JAFP 90-0742
ATTACHMENT (2)

NEW YORK POWER AUTHORITY

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

CONTAINMENT ISOLATION VALVE REPLACEMENT PROGRAM REPORT

OCTOBER 1990

PREPARED BY: J. GREENE — 10/1/90
JAF LICENSING ENGINEER — DATE

ACCEPTED BY: Victor M. Staly for P. SWINBURNE — 10/9/90
JAF PERFORMANCE ENGINEER — DATE

CONTAINMENT ISOLATION VALVE REPLACEMENT PROGRAM

Introduction

The Authority described a containment isolation valve (CIV) leakage improvement corrective action plan (CAP) to the NRC in JPN-88-012 dated 4/8/88. This CAP resulted in the replacement of 32 CIVs during the 1988, 1989, and 1990 outages. (One of the original 33 valves in the program was rescheduled to 1991 due to difficulties in procuring a suitable replacement (Ref: NYPA letter to the NRC (JPN-89-077), dated 11/17/89). In JPN-88-012, the Authority also committed to implement a number of other corrective actions and to provide the NRC a follow-up report discussing the effectiveness of the corrective actions. This appendix to the ILRT test report provides that follow-up report.

Objectives of Corrective Action Plan

A. Determine through historical review which valves have contributed an excessive amount of leakage during performance of LLRT tests.

This review was conducted in 1988. The results of this review identified the 33 valves selected for replacement. The Authority recognizes that not every valve that fails its LLRT test is necessarily a candidate for replacement. Particularly severe service conditions, unique valve designs and other factors can make valve replacement less valuable as a corrective action. The MSIVs are typical of this type of valve. During the late 1970's, these valves have exhibited leakage characteristics that could be seen as indications for replacement. Instead, improved maintenance through purchase of an MSIV seat maintenance tool coupled with additional training have reduced the MSIV LLRT failure rate to an acceptable level.

B. Determine through historical review which valves have shown a history of minimal or no leakage.

This review was also conducted during 1988. The selection of replacement valve designs and vendors considered the results of this review. The replacement valves were also specified to take advantage of more advanced designs and material considerations which did not exist at the time of initial plant construction. Some of these advanced features incorporated with the replacement valves are:

- Low cobalt alloys in seating surfaces to reduce cobalt transport to the reactor and the resulting neutron activation. This enhances the plant's overall ALARA program by reducing the quantity of Co-60 in the reactor coolant system.

- Live load packings to reduce valve stem leakage and prolong packing lifetimes. This also reduces the amount of corrective maintenance required to tighten or replace packings.

- Hard/soft seat construction on Feedwater check valves to maintain leak tight performance under both the 1000 psig service condition and 45 psig LLRT test condition.

- Parallel double disk gate valve design to reduce thrust loads, reduce seat wear, improve maintainability, and improve leak tight performance over the original "flexwedge" gate valve design.

C. **Develop LLRT trending to track penetration/valve performance.**

This trending program was developed using a personal computer and commercially available spreadsheet software and was fully implemented in September, 1988. The graphing routines of the spreadsheet program provides a visual trending capability. In addition to valve and penetration ID number, the data include valve manufacturer and model number to allow for review of which types of valves have had good and bad leakage characteristic. The historical reviews discussed above were facilitated by use of this trending program.

Corrective Action - LLRT Program

A. **Improved Valve Maintenance Practices**

1. **Purchase main steam isolation valve seat maintenance tool.**

This tool was purchased from the MSIV manufacturer. Use of this tool has greatly improved the quality of MSIV seat repairs. The results are seen as an improvement in the long term leakage characteristics of the MSIVs.

2. **For penetrations where multiple containment isolation valves are tested in combination, perform LLRT retest after maintenance is performed on a single valve.**

Maintenance practices have changed such that whenever practical, only one containment isolation valve located in a combined valve test configuration receives maintenance prior to LLRT retest. This more time consuming technique has now become standard practice at FitzPatrick. Although there may be times when other constraints (outage critical path, or ALARA concerns) necessitate a return to the past practice of repairing both valves prior to retesting, this has

allowed a more accurate determination of the leakage characteristics of many containment penetrations.

3. **Improve the quality of valve repairs.**

Plant mechanics have received special training from valve vendors in conducting leak repairs. An INPO certified apprenticeship program for mechanics has been implemented at FitzPatrick which includes job training and qualification. Greater control of valve repair is also obtained by having all valve repairs performed or directly supervised by Authority personnel. The selection of replacement valve designs has considered maintainability as a design specification. The replacement valves should be easier to repair and have better results.

B. **Identification of Valve Type/Manufacturer**

1. **Using historical data, identify the type/manufacturer of valves which have contributed an excessive amount of leakage during the performance of LLRTs.**

2. **Using historical data, identify the type/manufacturer of valves which have shown a history of minimal or no leakage during the performance of LLRTs.**

The valve type and manufacturer data was included in the valve leakage trending program discussed above. The Authority is confident that it has identified those manufacturers whose valves tend to deliver superior or substandard performance. This information was considered in the selection of replacement valves.

C. **Correction of Problem Penetrations:**

Recommend/implement effective repair or replacement methods on containment isolation valves identified as historically poor performers (excessive leakage).

The 33 valves selected for replacement are the direct result of this corrective action. The Authority believes that it has implemented an effective testing and maintenance program for containment isolation valves. The result can be seen as a demonstrated overall improvement in the "As-found" leakage characteristic of the primary containment system. The data contained in this ILRT test report show an improvement to the extent that many of the valves installed during the 1988 and 1989 outages did not require maintenance during the 1990 refueling outage. This trend is expected to continue with fewer valves requiring repeated maintenance in future refueling outages. It should be noted that valves in these service conditions have historically been poor

performers consistently failing the "as-found" LLRT and requiring repeated maintenance.

There were three replacement valves (12MOV-15, 13MOV-15, and 23MOV-15) whose performance did not meet Authority expectations. For reasons still under investigation by the valve manufacturer, the valve disks and seats distorted slightly during the operating cycle. The Authority believes that this behavior was due to thermal cycling from operating conditions to test conditions and that the warping was a stress relieving mechanism. As such, the Authority expects that this behavior is limited to the "break-in period" of the valve and should not result in long term leakage degradation. This will be confirmed when the valves are next tested during the 1991 refueling outage.

D. Augmented LLRT Program

Following completion of the currently scheduled valve replacements, consideration will be given to an augmented LLRT program if expected LLRT leakage reductions do not occur.

With the exception of the three valves discussed above, the results of the valve replacement program has met all objectives of our corrective action plan. "As-found" leakage has been reduced significantly, and fewer valves require corrective maintenance for leakage reduction. Valve maintenance, when required, is also easier to accomplish and generates higher quality results. The Authority is satisfied with these results.

It should be noted that the Authority's Inservice Testing (IST) program for valves exceeds the requirements of Appendix J. The IST program specifies individual valve leakage criteria and accelerated testing for valves which exceed their leakage criteria. This in itself can be considered an augmentation to the requirements of Appendix J. In actual practice, we repair valves before they exceed their acceptance criteria based upon historical trending of their leakage performance. The Authority does not plan to modify the existing LLRT test program.

JAF LLRT IMPROVEMENT
VALVE LLRT DATA

VALVE ID	1987 LLRT RESULTS AS FOUND/AS LEFT	1988 LLRT RESULTS AS FOUND/AS LEFT	1990 LLRT RESULTS AS FOUND/AS LEFT	REPLACEMENT DATE	POST-CHANGE LLRT RESULTS AS LEFT
02-2AOV-39	1.8731/1.8731	1.3896/.3563	261.117/.509	88 RFO	0.3563
02-2AOV-40	.2443/.2443	5.4553/.3843	194.947/.5228	88 RFO	0.3843
10MOV-26A (6)	3.3594/3.3954	14.2011/12.1142	2.4382/2.4382	88 RFO	12.1124
10MOV-26B (7)	712.6/26.0608	1084.17/1.75	.3793/.3793	88 RFO	1.7500
10MOV-31A (6)	SEE NOTE 6	SEE NOTE 6	SEE NOTE 6	88 RFO	SEE NOTE 6
10MOV-31B (7)	SEE NOTE 7	SEE NOTE 7	SEE NOTE 7	88 RFO	SEE NOTE 7
11SLC-16	44.435/9.7932	10.165/10.165	.3314/.2450	90 RFO	0.2450
12MOV-15	93.5542/1.6593	104.854/39.3457	GROSS/28.8094	88 RFO	39.3457
12MOV-18 (3)	107.818/23.5158	193.929/6.6933	391.93/29.8274	90 RFO	29.8274
12MOV-80 (3,14)	SEE NOTE 3	SEE NOTE 3	SEE NOTE 3	90 RFO	SEE NOTE 3
13MOV-15	17.4587/17.4587	4.2858/3.1726	401.601/7.7443	88 RFO	3.1726
13MOV-16 (11)	.1018/.1018	SEE NOTE 11	SEE NOTE 11	90 RFO	SEE NOTE 11
13RCIC-4	212.253/40.3128	8459.58/17.1024	44.8938/44.8938	88 RFO	17.1024
13RCIC-5	96.6082/43.265	677.479/54.1067	49.0167/49.0167	88 RFO	54.1067
13RCIC-7	.6296/.6296	4.2960/8.2814	NA	88 RFO	8.2814
13RCIC-8	13.9975/13.9975	.1425/13.0813	NA	88 RFO	13.0813
20AOV-95	570.08/21.9888	3.7204/3.7204	40.4655/15.27	NOT CHANGED	NA
20MOV-94	308.454/21.887	4.0618/4.0618	44.1812/21.887	90 RFO	21.8870
23HPI-11 (12)	SEE NOTE 12	SEE NOTE 12	SEE NOTE 12		SEE NOTE 12
23HPI-12	7889.5/8.5766	3736.06/96.4555	.2189/.2189	88 RFO	96.4555
23HPI-65	8194.4/78.1315	94.8776/94.8776	2.9828/2.9828	88 RFO	94.8776
23MOV-15 (8,14)	369.025/5.0575	1338.67/35.0956	GROSS/9.5794	88 RFO	35.0956
23MOV-16 (8,14)	SEE NOTE 8	SEE NOTE 8	SEE NOTE 8	88 RFO	SEE NOTE 8
27CAD-67 (9)	11.6561/8.5817	8.9228/8.9228	1.6639/1.6639	89 MO	0.5278

JAF LLRT IMPROVEMENT
VALVE LLRT DATA

VALVE ID	1987 LLRT RESULTS AS FOUND/AS LEFT	1988 LLRT RESULTS AS FOUND/AS LEFT	1990 LLRT RESULTS AS FOUND/AS LEFT	REPLACEMENT DATE	POST-CHANGE LLRT RESULTS AS LEFT
27CAD-68 (4)	843.413/16.288	432.65/5.003	GROSS/.1018	89 MO	0.2662
27CAD-69 (5)	57.9242/.3471	4.2807/4.2807	.8765/.8765	89 MO	0.5400
27CAD-70 (10)	87.3444/25.0937	39.2998/39.2998	.2820/.2820	89 MO	0.1018
27SOV-124E1	.1517/.1517	.3715/.1089	.1304/.1304	NOT CHANGED	NA
27SOV-124E2	.3772/.3772	.2469/.2219	.1018/.1018	NOT CHANGED	NA
27SOV-125A	.8984/.4708	7.8895/7.8895	SEE NOTE 13	88 RFO ?	SEE NOTE 13
27SOV-125B	.6973/.4942	1.5728/1.5728	SEE NOTE 13	88 RFO ?	SEE NOTE 13
27SOV-135A	11,737.9/.1018	.1018/.1018	SEE NOTE 13	88 RFO ?	SEE NOTE 13
27SOV-135B	10,739.9/.6999	.1018/.1018	SEE NOTE 13	88 RFO ?	SEE NOTE 13
29MOV-74	.1018/.1018	.1018/.1018	926.889/.1018	90 RFO	0.1018
34NRV-111A (1)	46.5226/46.5226	20.6654/156.772	.1018/.1018	90 RFO	0.1018
34NRV-111B (2)	GROSS	279.95/3.11	279.95/3.11	90 RFO	3.1100

NOTES : (1) VALVE 34NRV-111A IS TESTED IN CONJUNCTION WITH 13MOV-21 AND 12RWC-62 (12MOV-69 AFTER 1987)

(2) VALVE 34NRV-111B TESTED IN CONJUNCTION WITH 23MOV-19

(3) VALVES 12MOV-18 AND 12MOV-80 ARE TESTED TOGETHER

(4) 27CAD-68 TESTED IN CONJUNCTION WITH 27AOV-131A

(5) 27CAD-69 TESTED IN CONJUNCTION WITH 27AOV-131B

(6) VALVES 10MOV-26A AND 10MOV-31A TESTED TOGETHER

(7) VALVES 10MOV-26B AND 10MOV-31B TESTED TOGETHER

(8) VALVE 23MOV-15 TESTED IN CONJUNCTION WITH 23MOV-16 AND 23MOV-60

(9) 27CAD-67 TESTED TOGETHER WITH 27AOV-132A

(10) 27CAD-70 TESTED TOGETHER WITH 27AOV-132B

(11) 13MOV-15 AND 13MOV-16 TESTED TOGETHER

JAF LLRT IMPROVEMENT
VALVE LLRT DATA

VALVE ID	1987 LLRT RESULTS AS FOUND/AS LEFT	1988 LLRT RESULTS AS FOUND/AS LEFT	1990 LLRT RESULTS AS FOUND/AS LEFT	REPLACEMENT DATE	POST-CHANGE LLRT RESULTS AS LEFT

(12) 23HPI-11 IS NOT A CIV. 23HPI-12 AND 23HPI-65 ARE TESTED THROUGH THIS VALVE

(13) THESE VALVES WERE MOVED AND RELABELED DURING THE 88 RFO.

(14) THESE VALVES WERE NOT COVERED UNDER JPN-88-012