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New York Power Authority

Harry P. Salmon, Jr.
Site Executive Officer

November 16, 1995
JAFP-95-0494

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

SUBJECT: **James A. FitzPatrick Nuclear Power Plant**
Docket No. 50-333
Response to NRC Bulletin 95-02

Reference: NRC Bulletin 95-02, Unexpected Clogging of Residual Heat Removal (RHR) Pump Strainer While Operating in Suppression Pool Cooling Mode, dated October 17, 1995

Dear Sir:

This letter describes actions taken by the Authority at the James A. FitzPatrick Nuclear Power Plant in response to NRC Bulletin 95-02 (Reference), to ensure that unacceptable buildup of debris that could clog Emergency Core Cooling System (ECCS) suction strainers does not occur during normal operation. Attachment 1 provides the detailed response.

The following provides a summary of the actions taken at FitzPatrick relevant to Bulletin 95-02:

1. In 1988, FitzPatrick implemented a suppression pool preservation initiative. As part of this initiative, debris (e.g., sludge) has been cleaned from the suppression pool four times since January 1988. The ECCS suction strainers and all 16 torus bays were cleaned during the 1995 Refueling Outage (RFO) (January 1995).

2. In June 1995, a torus preservation program was put in place. This program includes cleaning of the ECCS suction strainers and all 16 torus bays, and inspections of the ECCS suction strainers. These activities are scheduled for the upcoming Refuel 12/Cycle 13 RFO. The Authority will inform the NRC of the results of these inspections within 60 days after startup from the Refuel 12/Cycle 13 RFO.

3. Evaluations of torus information obtained before and after the 1995 RFO cleaning, (i.e., vendor inspection reports, log books, observations of videotape, analysis of sludge samples, and surveillance testing results and operational data for the ECCS pumps) concluded that there were no signs of ECCS pump cavitation, and that insufficient fibrous materials were present to cause ECCS suction strainer clogging.

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4. On November 7, 1995, all four Residual Heat Removal (RHR) pumps were run in the suppression pool cooling mode for approximately 10 hours. Based on the results of this run, engineering concluded that there was no evidence of strainer clogging, no indication of RHR pump cavitation, and that insufficient fibrous materials were present in the suppression pool to cause ECCS suction strainer clogging.

5. FitzPatrick Foreign Material Exclusion (FME) procedures provide the necessary controls to minimize foreign material in the suppression chamber and drywell.

6. Trending of RHR and Core Spray suction pressure is included in the In-service testing (IST) program. Trending of High Pressure Coolant Injection (HPCI) suction pressure is included in the IST program for Condensate Storage Tank (CST) suction only.

These actions demonstrate compliance with 10 CFR 50.46. Suppression pool cleanliness will not adversely impact ECCS performance and the ECCS will continue to perform the safety function of long-term decay heat removal following a Loss of Coolant Accident (LOCA). Based on the results of these actions, no operability concerns exist.

By June 30, 1996, the IST program will be updated to include trending of High Pressure Coolant Injection (HPCI) pump suction pressure, when HPCI takes suction from the torus. The torus preservation program will be enhanced to include criteria for determining the appropriate suppression pool cleaning frequency, measures for sampling suppression pool water, and criteria for evaluating the adequacy of pool cleanliness, by September 30, 1996.

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

Very truly yours,

HARRY P. SALMON, JR.

STATE OF NEW YORK
COUNTY OF OSWEGO
Subscribed and sworn to before me
this 16 day of November 1995.

Notary Public

NANCY B. CUTLER
Notary Public, State of New York
Qualified in Oswego County No. 4[illegible]11
My Commission Expires [illegible]

Attachments: As stated

cc: Regional Administrator
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ATTACHMENT 1

Background

10 CFR 50.46 requires that the Emergency Core Cooling System (ECCS) be designed so that it is calculated to provide adequate flow capability to maintain the core temperature at an acceptably low value and to remove decay heat for the extended period of time required by the long-lived radioactivity remaining in the core following a Loss of Coolant Accident (LOCA). Bulletin 95-02 was issued to ensure that licensees remain in compliance with 10 CFR 50.46 by taking actions to ensure that unacceptable buildup of debris on ECCS suction strainers does not occur during normal operation.

The Authority's response to the requested actions in NRC Bulletin 95-02, utilizing the guidance provided in BWROG-95083 (Reference 1), is as follows:

Requested Action 1

"Verify the operability of all pumps which draw a suction from the suppression pool when performing their safety functions (e.g., ECCS, containment spray, etc.), based on an evaluation of suppression pool and suction strainer cleanliness conditions. This evaluation should be based on the pool and strainer conditions during the last inspection or cleaning and an assessment of the potential for the introduction of debris or other materials that could clog the strainers since the pool was last cleaned."

Response to Requested Action 1

FitzPatrick has cleaned and removed debris (e.g., sludge) from the suppression pool four times since January 1988.

During the 1995 Refueling Outage (RFO) (January 1995), torus work scope included cleaning of all 16 torus bays and as-found underwater inspections. An engineering review of vendor inspection reports, log books, photographs, and video tape from the inspections of the ECCS suction strainers revealed that four out of the five ECCS suction strainers were clean [i.e., show no more than trivial (on the order of 1% or less surface area coverage) debris accumulation]. There was a single piece of plastic on the remaining strainer ("A" core spray suction), which accounted for approximately 10% strainer surface area coverage. Foreign material discovered was removed from the suppression pool and suction strainers.

Sludge samples were taken during the 1995 RFO. Chemistry analysis of these samples determined that the sludge consisted primarily of corrosion products, with the remaining material being organic. Further analysis concluded that insufficient organic fibrous materials were present to cause ECCS suction strainer clogging.

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In-service testing (IST) results and operational data for the ECCS pumps were reviewed to evaluate ECCS suction strainer conditions over the past three cycles. As part of the IST program, the RHR and Core Spray pumps are performance tested quarterly. During this testing, static and dynamic pump suction pressures are recorded and trended. Strainer clogging due to foreign material can be identified by a decreasing dynamic suction pressure. Decreasing dynamic suction pressure is the result of an increase in strainer differential pressure, because as the strainer clogs, strainer hydraulic resistance increases. Review of IST data for the past three cycles shows that dynamic suction pressure data for the RHR and Core Spray pumps is relatively constant. This evidence demonstrates that the RHR and Core Spray suction strainers are clean.

During both accident and surveillance testing conditions, the High Pressure Coolant Injection (HPCI) system primarily draws suction from the Condensate Storage Tank (CST). If during a transient the CST is depleted or torus level increases to a preset value, then HPCI can draw suction from the torus. During quarterly IST, the HPCI system is lined up to the CST in the recirculation mode. However, once per operating cycle the ability of HPCI to draw suction from the torus is verified under the IST program. These IST results were reviewed for the past three cycles and there was no evidence of HPCI suction strainer clogging or HPCI pump cavitation. Trending of HPCI suction pressure is currently included in the IST program when HPCI takes suction from the CST only. The Authority will update the IST program to include trending of HPCI pump suction pressure when HPCI takes suction from the torus.

Lessons learned from the Limerick event have shown strainer plugging due to foreign material in the suppression pool is the result of extended ECCS system operation at relatively high flow rates. For this reason, the process flow rates and strainer design data were evaluated for the ECCS systems at FitzPatrick to determine which system would be most susceptible to potential strainer clogging. Operation of both trains of RHR in suppression pool cooling would be the most limiting scenario, resulting in relatively high flow rates and providing significant mixing and agitation of the suppression pool.

This scenario is most closely simulated during extended HPCI surveillance test runs. Based on this, an extended HPCI surveillance test run performed in April 1994 was reviewed. During the test, "A" RHR pump operated for approximately 14 hours and all four RHR pumps operated in suppression pool cooling for approximately four hours. Additionally during the summer months, especially following periodic HPCI and Reactor Core Isolation Cooling (RCIC) testing, a single train of RHR (i.e., one or two pumps in one loop) has been operated in the suppression pool cooling mode for extended periods of time. A review of system parameters for the above noted time periods reveals no evidence of strainer clogging and no indication of RHR pump cavitation.

Based on torus inspection and cleaning activities, an effective plant Foreign Material Exclusion (FME) program as described in response to Requested Action 4 below, evaluations of ECCS pump performance, and the satisfactory results provided in response to Requested Action 2 below, no ECCS operability concerns exist at FitzPatrick.

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Requested Action 2

"The operability evaluation in requested action 1 above should be confirmed through appropriate test(s) and strainer inspection(s) within 120 days of the date of NRCB 95-02."

Response to Requested Action 2

On November 7, 1995 all four RHR pumps were placed in the suppression pool cooling mode at maximum flow. The pumps were run for approximately 10 hours. RHR pumps suction pressures, discharge pressures, system flow, and motor amps were recorded during the run. Motor performance and vibration readings were taken near the beginning and end of the pumps run.

Chemistry analyzed eight one liter samples taken from the torus and RHR system. Torus samples were taken from the upper and middle level torus sample points, near the beginning and end of the RHR pumps run. RHR system "A" and "B" samples were taken about midway through and near the end of the RHR pumps run. The eight one liter samples were then filtered and examined both visually and under a microscope. During the visual examination, four out of eight filters each had one fiber determined to be smaller in size (< 0.25") than the suction strainers openings. There was an average of four insignificant microscopic fibers per filter.

An engineering review of system parameters (i.e., RHR pumps suction pressures, discharge pressures, system flow, motor amps, motor performance, and vibration) during the pumps run revealed no evidence of strainer clogging and no indication of RHR pump cavitation.

Based on the above results, engineering concluded that insufficient fibrous materials were present in the suppression pool to cause ECCS suction strainer clogging. The evidence obtained during this run supports the operability evaluation in response to Requested Action 1, and supports the position that the ECCS suction strainers are clean.

The above noted pump run was performed within 120 days from the date of Bulletin 95-02. The ECCS suction strainer inspections will not be performed within 120 days from the date of Bulletin 95-02, based on the above noted results along with the operability determination in response to Requested Action 1. However, the ECCS suction strainers will be inspected during the upcoming Refuel 12/Cycle 13 RFO. In addition, the forced outage schedule includes an inspection of the ECCS suction strainers should a shutdown occur before the next refuel outage. The Authority will inform the NRC of the inspection results 60 days after startup form the Refuel 12/Cycle 13 RFO or any forced shutdown.

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Requested Action 3

"Schedule a suppression pool cleaning. The schedule for cleaning the pool should be consistent with the operability evaluation in requested action 1 above. In addition, a program for periodic cleaning of the suppression pool should be established, including procedures for the cleaning of the pool, criteria for determining the appropriate cleaning frequency, and criteria for evaluating the adequacy of pool cleanliness."

Response to Requested Action 3

In 1988 FitzPatrick implemented a suppression pool preservation initiative. As part of this initiative, debris (e.g., sludge) has been cleaned from the suppression pool four times since January 1988. This included cleaning the ECCS suction strainers and all 16 torus bays utilizing Authority approved vendor procedures, during the 1995 Refueling Outage (RFO) (January 1995).

In June 1995, a torus preservation program was put in place. This program includes cleaning of the ECCS suction strainers and all 16 torus bays and inspections of the ECCS suction strainers, utilizing Authority approved vendor procedures. These activities are scheduled for the upcoming Refuel 12/Cycle 13 RFO. The Authority will inform the NRC of the results of these inspections 30 days after startup from the Refuel 12/Cycle 13 RFO.

By September 30, 1996, the torus preservation program will be enhanced to include criteria for determining the appropriate suppression pool cleaning frequency, measures for sampling suppression pool water, and criteria for evaluating the adequacy of pool cleanliness.

Requested Action 4

"Review Foreign Material Exclusion (FME) procedures and their implementation to determine whether adequate control of materials in the drywell, suppression pool, and systems that interface with the suppression pool exists. This review should determine if comprehensive FME controls have been established to prevent materials that could potentially impact ECCS operation from being introduced into the suppression pool, and whether workers are sufficiently aware of their responsibilities regarding FME. Any identified weaknesses should be corrected. In addition, the effectiveness of the FME controls since the last time the suppression pool was cleaned and the ECCS strainers inspected, and the impact that any weaknesses noted may have on the operability of the ECCS should be assessed."

Response to Requested Action 4

FitzPatrick FME procedures were evaluated for effectiveness in preventing foreign material from being introduced into the suppression pool.

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During the 1995 RFO, preventing foreign material from entering the torus was controlled under AP-05.06 (Reference 2). Due to the importance of keeping the torus and suction strainers as clean as possible, the highest class (Class A) of cleanliness was imposed during the time that the torus hatch was opened. Class A cleanliness includes log-in and log-out forms for individuals entering the torus, constant foreign material monitoring, and tool accountability. Since the last time the suppression pool was cleaned and the ECCS suction strainers inspected, work performed on systems that interface with the suppression pool has been controlled under AP-05.06.

Per AP-05.06 workers are responsible to ensure that systems and components are not contaminated with foreign material and to ensure cleanliness is as good as or better when closing systems and components, than when the systems or components were opened. Additionally, workers were briefed on appropriate FME practices prior to entering the torus during the 1995 RFO.

Per FitzPatrick procedures, inspections are performed to ensure that the drywell is free of loose objects that could become missile hazards, that drywell temporary air filters have been removed, and that the drywell and downcomers are free of debris and foreign material. Discrepancies identified during inspections are resolved.

Based on the above, FME procedures have been implemented at FitzPatrick which ensure adequate control of materials in the drywell, suppression pool, and systems that interface with the suppression pool. Comprehensive FME controls have been established to prevent materials that could potentially impact ECCS operation from being introduced into the suppression pool. Additionally, workers are aware of their responsibilities regarding FME. Effective FME controls have been in place since the last time the suppression pool was cleaned and the ECCS suction strainers inspected.

Requested Action 5

"Consider additional measures such as suppression pool water sampling and trending of pump suction pressure to detect clogging of ECCS suction strainers."

Response to Requested Action 5

As stated in response to Requested Action 3, the Authority will include suppression pool water sampling measures in the torus preservation program. Trending of RHR and Core Spray pump suction pressures is included in the IST program. By June 30, 1996, the Authority will update the IST program to include trending of HPCI pump suction pressure when HPCI takes suction from the torus. This date is prior to the next scheduled In-service test when HPCI takes suction from the torus.

Summary

The actions taken by the Authority demonstrate compliance with 10 CFR 50.46 in that the status of suppression pool cleanliness will not adversely impact ECCS performance and the ECCS will continue to perform the safety function of long-term decay heat removal following a LOCA.

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References

1. BWROG-95083, Recommended Utility Interim Actions in Response to the Recent ECCS Suction Strainer Plugging Event at Limerick 1, dated September 29, 1995.

2. AP-05.06, "System Internal Cleanliness and Foreign Material Exclusion".

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ATTACHMENT 2

Summary of Commitments

Number	Commitment	Due Date
JAFP-95-0494-01	Perform as-found and as-left ECCS suction strainer inspections and clean the ECCS suction strainers and all 16 torus bays using Authority approved vendor procedures.	R12/C13 RFO
JAFP-95-0494-02	Update the IST program to include trending of HPCI pump suction pressure when HPCI takes suction from the torus.	6/30/96
JAFP-95-0494-03	Enhance the torus preservation program to include criteria for determining the appropriate suppression pool cleaning frequency, measures for sampling suppression pool water, and criteria for evaluating the adequacy of pool cleanliness.	9/30/96
JAFP-95-0494-04	Inform the NRC of the results of the ECCS suction strainer inspections.	60 days after S/U from the R12/C13 RFO or forced outage
JAFP-95-0494-05	Inspect ECCS suction strainers if forced shutdown occurs prior to next refuel outage.	Forced Outage