NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

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EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

# LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| Indian Point Unit 3 | 05000286 | 1 OF 5 |

TITLE (4) Technical Specification Required Shutdown due to Service Water Containment Isolation Valve Leakage Caused by Corrosion

| EVENT DATE (5) | | | LER NUMBER (6) | | | REPORT DATE (7) | | | OTHER FACILITIES INVOLVED (8) | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| 10 | 21 | 1995 | 95 | 024 | 01 | 2 | 15 | 96 | FACILITY NAME | DOCKET NUMBER |

| OPERATING MODE (9) | N | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| POWER LEVEL (10) | 000 | | 20.402(b) | | 20.405(c) | | 50.73(a)(2)(iv) | | 73.71(b) |
| | | | 20.405(a)(1)(i) | | 50.36(c)(1) | | 50.73(a)(2)(v) | | 73.71(c) |
| | | | 20.405(a)(1)(ii) | | 50.36(c)(2) | | 50.73(a)(2)(vii) | | OTHER |
| | | | 20.405(a)(1)(iii) | ✓ | 50.73(a)(2)(i) | | 50.73(a)(2)(viii)(A) | | (Specify in Abstract below and in Text, NRC Form 366A) |
| | | | 20.405(a)(1)(iv) | | 50.73(a)(2)(ii) | | 50.73(a)(2)(viii)(B) | | |
| | | | 20.405(a)(1)(v) | | 50.73(a)(2)(iii) | | 50.73(a)(2)(x) | | |

LICENSEE CONTACT FOR THIS LER (12)

| NAME | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| Tim Moran, System Engineer | (914) 736-8498 |

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS | | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS |
|---|---|---|---|---|---|---|---|---|---|---|
| X | BI | ISV | V085 | Y | | | | | | |
| X | BI | V | X999 | N | | | | | | |

| SUPPLEMENTAL REPORT EXPECTED (14) | | | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
|---|---|---|---|---|---|---|
| | YES (If yes, complete EXPECTED SUBMISSION DATE). | ✓ NO | | | | |


ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On October 21, 1995, with the unit in hot shutdown, the body of essential service water (BI) containment isolation valve SWN-43-5 was confirmed to have a small hole downstream of the valve disk. Ultrasonic testing showed valve body wall thinning. Indian Point 3 commenced a technical specification required cooldown to cold shutdown based on the loss of containment integrity. An extent of condition review was performed. Nine valves, including an additional containment isolation valve, SWN-43-1, were replaced due to leakage or unacceptable wall thinning. The cause of the valve leakage was under-deposit, oxygen concentration cell corrosion and/or microbiologically induced corrosion due to long term stagnant service water which resulted in through-wall thickness pitting corrosion. Corrective actions include an expansion of the corrosion monitoring program to include the service water containment isolation valves in the service water corrosion monitoring program. In addition, follow-up ultrasonic testing will be performed on the valves that were found to have 15% or less margin over the required minimum wall thickness during initial ultrasonic testing and degraded valves will be repaired or replaced as required.

DESCRIPTION OF THE EVENT

On October 21, 1995, with the unit in hot shutdown, a mechanic noticed that the body of essential service water (BI) containment isolation valve SWN-43-5 appeared to be leaking. By 1145 hours, on October 21, 1995, it was confirmed that the valve body had a small hole downstream of the valve disk and ultrasonic testing had showed possible valve body wall thinning. At 1241 hours, on October 21, 1995, Indian Point 3 (IP3) commenced a technical specification required cooldown to cold shutdown based on the loss of containment integrity. A one-hour non-emergency report was made to the NRC in accordance with 10 CFR 50.72(b)(1)(i)(A). Cold shutdown was achieved at 2333 hours on October 21, 1995.

For a loss of containment integrity, Technical Specification 3.6.A.3 requires that containment integrity be re-established within 1 hour, or that the plant be placed in the cold shutdown condition within the next 30 hours. Since valve SWN-43-5, on the service water supply side drain line to the 35 Fan Cooler Unit, is a single isolation valve, the questionable structural integrity of the valve was considered to be a loss of containment integrity.

Subsequent to the discovery of the SWN-43-5 valve leakage, an extent of condition review was initiated. The initial extent of condition review consisted of visual inspections and ultrasonic testing of service water valves that are either containment isolation valves or located inside containment. Engineers visually inspected a total of 81 valves, including the initially failed valve. One additional containment isolation valve (SWN-43-1) was found to be leaking through its body and three valves inside containment (SWN-520, SWN-524, and SWN-525) showed weepage, which was later confirmed to be leakage. Other valves that showed significant surface corrosion, similar to that shown on the initial leaking valves, were then examined using ultrasonic testing (UT) methods. The intent of these UTs was to determine if wall thinning on these valve bodies had progressed to the point that they no longer met the minimum valve wall thickness as called for in American National Standards Institute (ANSI) standard B16.34. As a result of this initial extent of condition review, nine valves (the five valves already noted plus SWN-521, SWN-523, SWN-526, and SWN-527) were replaced due to leakage or unacceptable wall thinning.

Subsequent to the initial review, a second extent of condition review was performed for selected valves within the Inservice Inspection (ISI) Class 3 portion of the service water system. The valves included were selected based on the fact that they were located on lines of normally low or no flow and that they were two inches or smaller in diameter. These criteria were based on the experiences gained from the initial extent of condition review: Of the nine valves that failed inspection, all were two inches or smaller and all were on lines that experience low or no flow. Approximately 150 valves were selected based on this criteria. A few of these valves were exempted from the visual inspection due to the fact that they had been recently replaced. Sixteen valves, or 10% of the valve population examined, were chosen for UT examination based on either the extent of surface corrosion on the valve body that was observed during visual inspection or on the fact that the valve was representative of a group of similar valves. The results of these surveys showed that no further valves had failed nor were in immediate danger of failing (i.e., they had sufficient wall thickness).

The visual and ultrasonic inspections performed showed that the majority of the service water valves were in good condition and that a systemic valve failure problem was not present.

## CAUSE OF THE EVENT

The results of further assessment concluded that the cause of the valve leakage was under-deposit, oxygen concentration cell corrosion, and/or microbiologically induced corrosion (MIC). Under-deposit corrosion and/or MIC were the result of the presence of high chlorides/phosphates and anaerobic bacteria, which are common to stagnant Hudson River service water. Therefore, stagnant service water in the valves caused the conditions that resulted in through-thickness pitting corrosion of the valves. Corrosion wastage and galvanic corrosion, which NYPA initially judged to be the cause of failure, was determined by an independent metallurgist to be present on both valves to some extent, especially on the carbon steel valves. The independent metallurgist determined these mechanisms were not the cause of the leakage.

CORRECTIVE ACTIONS

- The nine valves found to be leaking or found to have unacceptable wall thinning (SWN-43-5, SWN-43-1, SWN-520, SWN-524, SWN-525, SWN-521, SWN-523, SWN-526, and SWN-527) were replaced.

- Two of the failed valves (SWN-43-1 and SWN-520) were sent to an independent metallurgist for a more thorough analysis. The independent metallurgist issued a report dated January 18, 1996.

- In response to Generic Letter 89-13, a corrosion monitoring program was established for the service water system. Past experience with service water leakage had limited the scope of this program to examining welds on the piping system, particularly those on the cement-lined carbon steel portion of the piping system. This had been the scope of the program because previous leaks had been on piping not valves. Since most of these valves are located on dead legs and lines whose flow cannot be adjusted, NYPA concluded that it would not be feasible to change the condition that led to the corrosion mechanisms. Therefore, the scope of the original monitoring program will be expanded to include more than just pipe welds in its non-destructive examination. Procedure TSP-48, the implementing procedure for the corrosion monitoring program, will be revised to include inspections of selected valves in order to ensure their integrity and to trend any deterioration of valves considered to be high-risk valves. The procedure for the SW corrosion monitoring program, AP-58 will be revised to incorporate the increased scope. Procedure AP-58 will be revised by April 19, 1996. Procedure TSP-48 will be revised by March 15, 1996.

- Six valves that had 15% or less margin over the required minimum wall thickness (per ANSI B16.34 standards) will be UT examined during the next refueling outage (Refueling Outage 9). Based on engineering judgement, the valves in this category will require further evaluation during Refueling Outage 9 to determine whether any additional corrosion has occurred that could affect their reliability for cycle 10 operation. Should these valves show significant additional wall thinning, then additional valves will be UT examined during Refueling Outage 9 and a determination will be made as to whether the valves need replacement or repair.

## ANALYSIS OF EVENT

These events are reportable under 10CFR50.73(a)(2)(i)(A); a plant shutdown was required by the plant's Technical Specifications. Technical Specification 3.6.A.3 requires that, if containment integrity requirements are not met when the reactor is above cold shutdown, containment integrity shall be restored within one hour or the reactor shall be in the hot shutdown condition within six hours and in the cold shutdown condition within the next 30 hours. A one-hour non-emergency report was made to the NRC in accordance with 10CFR50.72(b)(1)(i)(A). A review of past LERs shows no previous occurrences of containment isolation valve corrosion leakage at IP3.

## SAFETY SIGNIFICANCE

No safety consequences for the public health resulted from these events. No release of radiation occurred.

The containment isolation valves that were found to be leaking were in the supply side of the fan cooler units. These leaks were pinhole type leaks. The service water system is a low energy system that would be expected to leak and would continue to leak rather than catastrophically fail. Therefore, even if a design basis accident did occur while containment isolation valves SWN-43-1 and SWN-43-5 were in their as-found condition, the service water system pressure at the point where these inlet containment isolation valves are located would have remained above the containment pressure. Therefore, containment integrity would not be significantly affected by the as-found leakage of the containment isolation valves.

The system pressure at the point where some of the "SWN-520" series valves are located may not have remained above containment pressure if a design basis accident had occurred. However, the outlet of the fan cooler motor coolers is monitored for radioactivity and, if required, the affected fan cooler motor coolers could have been isolated. Therefore, containment integrity would not be significantly affected by the as-found leakage of the "SWN-520" series fan cooler unit motor cooler valves.