

September 15, 1986

Docket No.: 50-333

Mr. John C. Brons
Senior Vice President -
Nuclear Generation
Power Authority of the State
of New York
123 Main Street
White Plains, New York 10601

Dear Mr. Brons:

SUBJECT: EXEMPTION FROM APPENDIX R TO 10 CFR 50 CONCERNING CORE UNCOVERY
DURING ALTERNATE SAFE SHUTDOWN

Re: James A. Fitzpatrick Nuclear Power Plant

The Commission has issued the enclosed Exemption from the requirements of Sections III.L.1.b and III.L.2.b of Appendix R to 10 CFR Part 50 to the extent that the reactor coolant level be permitted to drop below the top of the core for BWRs during use of alternate safe shutdown procedures following a postulated fire which renders the control room uninhabitable.

A copy of our Safety Evaluation is enclosed.

The Exemption is being forwarded to the Office of the Federal Register for publication.

Also enclosed for your information is a copy of an Environmental Assessment and Finding of No Significant Impact which has been published in the Federal Register.

Sincerely,

Original Signed By
Robert M. Bernero

Robert M. Bernero, Director
Division of BWR Licensing
Office of Nuclear Reactor Regulation

Enclosures:

1. Exemption
2. Safety Evaluation
3. Environmental Assessment

cc w/enclosures:
See next page

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Power Authority of the State of New York

James A. FitzPatrick Nuclear
Power Plant

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The request for exemption is a result of a revised determination made by the licensee, of the time required for an operator to regain control functions for reactor shutdown at the remote alternate shutdown panels, after manual scram of the reactor following a control room fire. The required time has been revised from the currently allowed 10 minutes to 30 minutes. This increase in operator action time would result in a temporary uncovering of the top of the core for a maximum duration of 150 seconds. (At 10 minutes, no uncovering of the core occurs.)

The licensee's submittal dated June 14, 1985 refers to a previously approved (by Safety Evaluation Report dated April 26, 1983) alternate method of achieving remote reactor shutdown. Under the assumption of a loss of all high pressure reactor coolant makeup systems, this method employs the Automatic Depressurization System (ADS) in conjunction with the Residual Heat Removal (RHR) system in the Low Pressure Coolant Injection (LPCI) mode of operation. An analysis performed by General Electric (GE) for the licensee using this method of alternate shutdown and an extended operator action time of 30 minutes has indicated that the extended operator action time does not pose any threat to the fuel cladding integrity or the suppression pool (SP) integrity. The analysis also has indicated that the ability of ADS to discharge low pressure subcooled reactor water to the SP after the vessel is filled would not be compromised. On request from the staff, the licensee provided, (by letter dated December 17, 1985), the GE analysis, titled "Analysis to Extend Operator Action Time for Alternate Shutdown Panels in Support of FitzPatrick Compliance to Appendix R."

The staff has reviewed the licensee's request for exemption and the supporting documentation cited above with regard to the impact of a maximum operator action time of 30 minutes on fuel cladding integrity, the ability of the SP to condense discharged steam via the safety relief valves (SRVs) and the ability of the SP to provide adequate net positive suction head (NPSH) to the RHR/LPCI pump. The staff has also considered other associated issues such as 1) the licensee's capability to complete the needed operator action within 30 minutes to regain control of safe shutdown functions at the alternate shutdown panels, 2) adequate training for the operators to perform the needed manual operations for achieving safe shutdown utilizing the above alternate shutdown method, and 3) emergency lighting and communications capability which would be needed to perform these operations.

Based on this review, the staff has determined that the analysis is sufficiently conservative and that the licensee has demonstrated that a maximum operator action time of 30 minutes for utilizing the abovementioned alternate shutdown method does not pose a threat to the fuel cladding integrity. Furthermore, the staff has determined that an operator action time of 30 minutes will not compromise the ability of the SP to condense steam in a stable condition during steam discharge via SRVs, or compromise the integrity of the SP. With regard to possible cavitation of the RHR/LPCI pump, the staff has determined that the available NPSH at the peak SP temperature and associated pressure is well above the minimum NPSH required to prevent cavitation and, therefore, an operator action time of 30 minutes will not compromise the ability of the above alternate shutdown method to achieve cold shutdown.

On these bases, the staff finds the licensee's requested exemption from the requirements of Items III.L.1.b and III.L.2.b of Section III.L of Appendix R to 10 CFR 50, insofar as they relate to maintaining the reactor coolant level above the top of the core for BWRs, to be justified and acceptable.

III.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, this exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. The Commission further determines that special circumstances, as provided in 10 CFR 50.12(a)(2)(ii), are present justifying the exemption, namely that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule-to ensure the ability to effect safe shutdown of the plant through the use of an alternative/ dedicated shutdown system provided for a specific fire area; in this case, for a fire that renders the control room uninhabitable. The licensee has demonstrated that, under this scenario, notwithstanding the maximum time interval of 150 seconds during which the coolant level would drop below the top of the core, safe shutdown could be affected from the remote shutdown panels under an operator action time of 30 minutes using approved alternate shutdown procedures. Accordingly, the Commission hereby grants an exemption, as described in Section II above, from Section III.L, Items III.L.1.b and III.L.2.b of Appendix R to 10 CFR 50, to the extent that the reactor coolant level be permitted to drop below the top of the core during the use of alternate safe shutdown procedures following a fire which renders the control room uninhabitable.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will have no significant impact on the environment (51 FR 31990).

This Exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Robert M. Bernero, Director
Division of BWR Licensing
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland, this 15th day of September 1986.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

EXEMPTION FROM 10 CFR PART 50, APPENDIX R, SECTION III.L,

ITEMS III.L.1.b AND III.L.2.b REQUIREMENTS

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

DOCKET NO. 50-333

1.0 INTRODUCTION

By letter dated June 14, 1985, the Power Authority of the State of New York, licensee for James A. FitzPatrick Nuclear Power Plant (JAF), requested an exemption from the requirements of Appendix R to 10 CFR Part 50, Section III.L, Items III.L.1.b and III.L.2.b. These items require that the reactor coolant make-up function associated with the alternative/dedicated shutdown system provided for a specific fire area be capable of maintaining the reactor coolant level above the top of the core for BWRs (III.L.2.b) and, thus, assure that the system has the capability to maintain the reactor coolant inventory (III.L.1.b). In their submittal, the licensee requested the above exemption, specifically, for a fire event that renders the control room uninhabitable and results in loss of control functions for safe shutdown in the control room. It further requires a maximum operator action time (the time required for an operator to regain the control functions for reactor shutdown at the remote alternate shutdown panels after manual scram of the reactor) of 30 minutes instead of the currently allowed 10 minutes. In their submittal, assuming the loss of all high pressure reactor coolant makeup systems, the licensee referred to a previously approved (Safety Evaluation Report (SER) dated April 26, 1983, relating to alternate shutdown capability at JAF) use of the Automatic Depressurization System (ADS) in conjunction with the Residual Heat Removal (RHR) system in the Low Pressure Coolant Injection (LPCI) mode of operation, as the alternative shutdown method for achieving reactor shutdown. The licensee pointed out that even for the above case, an operator action time of 30 minutes does not pose any threat to the fuel cladding integrity. In support of their requested exemption from applicable Appendix R requirements, which will be needed if the operator action time is extended to 30 minutes from the currently allowed 10 minutes (10 minutes will not result in any core uncover), the licensee provided a summary of the analysis performed by General Electric Company (GE) for JAF. Assuming the use of the above mentioned alternate shutdown method and operator action time of 30 minutes, the GE analysis concluded that the extended operator action time does not pose any threat to the fuel cladding integrity or the suppression pool (SP) integrity. Also it does not compromise the ability of ADS to discharge low pressure subcooled reactor water to the SP after the vessel is filled. On request from the staff, by letter dated December 17, 1985, the licensee provided this GE report, titled "Analysis to Extend Operator Action Time for Alternate Shutdown Panels in Support of FitzPatrick Compliance to Appendix R."

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The NRC had previously determined that the use of ADS in conjunction with LPCI as the alternate shutdown method is acceptable for BWRs. Specifically, the staff had concluded that the above method is acceptable though not preferred, even though it may result in short term uncovering of the upper portion of the core during depressurization of the Reactor Coolant System (RCS). This acceptance is valid provided that the uncovering time is short enough and the amount of fuel uncovered is small enough to preclude a threat to the fuel cladding integrity. With the above considerations, the staff has reviewed the above mentioned submittals with regard to the impact of a maximum operator action time of 30 minutes on fuel cladding integrity, the ability of the SP to condense discharged steam via the Safety Relief Valves (SRVs) and the ability of the SP to provide adequate net positive suction head (NPSH) to the RHR/LPCI pump. The staff has also considered other issues such as 1) the licensee's capability to complete the needed operator action within 30 minutes to regain control of safe shutdown functions at the alternate shutdown panels, 2) adequate training for the operators to perform the needed manual operations for achieving safe shutdown utilizing the above alternate shutdown method, and 3) emergency lighting and communications capability which would be needed to perform these operations.

2.0 EVALUATION

The GE analysis assumes that the fire event has rendered the control room unavailable. Further, the two high pressure reactor coolant makeup systems, namely, the High Pressure Coolant Injection (HPCI) and the Reactor Core Isolation Cooling (RCIC) Systems are assumed inoperable. As a result, the coolant is "boiled off" at high pressure. The analysis assumes that in the above situation, the operator initiates manual depressurization of the RCS by opening six or seven ADS SRVs at 30 minutes following the manual scram of the reactor. The operator achieves depressurization and cooling of the RCS by the use of ADS, one RHR/LPCI pump, one RHR heat exchanger and one RHR service water pump, all initiated from the remote alternate shutdown panels. The analysis further assumes that the automatic initiation of the low-pressure core spray system and other RHR pumps are inoperable and hence unavailable for maintaining the coolant inventory. Therefore, the LPCI system is the only system that functions as the reactor coolant makeup source to maintain the reactor coolant inventory. With the above assumptions, GE evaluated the fuel cladding integrity by determining the duration of core uncovering and the resulting peak fuel cladding temperature, using previously NRC-approved GE models and Appendix K decay heat curve. Based on the analysis, GE has determined that for the above scenario, the reactor water level will drop below the top of the fuel for a maximum of 150 seconds and thereafter the level will be quickly restored upon depressurization by the LPCI system. Allowing no credit for additional cooling of the exposed rods during the 150 seconds by the boiled-off steam (steam cooling), the analysis has determined that the peak fuel cladding temperature will reach a maximum of 1013°F, which is well below the 1500°F - the temperature about which the fuel cladding material

begins to undergo structural change. Based on the above, the staff has determined that the analysis is sufficiently conservative and that the licensee has demonstrated that a maximum operator action time of 30 minutes for utilizing the above mentioned alternate shutdown method does not pose a threat to the fuel cladding integrity.

Regarding the ability of the SP to condense steam in a stable condition during SRV operation involving steam discharge into the SP, the staff has looked at both the peak bulk temperature and the local temperature of the SP during the above operation. According to the GE analysis, the peak bulk temperature of the SP during SRV operation involving steam discharge into the pool is about 147°F, which is below the limiting value of 160°F for SP bulk temperature during the above SRV operation as given in the "basis" section for JAF Technical Specification (TS) 3.7. Assuming a previously approved maximum differential temperature of 43°F between the bulk and local temperature of the SP for SRV steam discharge through a T-quencher device for a BWR with Mark I containment and with no RHR operation, a maximum local temperature of 190°F for the SP during the above SRV operation is calculated. This is below the limit of 200°F allowed for JAF SP local temperature during SRV operation involving steam discharge into the SP, as given in the SER dated December 12, 1984. The GE analysis also shows that the pool will attain a maximum bulk temperature of 193°F with a maximum pressure of 27 psia about 15 hours after manual scram during the cooldown phase of the reactor when sub-cooled water is discharged via the ADS SRVs into the SP. This is below the design limits of 56 psig and 220°F for the JAF SP. Based on the above, the staff has determined that an operator action time of 30 minutes will not compromise the ability of the SP to condense steam in a stable condition during steam discharge via SRVs or the integrity of the SP.

The staff has also looked at the problem of possible RHR/LPCI pump cavitation. From the analysis, the staff has concluded that the SP temperature when the LPCI system begins discharging sub-cooled water through the ADS SRVs is about 147°F, and this is sufficiently low to assure that the RHR/LPCI pump can operate without cavitation. The analysis has further determined that the NPSH at peak temperature and pressure of the SP (193°F, 27 psia as stated above) is 47.5 feet. This is well above the minimum NPSH of 13 feet computed for preventing RHR/LPCI pump cavitation. Based on the above, the staff has determined that an operator action time of 30 minutes will not compromise the ability of the above alternate shutdown method to achieve cold shutdown.

The licensee has implemented the procedures for achieving reactor safe shutdown from outside the control room. Based on available operators (at least 5 including shift supervisor) trained in accordance with 10 CFR Part 55 Appendix A requirements, and manual operations spelled out in the procedures to regain control of safe shutdown functions at the alternate shutdown panels, the staff finds that there is reasonable assurance that these operations can be completed within 30 minutes. The staff also

finds that the licensee has provided emergency lighting in compliance with Item III.J of Appendix R to 10 CFR Part 50. Additionally, as stated in the procedures, the staff finds that the licensee has provided the capability for communication between operators stationed at different alternate shutdown panels, in the form of local dedicated head phone sets.

3.0 CONCLUSION

Based on the above findings, the staff concludes that licensee's proposed maximum operator action time of 30 minutes is acceptable. The staff further concludes that the licensee's request for exemption from III.L.1.b and III.L.2.b, insofar as they relate to the requirement for maintaining the reactor coolant level above the top of the core for BWRs, should also be granted.

Principal Contributor: T. Chandrasekaran

Dated: September 15, 1986

UNITED STATES NUCLEAR REGULATORY COMMISSION
POWER AUTHORITY OF THE STATE OF NEW YORK
DOCKET NO. 50-333
ENVIRONMENTAL ASSESSMENT AND FINDING OF
NO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (NRC/the Commission) is considering issuance of an exemption from the requirements of Appendix R of 10 CFR 50 to the Power Authority of the State of New York (PASNY/the licensee), for the James A. FitzPatrick Nuclear Power Plant located in Oswego County, New York.

ENVIRONMENTAL ASSESSMENT

Identification of Proposed Action:

The licensee would be exempted from the requirements of Sections III.L.1.b and III.L.2.b of Appendix R to 10 CFR 50 to the extent that the reactor coolant level would be permitted to drop below the top of the core during use of alternate safe shutdown procedures following a postulated fire which renders the control room uninhabitable.

The Need for the Proposed Action:

The licensee has performed revised analyses to determine the time required for an operator to regain control functions for reactor shutdown at the remote alternate shutdown panels after manual scram of the reactor following a control room fire. The required time has been revised from 10 minutes to 30 minutes. This increase in operator action time would result in a temporary uncover of the core (i.e., at 10 minutes, no core uncover occurs).

Environmental Impact of the Proposed Action:

The proposed action would not impact the ability to effect safe shutdown of the plant in the event of a fire in the control room, would not pose a threat to the fuel cladding integrity, and would provide an acceptable level

of safety, equivalent to that attained by compliance with Section III.L. of Appendix R to 10 CFR 50. On this basis, the Commission concludes there are no significant radiological environmental impacts associated with this proposed exemption.

With regard to potential nonradiological impacts, the proposed exemption involves features located entirely within the restricted areas as defined in 10 CFR Part 20. It does not affect nonradiological plant effluents and has no other environmental impact. Therefore, the Commission concludes that there are no significant nonradiological environmental impacts associated with the proposed exemption.

Alternative Use of Resources:

This action involves no use of resources not previously considered in the Final Environmental Statement (construction permit and operating license) for the James A. FitzPatrick Nuclear Power Plant.

Agencies and Persons Consulted:

The NRC staff reviewed the licensee's request and did not consult other agencies or persons.

FINDING OF NO SIGNIFICANT IMPACT

The Commission has determined not to prepare an environmental impact statement for the proposed exemption.

Based upon the foregoing environmental assessment, we conclude that the proposed action will not have a significant effect on the quality of the human environment.

For further details with respect to this action, see the request for exemption dated June 14, 1985, which is available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C., and at the Penfield Library, State University College of Oswego, Oswego, New York.

Dated at Bethesda, Maryland, this 2nd of September 1986.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in cursive script that reads "Daniel R. Muller".

Daniel R. Muller, Director
BWR Project Directorate #2
Division of BWR Licensing