James A. FitzPatrick
Nuclear Power Plant
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NewYork Power Authority

**Michael J. Colomb**
Site Executive Officer

October 26, 1999
JAFP-99-0292

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, D.C. 20555

Subject: Docket No. 50-333
LICENSEE EVENT REPORT: LER-97-003-02

Potential Overpressurization of Containment Penetrations Due to Thermal Expansion

Dear Sir:

This report is submitted in accordance with 10 CFR 50.73 (a) (2) (ii)(B).

This supplement clarifies one of the previously committed actions associated with Generic Letter 96-06 and updates the status of corrective actions.

There are no commitments contained in this report.

Questions concerning this report may be addressed to Mr. Richard A. Plasse, Jr. at (315) 349-6793.

Very truly yours,

MICHAEL J. COLOMB

MJC:RAP:las
Enclosure

cc: USNRC, Region 1
USNRC Resident Inspector
INPO Records Center

NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), 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) |
|---|---|---|
| James A. FitzPatrick Nuclear Power Plant | 05000333 | 01 OF 06 |

TITLE (4)

Potential Overpressurization of Containment Penetrations Due to Thermal Expansion

| 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 |
| 02 | 13 | 97 | 97 | 003 | 02 | 10 | 26 | 99 | N/A | 05000 |
| | | | | | | | | | FACILITY NAME: N/A | DOCKET NUMBER: 05000 |

| OPERATING MODE (9) | N |
|---|---|
| POWER LEVEL (10) | 100 |

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 20.2201(b) | | 20.2203(a)(2)(v) | | 50.73(a)(2)(i) | | 50.73(a)(2)(viii) |
| | 20.2203(a)(1) | | 20.2203(a)(3)(i) | X | 50.73(a)(2)(ii) | | 50.73(a)(2)(x) |
| | 20.2203(a)(2)(i) | | 20.2203(a)(3)(ii) | | 50.73(a)(2)(iii) | | 73.71 |
| | 20.2203(a)(2)(ii) | | 20.2203(a)(4) | | 50.73(a)(2)(iv) | | OTHER |
| | 20.2203(a)(2)(iii) | | 50.36(c)(1) | | 50.73(a)(2)(v) | | Specify in Abstract below or in NRC Form 366A |
| | 20.2203(a)(2)(iv) | | 50.36(c)(2) | | 50.73(a)(2)(vii) | | |

LICENSEE CONTACT FOR THIS LER (12)

| NAME | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| Mr. Richard A. Plasse, Jr., Senior Licensing Engineer | (315) 349-6793 |

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 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |

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


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

As a result of Generic Letter (GL) 96-06, "Assurance of Equipment Operability and Containment Integrity During Design Basis Accident Conditions", the Authority identified containment penetrations which could be subjected to overpressurization due to thermal expansion of the entrapped water during design basis accidents (DBAs) when the penetrations are isolated. On 2/13/97 the Authority reported that the overpressurization of containment penetrations could potentially be a condition that is outside the design basis of the plant. The cause of this event is that pressurization of these penetrations due to thermal expansion of entrapped fluid between the containment isolation valves was not considered during the design of the FitzPatrick plant.

Operability determinations have been completed in accordance with GL 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Non-Conforming Conditions and on Operability" to verify operability. The operability determination demonstrated that containment integrity is maintained and safety functions are not compromised for the susceptible containment penetrations. Long term resolution of these overpressurization concerns has been evaluated in our response to GL 96-06. The results of this evaluation were submitted to the NRC in correspondence dated May 27, 1997.

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**EVENT DESCRIPTION**

At 11:40 on February 13, 1997, it was reported that the overpressurization of containment penetrations could potentially be a condition that is outside the design basis of the plant. In October 1996, the Authority began an evaluation of FitzPatrick containment penetrations in accordance with GL 96-06, "Assurance of Equipment Operability and Containment Integrity During Design Basis Accident Conditions". As a result of that review, penetrations were identified as being subjected to temperatures following a DBA which could cause pressurization in excess of piping system design pressures. Operability determinations were completed and concluded that containment penetrations susceptible to thermal overpressurization remain operable in that they will not rupture and they will continue to perform their safety function. Detailed results of the GL 96-06 evaluation were provided to the NRC in the GL 96-06 120-Day Response dated January 27, 1997.

**EVENT CAUSE**

The piping code of record for FitzPatrick is the ANSI B31.1 Power Piping Code, 1967 Edition. This code does not explicitly identify the requirements for qualification of accident conditions. The FitzPatrick FSAR and the design basis for balance of plant piping do not identify requirements for addressing fluid expansion effects in isolated piping sections. The extent to which heatup and pressurization of penetrations was considered during the original design is not known. It appears that fluid expansion effects were originally interpreted as pertaining to normal operating conditions and analysis of pipe stress due to thermal expansion due to DBA conditions was not explicitly performed during original plant design. This postulated condition is potentially outside the plant's design basis and is reportable under 10 CFR 50.73 (a) (2) (ii)(B).

**EVENT ANALYSIS**

This condition is reportable in accordance with 10 CFR 50.73 (a) (2) (ii)(B), as a condition that resulted in the overpressurization of containment penetrations which could potentially be a condition that is outside the design basis of the plant.

**Thermal Pressurization Evaluation**

Generic Letter 96-06 requested licensees to evaluate if thermally induced overpressurization of isolated water filled piping sections in containment could jeopardize the ability of accident mitigating systems to perform their safety functions and/or lead to a breach of containment integrity via bypass leakage. In order to analyze this issue, the following evaluation process was used:

- a review of Drywell and Suppression Pool penetrations was made to identify those which involved liquid systems,
- valve arrangements for the above systems were reviewed to determine if isolated water filled sections exist and if thermal pressurization was possible,
- a heat transfer model was developed to determine the effect of the post accident ambient area temperatures on the isolated water temperature,
- the isolated pipe section internal pressure was then determined,
- containment integrity and safety system function were evaluated.

The containment penetrations (584 total) were reviewed, of which 314 contained water . After excluding penetrations that do not contain isolated water filled pipe sections, only fourteen (14) penetrations remained. Two of these fourteen penetrations were eliminated from further thermal pressurization and containment integrity evaluation since the normal operating water temperature would be the same or higher than the DBA condition. Another penetration was eliminated from further evaluation since the limiting pressure, based on valve design feature, resulted in stresses below design allowable limits. The remaining penetrations, identified as being susceptible to thermal pressurization concerns, are the following:

| Penetration No. | System | Inboard Valve | Outboard Valve |
|---|---|---|---|
| X-8 | Main Steam Drain | 29MOV-74 | 29MOV-77 |
| X-18 | Drywell Floor Drain Sump Discharge | 20MOV-82 | 20AOV-83 |
| X-19 | Drywell Equipment Drain Sump Discharge | 20MOV-94 | 20AOV-95 |
| X-39 A&B | RHR Reactor Spray | 10MOV-31 A&B | 10MOV-26 A&B |
| X-210 A&B | RHR to Suppression Pool | 10MOV-34 A&B | 10MOV-39 A&B |
| X-211 A&B | RHR - Suppression Spray Header | 10MOV-38 A&B | 10MOV-39 A&B |
| X-224 | RCIC Pump Suction from Suppression Pool | 13MOV-41 | 13MOV-39 |
| X-226 | HPCI Pump Suction from Suppression Pool | 23MOV-58 | 23MOV-57 |

**System Safety Function Review**

The valves associated with the penetrations identified to be susceptible to thermal pressurization were evaluated as to their ability to perform their safety function.

The systems associated with penetrations X-8, X-18, X-19, and X-224 do not perform active safety functions. The associated containment isolation valves are closed for DBA conditions and remain closed for the duration of the event.

Penetrations X-39 A&B, X-210 A&B and X-211 A&B (six penetrations) employ inboard globe valves with isolated fluid under the seats. An increase in line pressure due to thermal conditions would assist valve opening. Therefore, valve operability and consequently system safety function will not be jeopardized.

The valves associated with penetration X-226 (23MOV-57 & 58) are required to open during transfer of HPCI suction water source from the Condensate Storage Tank (CST) to the Suppression Pool. Thermal pressurization of this containment penetration configuration is due to elevated area temperatures resulting from elevated Suppression Pool temperatures during DBA conditions. A review of plant transient and accident analyses indicates that the transfer function is not required except for initiating events which would render the CST unavailable. No accident sequences have been identified which would require opening of these valves coincident with elevated Suppression Pool temperature. Therefore, the system safety function will not be jeopardized.

**Containment Integrity Review**

The penetrations identified to be susceptible to thermal pressurization were evaluated for operability in accordance with NRC Generic Letter 91-18. Existing stress analyses, pipe support, penetration, integral welded attachment details, and integrity of valve internals, were evaluated for all of the susceptible penetrations. The evaluation determined that the isolated fluid pressures for the thermal overpressurization condition were above operating design pressures; however, the affected penetrations remain operable in that they will not rupture and they will continue to perform their safety function. Discussion and correspondence with the valve vendor indicates the outboard valve at penetration X-19 (20AOV-95) will develop a leak path at a pressure of approximately 1350 psid limiting further thermal pressurization. Under this circumstance, containment integrity is assured by the closed inboard isolation valve (20MOV-94).

As a result of additional engineering review associated with Generic Letter 96-06, a scenario was identified where the failure of the inboard isolation valve to close (20MOV-82) could result in thermal pressurization during DBA conditions for penetration X-18 (Drywell floor drain sump to radwaste). Specifically, water-filled piping segments between sump pump discharge check valves 20RDW-80A, 20RDW-80B, and outboard isolation valve 20AOV-83 may be susceptible to thermal pressurization. An operability evaluation has been completed in accordance with GL 91-18. The evaluation concluded that the penetration would remain operable and will continue to perform its safety function. A review of other penetrations for similar concerns (i.e. assuming a single failure) was performed, no other penetrations susceptible to thermal pressurization were identified.

**Conclusion**

The thermal overpressurization evaluation performed in accordance with GL 91-18 demonstrates that containment integrity is maintained and safety functions are not compromised, for the susceptible containment penetrations and their associated valves, during the GL 96-06 postulated accident.

## CORRECTIVE ACTIONS

Corrective actions for the event are as follows:

1. An operability determination for the affected penetrations has been completed in accordance with GL 91-18.

2. Long term resolution of these overpressurization concerns has been evaluated in our response to GL 96-06. The results of this evaluation were submitted to the NRC in correspondence dated May 27, 1997. **(Completed)**

3. Since thermal pressurization failure of penetration X-18 may be possible under certain single failure scenarios, a modification (JD-99-093) will be implemented prior to startup from the next refueling outage to provide pressure relief. This will ensure this failure mechanism is eliminated.

## ADDITIONAL INFORMATION

Failed Components: None

Previous Similar Events: None

Identification of Components Referred to in this LER:

| Component | IEEE 803 EIIS Function | IEEE 805 System ID |
|---|---|---|
| X8 | PEN | SB |
| X18 & X19 | PEN | NB |
| X39 A&B | PEN | BO |
| X210 A&B | PEN | BO |
| X211 A&B | PEN | BO |
| X224 | PEN | BN |
| X226 | PEN | BJ |