November 7, 1988

Docket No. 50-333

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

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Dear Mr. Brons:

SUBJECTS: 1) EXEMPTION FROM 10 CFR 50.62(c)(4) FOR JAMES A. FITZPATRICK NUCLEAR POWER PLANT, REGARDING THE STANDBY LIQUID CONTROL SYSTEM (SLCS)

2) ISSUANCE OF AMENDMENT NO. 116 TO FACILITY OPERATING LICENSE NO. DPR-59 - JAMES A. FITZPATRICK NUCLEAR POWER PLANT, REGARDING SLCS (TAC NO. 69314)

The Nuclear Regulatory Commission, in response to your request for amendment dated August 24, 1988, has issued 1) the enclosed Exemption from 10 CFR Part 50.62(c)(4) and 2) Amendment No. 116 to Facility Operating License No. DPR-59 for James A. FitzPatrick Nuclear Power Plant.

We are granting the Exemption from the requirements of 10 CFR Part 50.62(c)(4) to allow a lower minimum injection flow rate and a lower sodium pentaborate solution concentration in the Standby Liquid Control System (SLCS), based on the smaller size reactor vessel and the use of enriched Boron-10. This is consistent with guidance provided in Generic Letter (GL) 85-03, "Clarification of Equivalent Control Capacity for Standby Liquid Control Systems," January 28, 1985. The bases for this Exemption are discussed in the enclosed Exemption and Safety Evaluation. The Exemption has been forwarded to the Office of the Federal Register for publication.

The amendment revises the Technical Specifications to reflect the above changes to satisfy the Anticipated Transient Without Scram (ATWS) rule requirements specified in 10 CFR Part 50.62.

The NRC staff has concluded that this amendment is acceptable. The enclosed copy of the Safety Evaluation is applicable to the Exemption and the amendment.

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The Notice of Issuance will be included in the Commission's Bi-Weekly Federal Register.

Sincerely,

Robert A. Capra, Director
Project Directorate I-1
Division of Reactor Projects, I/II

Enclosures:
1. Exemption
2. Amendment No. 116 to Operating License No. DPR-59
3. Safety Evaluation

cc: w/enclosure:
See next page

PDI-1	PD	OGC	PDI-1
LA:CVogan	PM:[illegible]elson:dlg		PD:RCapra
10/11/88	10/7/88	10/10/88	10/24/88

Mr. John C. Brons
Power Authority of the State of New York
James A. FitzPatrick Nuclear
Power Plant

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UNITED STATES NUCLEAR REGULATORY COMMISSION

In Matter of POWER AUTHORITY OF THE STATE OF NEW YORK (James A. FitzPatrick Nuclear Power Plant)	)	Docket No. 50-333

EXEMPTION

I.

Power Authority of the State of New York (the licensee) is the holder of Facility Operating License No. DPR-59, which authorizes operation of the James A. FitzPatrick Nuclear Power Plant (the facility). The license provides, among other things, that the facility is subject to all rules, regulations and Orders of the Nuclear Regulatory Commission (the Commission) now or hereafter in effect.

The facility is a boiling water reactor located at the licensee's site in Oswego County, New York.

II.

10 CFR Part 50.62(c)(4) requires that each boiling water reactor have a Standby Liquid Control System (SLCS) with minimum flow capacity equivalent in control capacity to 86 gallons per minute (gpm) with a boron concentration of 13 weight percent sodium pentaborate. The licensee proposes to use a minimum flow rate of 50 gpm and a sodium pentaborate concentration of 11.5 weight percent. Therefore, an exemption from this regulation is required. The sodium pentaborate solution used by the licensee will be made up from boron enriched to 34.7 atom percent Boron-10 isotope.

The requirement established by the regulation was intended to provide for prompt injection of negative reactivity into a boiling water reactor pressure vessel in the event of an anticipated transient without scram (ATWS) event. The reactor vessel size used to establish the required flow rate of 86 gpm and the sodium pentaborate concentration of 13 weight percent was the large 251-inch diameter vessel used in the BWR/5 and BWR/6 designs. The FitzPatrick reactor has a much smaller, 218-inch diameter, vessel. For the FitzPatrick reactor, a lesser flow rate will provide adequate shutdown margin in an ATWS event, equivalent to that called for by the regulation for the larger 251-inch diameter boiling water reactor vessel. The use of enriched boron would allow a concentration lower than 13 weight percent and still provide an equivalent shutdown margin. Refer to Generic Letter 85-03, "Clarification of Equivalent Control Capacity for Standby Liquid Control Systems," January 28, 1985.

III.

In this case, the injection flow rate and boron concentration will provide the equivalent level of control capacity for the smaller FitzPatrick reactor pressure vessel as that called for by the rule based on larger reactor pressure vessels. Requiring FitzPatrick to provide the flow rate-boron concentration capacity specified by the rule would not, in these particular circumstances, serve the underlying purpose of the rule. The purpose of the rule is to reduce the risk from ATWS events by ensuring adequate shutdown margin. Thus, the Commission's staff finds that there are special circumstances in this case which satisfy the standards of 10 CFR Part 50.12(a)(2)(ii).

IV.

As discussed above, the underlying purpose of the requirements of paragraph (c)(4) of 10 CFR Part 50.62 is to ensure adequate shutdown margin in an ATWS event. The underlying purpose is achieved and served by an injection rate of 50 gpm of 11.5 weight percent sodium pentaborate solution.

Accordingly, the Commission has determined that pursuant to 10 CFR Part 50.12(a), the Exemption, as described in Section III, is authorized by law and will not present an undue risk to the public health and safety and is consistent with common defense and security, and special circumstances are present for the Exemption, in that application of the regulation in these particular circumstances is not necessary to achieve the underlying purposes of 10 CFR Part 50.62(c)(4). Therefore, the Commission hereby grants the Exemption from paragraph (c)(4) of 10 CFR Part 50.62 to allow the use of an SLCS injection flow rate of 50 gpm of 11.5 weight percent sodium pentaborate solution, made up from boron enriched to 34.7 atom percent Boron-10 isotope.

Pursuant to 10 CFR Part 51.32, the Commission has determined that the granting of this Exemption will have no significant impact on the environment (53 FR 43954).

This Exemption is effective upon issuance.

Dated at Rockville, Maryland, this 7thday of November 1988.

FOR THE NUCLEAR REGULATORY COMMISSION

Steven A. Varga, Director
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

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

POWER AUTHORITY OF THE STATE OF NEW YORK

DOCKET NO. 50-333

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 116
License No. DPR-59

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Power Authority of the State of New York (the licensee) dated August 24, 1988, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-59 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 116, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert A. Capra

Robert A. Capra, Director
Project Directorate I-1
Division of Reactor Projects, I/II

Attachment:
Changes to the Technical Specifications

Date of Issuance: November 7, 1988

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

ATTACHMENT TO LICENSE AMENDMENT NO. 116

FACILITY OPERATING LICENSE NO. DPR-59

DOCKET NO. 50-333

Revise Appendix A as follows:

Remove Pages	Insert Pages
vii	vii
105	105
107	107
108	108
109	109
109a	109a
110	110
111	111

LIST OF FIGURES

Amendment No. ~~14, 22, 93, 94, 112, 114, 86, 98, 113~~ 116

8 pp.

3.4 LIMITING CONDITIONS FOR OPERATION

3.4 STANDBY LIQUID CONTROL SYSTEM

Applicability:

Applies to the operating status of the Standby Liquid Control System.

Objective:

To assure the availability of a system with the capability to shut down the reactor and maintain the shutdown condition without control rods.

Specifications

A. Normal Operation

During periods when fuel is in the reactor and prior to startup from a cold condition, the Standby Liquid Control System shall be operable except as specified in 3.4.B below. This system need not be operable when the reactor is in the cold condition, all rods are fully inserted and Specification 3.3.A is met.

4.4 SURVEILLANCE REQUIREMENTS

4.4 STANDBY LIQUID CONTROL SYSTEM

Applicability:

Applies to the periodic testing requirements for the Standby Liquid Control System.

Objective

To verify the operability of the Standby Liquid Control System.

Specification:

A. Normal Operation

The operability of the Standby Liquid Control System shall be verified by performance of the following tests:

1. At least once per month -

   Demineralized water shall be recycled to the test tank. Pump minimum flow rate of 50 gpm shall be verified against a system head of ≥ 1,275 psig.

2. At least once during each operating cycle

   Manually initiate the system, except the explosive valves and

3.4 (Cont'd)

C. Sodium Pentaborate Solution

The standby liquid control solution tank shall contain a boron bearing solution with a minimum enrichment of 34.7 atom percent of B-10 that satisfies the volume-concentration requirements of Fig. 3.4-1 at all times when the Standby Liquid Control System is required to be operable and the solution temperature including that in the pump suction piping shall not be less than the temperature presented in Fig. 3.4-2. Tank heater and the heat tracing system shall be operable whenever the SLCS is required in order to maintain solution temperature in accordance with Fig. 3.4-2.

D. If specifications 3.4.A through C are not met, the reactor shall be in the cold condition within 24 hours.

4.4 (Cont'd)

C. Sodium Pentaborate Solution

The availability of the proper boron bearing solution shall be verified by performance of the following tests:

1. At least once per month -

   Boron concentration shall be determined. In addition, the boron concentration shall be determined any time water or enriched sodium pentaborate is added or if the solution temperature drops below the limits specified by Fig. 3.4-2.

2. At least once per day -

   Solution volume and the solution temperature shall be checked.

3. At least once per operating cycle -

   a. The temperature and level elements shall be calibrated.

   b. Enrichment of B-10 (in atom percent) shall be checked.

3.4 and 4.4 BASES

A. Normal Operation

The design objective of the Standby Liquid Control System is to bring the reactor from full power to cold, xenon-free shutdown assuming that no control rods can be inserted. To do this, the Standby Liquid Control System is designed to inject a quantity of boron which produces a minimum concentration equivalent to 660 ppm of natural boron in the reactor core. Six hundred and sixty ppm boron concentration in the reactor core is required to bring the reactor from full power to a subcritical condition considering:

- o the reactivity insertion due to temperature decrease caused by changing water density,
- o decay of xenon poisoning
- o uncertainties and biases in the analyses and
- o 25% margin for potentially imperfect mixing of the sodium pentaborate solution in the reactor water.

The design basis of the SLCS requires that injection be completed in a time period no less than 23 minutes and no greater than 125 minutes. The upper time limit (125 min) for complete injection of the sodium pentaborate solution was selected to override the rate of reactivity insertion due to cooldown of the reactor following the xenon poison peak. The lower time limit (23 min) is based on the need to allow adequate mixing, so the boron does not circulate in uneven concentrations that could cause local power fluctuations.

The technical specifications assure that the minimum injecting time for the SLC System is 44 minutes and maximum injection time 96 minutes, thus meeting the plant design basis. In addition to meeting its original design basis, the system must also satisfy the Anticipated Transient Without Scram (ATWS) Rule, 10 CFR 50.62 paragraph (c) (4).

The ATWS Rule requires a minimum flow capacity and boron content equivalent in control capacity to 86 gallons per minute of 13 weight percent sodium pentaborate solution. The "equivalent in control capacity" wording was clarified in Generic Letter 85-03. Equivalence can be obtained by increasing the flow, boron concentration, or boron enrichment. For the FitzPatrick plant, the rule is met by using boron enriched to 34.7 atom percent boron-10 and a pumping rate of 50 gpm. The method used to show equivalence with 10 CFR 50.62 is described in NEDE - 31096 - P-A :

$$E/19.8 \times C/13 \times M251/M \times Q/86 \geq 1$$

where

E = boron enrichment = 34.7 atom %
Q = SLCS flow rate = 50 gpm
M = mass of water in reactor vessel and recirculation system at hot rated condition 491,700 lbs. for FitzPatrick plant
M251 = mass of water in vessel and recirculation system at hot rated condition (628,300 lbs.) for 251 - inch diameter vessel plant
C = sodium pentaborate solution concentration (weight percent) greater than or equal to 10 percent

ATWS requirements are satisfied at all concentrations above 10 weight percent for a minimum enrichment of 34.7 atom percent of B-10.

Figure 3.4-1 shows the permissible region of operation on a sodium pentaborate solution volume versus concentration graph. This curve was developed for 34.7% enriched B-10 and a pumping rate of 50 gpm. Each point on this curve provides a minimum of 660 ppm of equivalent natural boron in the reactor vessel upon injection of SLC solution. At a solution volume of 2200 gallons, a weight concentration of 13% sodium pentaborate, enriched to 34.7% boron-10 is needed to meet shutdown requirements. The maximum storage volume of the solution is 4780 gallons which is the net overflow volume in the SLC tank.

Boron concentration, isotopic enrichment of boron-10, solution temperature, and volume are checked on a frequency adequate to assure a high reliability of operation of the system should it ever be required. Experience with pump operability indicates that monthly testing is adequate to detect if failures have occurred.

The only practical time to test the Standby Liquid Control System is during a refueling outage and by initiation from local stations. Components of the system are checked periodically as described above and make a functional test of the entire system on a frequency of more than once each refueling outage unnecessary. A test of explosive charges from one manufacturing batch is made to assure that the charges are satisfactory. A continuous check of the firing circuit continuity is provided by pilot lights in the control room.

The relief valves in the Standby Liquid Control System protect the system piping and positive displacement pumps, which are nominally designed for 1,500 psig, from overpressure. The pressure relief valves discharge back to the standby liquid control pump suction line.

B. Operation with Inoperable Components

Only one of two standby liquid control pumping circuits is needed for operation. If one circuit is inoperable, there is no immediate threat to shutdown capability, and reactor operation may continue during repairs. Assurance that the remaining system will perform its function and that reliability is good is obtained by demonstrating pump operation in the operable circuit at least daily.

C. Sodium Pentaborate Solution

To guard against precipitation, the solution, including that in the pump suction piping, is kept at least 10°F above saturation temperature. Figure 3.4-2 shows the saturation temperature including 10°F margin as a function of sodium pentaborate solution concentration. Tank heater and heat tracing system are provided to assure compliance with this requirement. The set points for the automatic actuation of the tank heater and heat tracing system are established based on the solution concentration. Temperature and liquid level alarms for the system annunciate in the control room. Pump operability is checked on a frequency to assure a high reliability of operation of the system should it ever be required.

Once the solution is prepared, boron concentration does not vary, unless more enriched sodium pentaborate or more water is added. Level indications and alarms indicate whether the solution volume has changed which might indicate a possible solution concentration change. The test interval has been established considering these factors.

Boron enrichment (B-10 atom percent) does not vary with the addition of enriched sodium pentaborate material or water to the SLC tank provided 34.7% enriched (B-10 atom percent) is added. Therefore, a check once per operating cycle is adequate to ensure proper enrichment.

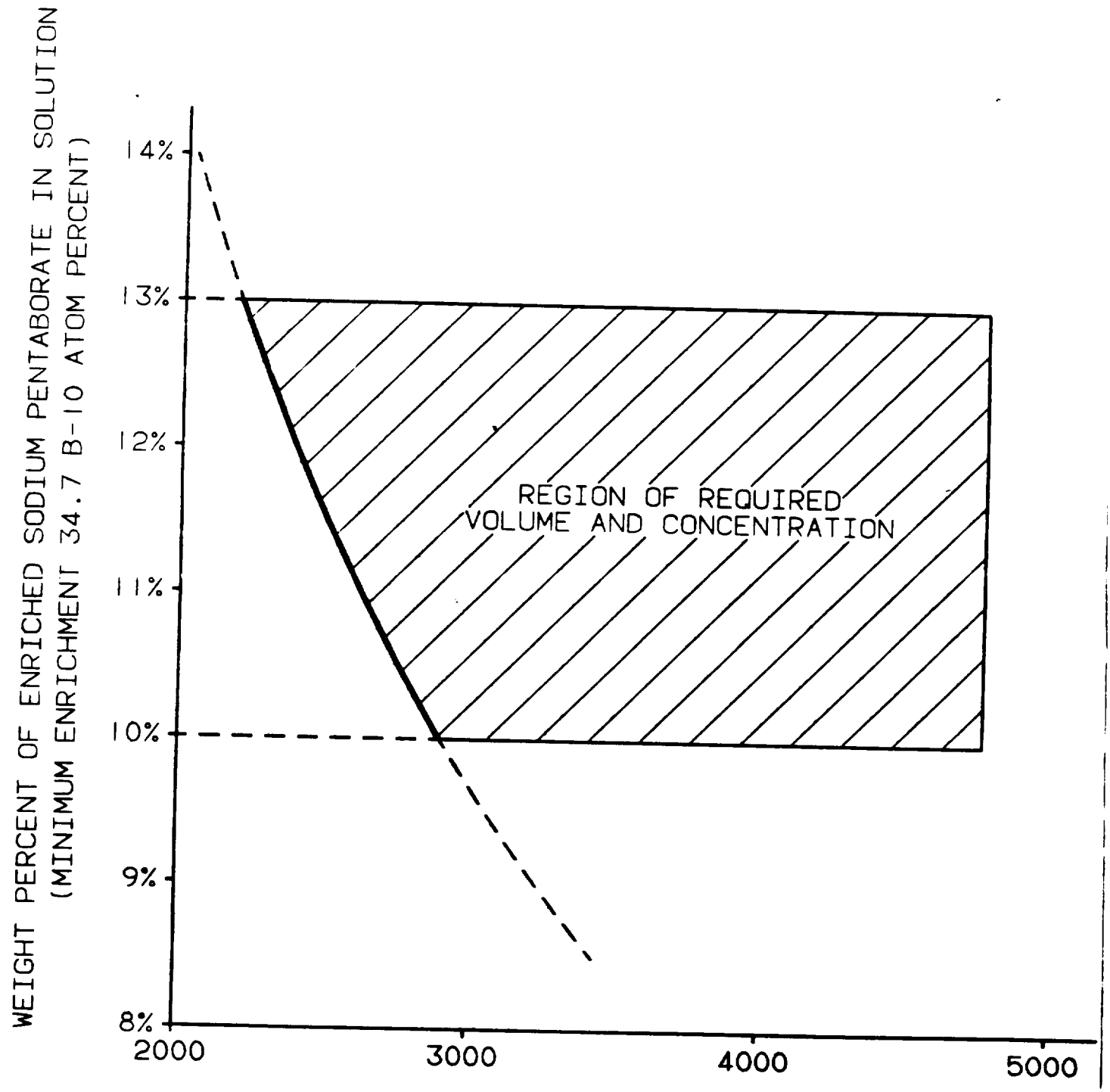
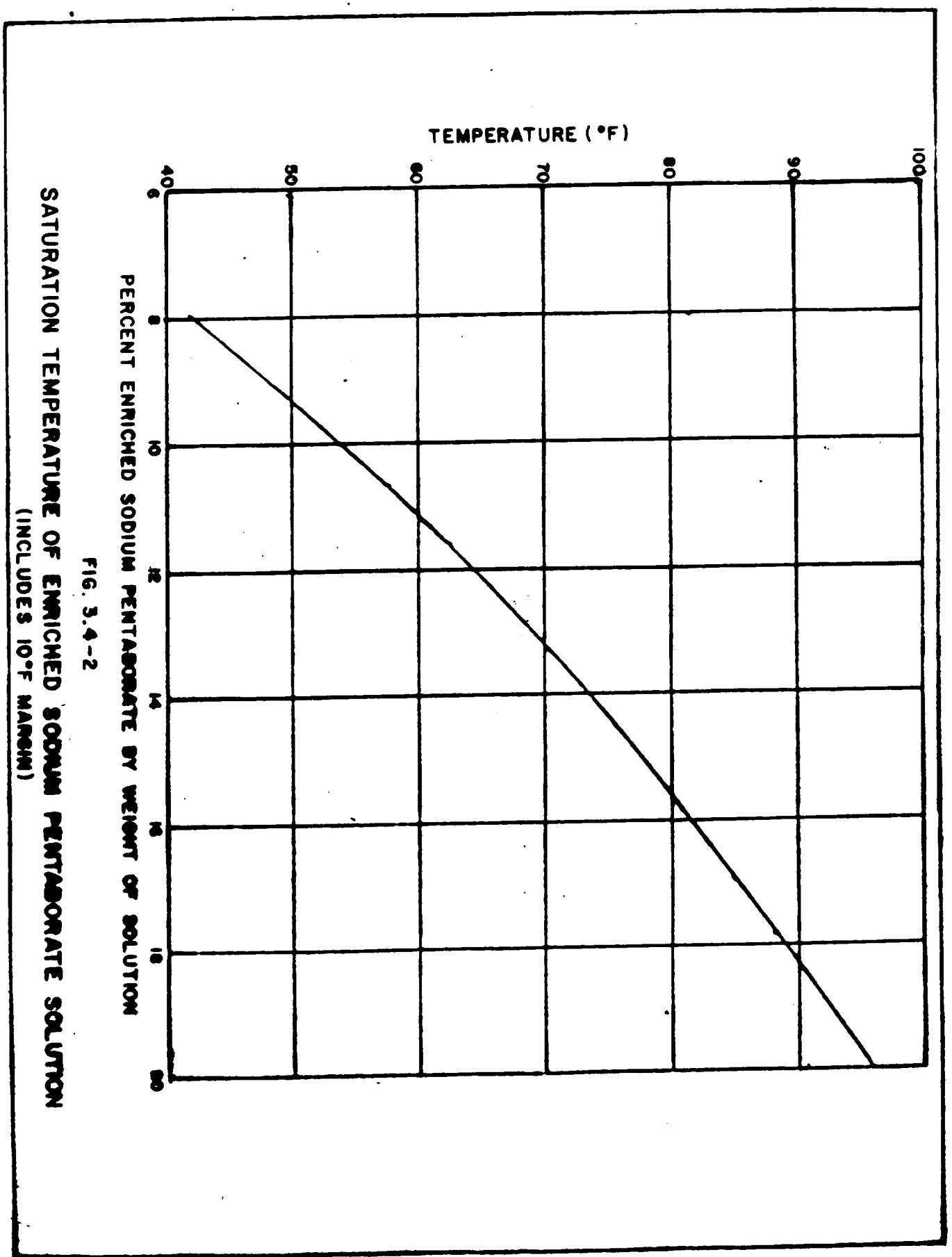


FIG.3.4-1

SODIUM PENTABORATE SOLUTION(MINIMUM 34.7 B-10 ATOM% ENRICHED)
VOLUME CONCENTRATION REQUIREMENTS.



SATURATION TEMPERATURE OF ENRICHED SODIUM PENTABORATE SOLUTION
(INCLUDES 10°F MARGIN)

FIG. 3.4-2

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 116 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

INTRODUCTION

By letter dated August 24, 1988, the Power Authority of the State of New York, licensee for the James A. FitzPatrick Nuclear Power Plant, proposed revisions to the Technical Specifications (TS). The changes address the use of boron, enriched in the isotope B-10, in the sodium pentaborate solution used in the Standby Liquid Control System (SLCS) in order to meet the requirements of the Anticipated Transient Without Scram (ATWS) Rule, 10 CFR Part 50.62 paragraph (c)(4). The proposed changes revise TS Sections 3.4.C, 4.4.A, 4.4.C, Figures 3.4-1 and 2, and Bases 3.4 and 4.4.

EVALUATION

The proposed TS changes are intended to meet the requirements of the ATWS Rule, 10 CFR Part 50.62(c)(4). The ATWS Rule requires that the SLCS be equivalent in control capacity to a system with an 86 gpm injection rate, using 13 weight percent unenriched sodium pentaborate solution, in a system with a 251 inch diameter reactor vessel. Of the several proposed approaches presented in the General Electric report (Ref. 1), and approved in the NRC evaluation (Ref. 2), the licensee has chosen to use enriched (in B-10) boron. Using the calculation methods of Reference 1 allows a minimum concentration of 11.5 weight percent sodium pentaborate when using an enrichiment of 34.7 atom percent B-10, an injection rate of 50 gpm and a water mass of 491,700 pounds (218 inch vessel). The new limits are reflected in the revised TS Section 3.4.C and Figure 3.4-1.

The licensee's submittal stated that surveillance and positive verification will be performed periodically (once per month) to assure that the correct boron concentration is maintained. When additional chemicals, e.g., boron or boric acid are added to the storage tank, or if the solution temperature drops below specified limits, the boron concentration will also be verified (TS Section 4.4.C). The enrichment of B-10 will be checked at least once per operating cycle. Periodic verification of the 50 gpm flow rate is also performed (TS Section 4.4.A). The temperature-concentration requirements of existing Figure 3.4-2 are unchanged; however, the Figure is revised to reflect

an editorial change in the title. The aforementioned surveillance requirements provide reasonable assurance that an adequate neutron poison level will be maintained, are consistent with previously reviewed specifications, and are, therefore acceptable. The bases to Technical Specification 3.4 and 4.4, which were revised to reflect the proposed changes, are also acceptable.

ENVIRONMENTAL CONSIDERATION

This amendment involves a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes to the surveillance requirements. The 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 this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR Part 51.22(c)(9). Pursuant to 10 CFR Part 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

CONCLUSIONS

The licensee has requested TS changes for James A. FitzPatrick Nuclear Power Plant which would provide for the use of enriched boron in the SLCS to meet the requirements of 10 CFR Part 50.62(c)(4). The approach selected by the licensee and the associated TS are acceptable. The staff 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, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: November 7, 1988

PRINCIPAL CONTRIBUTOR:

M. McCoy

REFERENCES

1. "Anticipated Transients Without Scram: Response to NRC ATWS Rule, 10 CFR 50.62," NEDE-31096-P, December 1985.

2. "Safety Evaluation of Topical Report (NEDE-31096-P) 'Anticipated Transients Without Scram: Response to ATWS Rule, 10 CFR Part 50.62,'" letter from G. Lainas (NRC) October 21, 1986.