94-0453), Transmittal of LER-92-008-02, "PCIV Stem Packing not Subjected to LLRT", dated September 14, 1994.

3. NUREG-1493, "Performance-Based Containment Leak-Test Program", Final Report, dated September 1995.

4. NUREG/CR-4330, "Review of Light Water Reactor Regulatory Requirements, Assessment of Selected Regulatory Requirements that may have Marginal Importance to Risk - Reactor Containment Leakage Rates - Main Steam Isolation Valve Leakage Control Systems - Fuel Design Safety Reviews", Volume 2, dated June 1, 1986.

5. NUREG-1150, "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants, Final Summary Report", dated December 1, 1990.

ATTACHMENT 2 to JPN-96-002

Summary of Commitments

Number	Commitment	Due Date
JPN-96-002-01	Soap bubble test the 17 containment isolation valves listed in this exemption request, utilizing the acceptance criteria of zero bubbles.	During regularly scheduled ILRT