UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 204 TO FACILITY OPERATING LICENSE NO. DPR-59

POWER AUTHORITY OF THE STATE OF NEW YORK

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

DOCKET NO. 50-333

1.0 INTRODUCTION

By letter dated September 28, 1992, the Power Authority of the State of New York (the licensee) submitted a request for changes to the James A. FitzPatrick Nuclear Power Plant Technical Specifications (TSs). The requested changes would revise the flow requirement for the Core Spray (CS) pumps and the associated Bases. The change reduces the CS pump minimum flow acceptance criteria by 10% and addresses an inconsistency between the system leakage rates in the Updated Final Safety Analysis Report (UFSAR) and the TSs. Specifically, the surveillance testing required by the TSs is intended to verify the capability of a core spray pump to deliver acceptable flow to the core. The new CS pump minimum flow acceptance criteria now accounts for system leakage that is not delivered to the core.

2.0 DISCUSSION

The Emergency Core Cooling System (ECCS) for the James A. FitzPatrick Nuclear Power Plant consists of the following systems:

(a) High Pressure Coolant Injection (HPCI) system.
(b) Automatic Depressurization System (ADS).
(c) Core Spray System (consisting of two loops, one pump per loop, each pump powered from separate diesel generators).
(d) Low Pressure Coolant Injection (LPCI) mode of the RHR system (consisting of two loops, two pumps per loop, with each pump in a loop powered from a different diesel generator).

The CS System is one of several ECCSs used to mitigate the consequences of loss-of-coolant accidents (LOCAs). Core spray is comprised of two subsystems (independent loops) with each subsystem consisting of a 100 percent capacity motor driven pump, piping, valves and a sparger to transfer water from the suppression pool to the reactor vessel. The A and B core spray lines enter the reactor vessel through two nozzles located 180° apart to provide physical

separation. Each nozzle has a thermal sleeve that is welded into a T box. Two pipes are run from the T box to form a semicircular header with a downcomer at each end. The downcomer has an elbow where the spray lines pass through the upper part of the shroud and into the spray sparger.

The core spray pumps are tested in accordance with Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code and Technical Specifications 4.5.A.1.b and 4.5.F.1 to ensure that adequate emergency core cooling capacity is available. The current requirement in the TSs is that core spray pumps deliver at least 4625 gpm against a system head corresponding to a reactor vessel pressure greater than or equal to 113 psi above primary containment pressure. The surveillance test should also account for system leakage that is not delivered to the core. Surveillance testing is conducted in accordance with the In-Service Testing (IST) program.

The purpose of this change request is to reduce the flow requirement for core spray surveillance testing. The change will also clarify the testing requirements for system leakage.

3.0 EVALUATION

The CS system is an emergency core cooling system used to mitigate the consequences of loss-of-coolant accidents and to provide inventory makeup in the alternate shutdown cooling mode in the event that the suction path from the reactor becomes unavailable for shutdown cooling or reactor inventory is lost. The surveillance testing required by Technical Specifications 4.5.A.1.b and 4.5.F.1 is intended to verify the capability of the core spray pump to deliver to the core the flow assumed in the SAFER/GESTR LOCA analysis ("JAFNPP SAFER/GESTR - LOCA Analysis," General Electric Company, NEDC-31317P, October 1986).

A sensitivity analysis (GE "Sensitivity of the JAFNPP Safety Systems Performance to Fundamental System Parameters," July 1986) was performed by the licensee based on the SAFER/GESTR LOCA analysis to assess the conservatism in current and proposed TS requirements for ECCS components. The sensitivity analysis varied component performance requirements to determine the sensitivity of the SAFER/GESTR LOCA analysis results for the design basis accident (i.e., recirculation line break). The flow rates for CS, LPCI, and HPCI were reduced by 10% over their entire range in the analysis. For CS, the reduction was equivalent to a minimum rated flow of 4,163 gpm to the spray nozzles at a reactor vessel pressure equal to 113 psi above containment pressure.

Reducing the CS pump minimum flow acceptance criteria by 10% effectively reduces the criteria from 4625 gpm to 4163 gpm. However, the CS flowrate used in the LOCA analysis is the CS flowrate inside the core shroud. System leakage (i.e., the difference between CS pump flowrate and CS flowrate inside

the core shroud) must also be accounted for when establishing CS pump minimum flow acceptance criteria.

When the FitzPatrick plant was being designed, leakage was postulated to occur from the thermal sleeve between the T box and vessel nozzle and a quarter inch vent hole in the T box that allowed for release of noncondensable gases. The leakage requirement included in this proposed TS change is based on an assessment of the actual system leakage. The assessment was part of the analysis used to validate CS flowrate after repair of a crack in the core spray piping outside the shroud on the "B" loop. The assessment identifies the elimination of thermal sleeve leakage before plant operation and calculates the upper bound leakage from the upper T box vent hole (0.25 plus or minus .05 inch) as less than 20 gpm. The crack in the "B" loop core spray piping was repaired by welding a clam shell on the upper riser outside the shroud. The weld covers only 5/6 of the circumference of the pipe and calculations conservatively conclude that leakage from the unwelded sector is less than 40 gpm.

Based on the above, the required CS flowrate must allow for leakage of 20 gpm and 60 gpm to the "A" and "B" loops, respectively. Since 4163 gpm is required for delivery to the core, the new acceptance criteria (4265 gpm) conservatively bounds the calculated maximum leak rate.

The LOCA analysis performed using the approved SAFER/GESTR evaluation models per Appendix K to 10 CFR Part 50, demonstrates that, for a 10% reduction in all ECCS flow rates, the peak cladding temperature (PCT) will increase by 88 °F. Since the current limiting licensing PCT is more than 600 °F below the allowable 2200 °F, the plant will continue to meet the requirements of Appendix K to 10 CFR Part 50 and 10 CFR 50.46 with over 500 °F margin. The statistical upper bound PCT remains at least 150 °F less than the Appendix K case and will meet the 1600 °F limit. The metal water requirements of 10 CFR 50.46 were also evaluated using the reduced CS flow rate. This evaluation indicated an increase in temperature will result in a small increase in the metal water reaction for the limiting break accidents. However, even with this small increase, the metal water requirements of 10 CFR 50.46 are still met. Therefore, the proposed reduced CS flow rate of 4265 gpm is acceptable based on LOCA considerations.

The requirements for inventory makeup to mitigate the consequences of inadvertent draindown while the unit is shutdown were also evaluated. This evaluation concluded that the limiting double ended guillotine break of the recirculation line is larger than any opening associated with draindown and, therefore, the requirements for makeup to mitigate the consequences of an inadvertent draindown while shutdown are bounded by the LOCA. Analysis indicates that a single CS system is capable of long-term cooling for a LOCA and a single CS system is suitable for the cold condition. Therefore, the analysis concludes that there is no adverse safety impact associated with this change to the flow criteria.

The LPCI system is relied on to supply makeup water to the reactor during postulated fire events in accordance with Appendix R of 10 CFR Part 50. These are not pipe break events but are postulated fire events which can threaten the ability of the plant to maintain reactor vessel water inventory, depleted by decay heat and sensible heat boiloff. The core spray pumps were assumed to be inoperable. Therefore, there is no increase in the PCT for the worst case Appendix R fire due to a reduction in core spray flow.

In conclusion, the analysis demonstrates that there is no safety impact associated with this change to the flow criteria. The conclusions of the plant's accident analysis as documented in the UFSAR and the NRC staff's SER at operating license stage are not altered by these changes to the TSs. Therefore, based on the above evaluation, the proposed change to the CS pump flow acceptance criteria is acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New York State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (57 FR 58250). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Brian C. McCabe

Date: February 8, 1994

February 8, 1994

Docket No. 50-333

Mr. William A. Josiger, Acting
Executive Vice President - Nuclear Generation
Power Authority of the State of New York
123 Main Street
White Plains, New York 10601

Dear Mr. Beedle:

SUBJECT: ISSUANCE OF AMENDMENT FOR JAMES A. FITZPATRICK NUCLEAR POWER PLANT (TAC NO. M84621)

The Commission has issued the enclosed Amendment No. 204 to Facility Operating License No. DPR-59 for the James A. FitzPatrick Nuclear Power Plant. The amendment consists of changes to the Technical Specifications (TSs) in response to your application transmitted by letter dated September 28, 1992.

The amendment revises the flow requirement for the Core Spray (CS) pumps and the associated Bases. The change reduces the CS pump minimum flow acceptance criteria by 10% and addresses an inconsistency between the system leakage rates in the Updated Final Safety Analysis Report and the Technical Specifications. Specifically, the surveillance testing required by the TSs is intended to verify the capability of a core spray pump to deliver acceptable flow to the core. The new CS pump minimum flow acceptance criteria now accounts for system leakage that is not delivered to the core.

A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's next regular biweekly Federal Register notice.

Sincerely,
Original signed by.
Brian C. McCabe, Senior Project Manager
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 204 to DPR-59
2. Safety Evaluation

cc w/enclosures:
See next page
*See previous concurrence

OFFICE	PDI-1:LA	PDI-1:PM	*NRR/SRXB	*OGC	PDI-1:D
NAME	CVogan cw	BMcCabe:avl	RJones	MYoung	RCapra RJC
DATE	1/25/94	1/26/94	01/27/94	02/04/94	02/08/94

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