

REGULATORY PROJECT FILE

JUNE 10 1980

Docket No. 50-321

Mr. William A. Widner
Vice President - Engineering
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

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Dear Mr. Widner:

The Commission has issued the enclosed Amendment No. 76 to Facility Operating License No. DPR-57 for the Edwin I. Hatch Nuclear Plant, Unit No. 1. The amendment consists of changes to the Technical Specifications to (1) remove the current restriction on the Operating Limit Minimum Critical Power Ratios, and (2) add limiting conditions for operation and surveillance requirements for End-of-Cycle Recirculation Pump Trip (EOC-RPT). The amendment completes our action on your application dated March 22, 1979, as supplemented by your letters dated May 11 and 16, June 4, 1979, and February 28, 1980.

During the review of your proposed Technical Specifications for the EOC-RPT, we recommended changes to more clearly specify the limiting conditions for operation, action statements and surveillance requirements. These were discussed with members of your staff and they agreed. Further, it is our understanding from inter-staff discussions that you will (1) make improvements in the protective fusing of the EOC-RPT system at the first opportunity but no later than the end of the next refueling outage, and (2) perform suitable circuit breaker time-response tests to verify that the EOC-RPT response time is no greater than the response time used in the transient calculations for the corresponding operating cycle. Each of these items is discussed in our evaluation documents supporting the amendment.

Our evaluation is based in part on a technical evaluation performed for us by the Lawrence Livermore Laboratory (LLL). Copies of these documents as well as a related Notice of Issuance are also enclosed.

Sincerely,

Original signed by
Robert W. Reid
Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Licensing

ORB#4:DL
RIngram
06/4/80

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Enclosures:
1. Amendment No. 76 to DPR-57

2. Evaluation	ORB#4:DL	C-ORB#4:DL	AD-OR:DL	OELD	AD-SA:DL
OFFICE 2	DVerrelli:kb	RReid	TNovak	Goddard	GLainas
4. Notice	06/11/80	06/5/80	06/10/80	06/9/80	06/5/80
SURNAME					
DATE	See next page				
DATE					



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 WASHINGTON, D.C. 20555
June 10, 1980

Distribution:
 Docket file
 R. Ingram
 ORB#4 Rdg.

Docket No. **50-321**

Docketing and Service Section
 Office of the Secretary of the Commission

SUBJECT: EDWIN I. HATCH NUCLEAR PLANT, UNIT NO. 1

Two signed originals of the Federal Register Notice identified below are enclosed for your transmittal to the Office of the Federal Register for publication. Additional conformed copies (**12**) of the Notice are enclosed for your use.

- Notice of Receipt of Application for Construction Permit(s) and Operating License(s).
- Notice of Receipt of Partial Application for Construction Permit(s) and Facility License(s): Time for Submission of Views on Antitrust Matters.
- Notice of Availability of Applicant's Environmental Report.
- Notice of Proposed Issuance of Amendment to Facility Operating License.
- Notice of Receipt of Application for Facility License(s); Notice of Availability of Applicant's Environmental Report; and Notice of Consideration of Issuance of Facility License(s) and Notice of Opportunity for Hearing.
- Notice of Availability of NRC Draft/Final Environmental Statement.
- Notice of Limited Work Authorization.
- Notice of Availability of Safety Evaluation Report.
- Notice of Issuance of Construction Permit(s).
- Notice of Issuance of Facility Operating License(s) or Amendment(s).
- Other: Amendment No. 76. Referenced documents have been provided PDR.

Division of Licensing, ORB#4
 Office of Nuclear Reactor Regulation

Enclosure:
 As Stated

OFFICE →	ORB#4:DL				
SURNAME →	R. Ingram				
DATE →	06/11/80				



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

June 10, 1980

Docket No. 50-321

Mr. William A. Widner
Vice President - Engineering
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

Dear Mr. Widner:

The Commission has issued the enclosed Amendment No. 76 to Facility Operating License No. DPR-57 for the Edwin I. Hatch Nuclear Plant, Unit No. 1. The amendment consists of changes to the Technical Specifications to (1) remove the current restriction on the Operating Limit Minimum Critical Power Ratios, and (2) add limiting conditions for operation and surveillance requirements for End-of-Cycle Recirculation Pump Trip (EOC-RPT). The amendment completes our action on your application dated March 22, 1979, as supplemented by your letters dated May 11 and 16, June 4, 1979, and February 28, 1980.

During our review of your proposed Technical Specifications for the EOC-RPT, we recommended changes to more clearly specify the limiting conditions for operation, action statements and surveillance requirements. These were discussed with members of your staff and they agreed. Further, it is our understanding from inter-staff discussions that you will (1) make improvements in the protective fusing of the EOC-RPT system at the first opportunity but no later than the end of the next refueling outage, and (2) perform suitable circuit breaker time-response tests to verify that the EOC-RPT response time is no greater than the response time used in the transient calculations for the corresponding operating cycle. Each of these items is discussed in our evaluation documents supporting the amendment.

Our evaluation is based in part on a technical evaluation performed for us by the Lawrence Livermore Laboratory (LLL). Copies of these documents as well as a related Notice of Issuance are also enclosed.

Sincerely,

A handwritten signature in cursive script, reading "Robert W. Reid".

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Licensing

Enclosures:

1. Amendment No. 76 to DPR-57
2. Evaluation
3. LLL Report
4. Notice

cc w/enclosures: See next page

Mr. William Widner
Georgia Power Company

cc:

G. F. Trowbridge, Esquire
Shaw, Pittman, Potts and Trowbridge
1800 M Street, N. W.
Washington, D. C. 20036

Ruble A. Thomas
Vice President
P. O. Box 2625
Southern Services, Inc.
Birmingham, Alabama 35202

Ozen Batum
P. O. Box 2625
Southern Services, Inc.
Birmingham, Alabama 35202

Mr. H. B. Lee, Chairman
Appling County Commissioners
County Courthouse
Baxley, Georgia 31513

Mr. L. T. Gucwa
Georgia Power Company
Engineering Department
P. O. Box 4545
Atlanta, Georgia 30302

Mr. Max Manry
Georgia Power Company
Edwin I. Hatch Plant
P. O. Box 442
Baxley, Georgia 31513

U. S. Environmental Protection
Agency
Region IV Office
ATTN: EIS COORDINATOR
345 Courtland Street, N. E.
Atlanta, Georgia 30308

Appling County Public Library
Parker Street
Baxley, Georgia 31513

Mr. R. F. Rodgers
U. S. Nuclear Regulatory Commission
P. O. Box 710
Baxley, Georgia 31513

Director, Technical Assessment
Division
Office of Radiation Programs (AW 459)
US EPA
Crystal Mall #2
Arlington, Virginia 20460

cc w/enclosure(s) & incoming dtd.:
03/22/79, 05/11/79, 05/16/79, 06/04/79 &
Charles H. Badger 02/28/80
Office of Planning and Budget
Room 610
270 Washington Street, S. W.
Atlanta, Georgia 30334



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

GEORGIA POWER COMPANY
OGLETHORPE POWER CORPORATION
MUNICIPAL ELECTRIC AUTHORITY OF GEORGIA
CITY OF DALTON, GEORGIA

DOCKET NO. 50-321

EDWIN I. HATCH NUCLEAR PLANT, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 76
License No. DPR-57

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Georgia Power Company, et al., (the licensee) dated March 22, 1979, as supplemented May 11 and 16, June 4, 1979, and February 28, 1980, 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.

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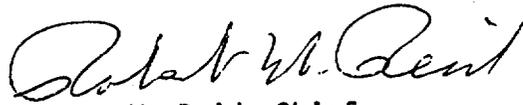
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-57 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 76, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

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

FOR THE NUCLEAR REGULATORY COMMISSION



Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: June 10, 1980

ATTACHMENT TO LICENSE AMENDMENT NO. 76

FACILITY OPERATING LICENSE NO. DPR-57

DOCKET NO. 50-321

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change.

<u>Remove</u>	<u>Insert</u>
3.2-20	3.2-20
3.2-45	3.2-45
3.2-67	3.2-67
----	3.2-67a (added)
3.11-2	3.11-2

Table 3.2-9

INSTRUMENTATION WHICH INITIATES RECIRCULATION PUMP TRIP

Ref. No. (a)	Instrument	Trip Condition Nomenclature	Required Operable Channels per Trip System	Trip Setting	Remarks
1	Reactor Water Level (ATWS RPT) (c)	Low Low (LL2)	1 (b)	≥ -38 inches	Power must be reduced and the mode switch placed in a mode other than the RUN Mode.
2	Reactor Pressure (ATWS RPT)	High	1 (b)	≤ 1120 psig	Power must be reduced and the mode switch placed in a mode other than the RUN Mode.
3 *	EOC - RPT (d)	<ol style="list-style-type: none"> Turbine Stop Valve Closure Turbine Control Valve Fast Closure 	2 (e) (f)	<ol style="list-style-type: none"> Stop Valve $\leq 90\%$ Open Control Valve Hydraulic Press Trip Point 	Trips recirculation pumps on turbine control valve fast closure or stop valve closure when reactor is $>30\%$. (e)

(a) The column entitled "Ref. No." is only for convenience so that a one-to-one relationship can be established between items in Table 3.2-9 and items in Table 4.2-9.

(b) Whenever the reactor is in the RUN Mode, there shall be one operable trip system for each parameter for each operating recirculation pump, except that one trip system may remain inoperable for up to 14 days. If this cannot be met, the indicated action shall be taken.

(c) Anticipated Transients Without Scram - Recirculation Pump Trip

(d) End of Cycle - Recirculation Pump Trip

(e) Either of these two EOC - RPT systems can trip both recirculation pumps. Each EOC - RPT system will trip if 2-out-of-2 fast closure signals or 2-out-of-2 stop valve signals are received.

(f) The requirement for these channels applies from EOC-2000 MWD/t to EOC. The RPT system may be placed in an inoperable status for up to 2 hours to provide the required monthly surveillance. If one EOC-RPT system is inoperable for longer than 72 hours or if both EOC-RPT systems are simultaneously inoperable, an orderly power reduction will be immediately initiated and reactor power will be $<30\%$ within the next 6 hours.

Table 4.2-9

CHECK AND CALIBRATION MINIMUM FREQUENCY FOR INSTRUMENTATION
WHICH INITIATES RECIRCULATION PUMP TRIP

Ref. No. (a)	Instrument	Instrument Check Minimum Frequency	Instrument Functional Test Minimum Frequency	Instrument Calibration Minimum Frequency
1	Reactor Water Level (ATWS RPT) (b)	Once/day	Once/operating cycle	Once/operating cycle
2	Reactor Pressure (ATWS RPT)	None	Once/operating cycle	Once/operating cycle
3*	EOC - RPT Trip			
	a) Initiating Logic	None	Once/month	None
	b) Breakers	None	Once/operating cycle	None
	c) Response Time	None	None	Once/operating cycle
	RPT logics + Breakers			

Notes for Table 4.2-9

- (a) The column entitled "Ref. No." is only for convenience so that a one-to-one relationship can be established between times in Table 3.2-9 and items in Table 4.2-9.
- (b) An ATWS recirculation pump trip logic system functional test shall be performed once per operating cycle.

* This item is effective after installation of EOC-RPT authorized by Amendment No. 76.

3.2.H.5. Main Steam Line Radiation Monitors (Continued)

the reactor through the main steam lines to the condenser. Two instrument channels with two radiation detectors in each channel are arranged in a one upscale per channel trip logic (one-out-of-two-taken-twice). The trip settings are based on limiting the release of radioactivity via the normal ventilation path and rerouting this activity to be processed through the standby gas treatment system.

I. Instrumentation Which Initiates Recirculation Pump Trip (Table 3.2-9)

ATWS - RPT

The ATWS recirculation pump trip has been added at the suggestion of ACRS as a means of limiting the consequences of the unlikely occurrence of a failure to scram during an anticipated transient. The response of the plant to this postulated event falls within the envelope of study events given in General Electric Company Topical Report NEDO-10349, dated March, 1971 and Appendix L of the FSAR.

EOC - RPT

An end-of-cycle recirculation pump trip (EOC-RPT) has been installed which trips both recirculation pumps upon sensing turbine stop valve or control valve fast closure. The prompt RPT is comprised of two separate systems, each capable of tripping both recirculation pumps.

Tripping the recirculation pumps reduces core flow, which reduces void collapse during pressurization events. The reduced void collapse produces a smaller net positive void reactivity addition which results in less of a power increase and consequently a smaller decrease in MCPR.

J. Instrumentation Which Monitors Leakage Into The Drywell (Table 3.2-10)

1. Drywell Equipment Drain Sump Flow Integrator

The equipment drain sump is provided with two sump pumps. A flow integrator is provided on the discharge header. The starting of each sump pump and high sump level are annunciated in the control room. The restarting frequency of a pump motor, in conjunction with the predetermined volume of liquid pumped out during each period, provides an alarm in the main control room indicating when the identified leakage rate limit is reached.

2. Drywell Floor Drain Sump Flow Integrator

The floor drain sump is provided with two sump pumps. A flow integrator is provided on the discharge header. The starting of each sump pump and high sump level are annunciated in the control room. The restarting frequency of a pump motor, in conjunction with the predetermined volume of liquid pumped out during each period, provides an alarm in the main control room indicating when the unidentified leakage rate limit is reached.

3. Scintillation Detector For Monitoring Air Particulates

A sodium-iodide scintillation detector contained in an instrument rack is used to monitor the release of airborne radioactive particulates in the drywell and torus. A high radiation level reading is indicative of a leak in the nuclear system process barrier in the primary containment. A sample that is continuously drawn from the primary containment is collected on traveling filter paper and monitored by a gamma sensitive scintillation detector. Radiation levels are read out by a log rate meter and recorded on a strip chart located in the control room. A high radiation level alarm and a failure alarm are provided and are annunciated in the control room. Also, a high-low flow alarm is provided which annunciates in the control room.

BASES FOR LIMITING CONDITIONS FOR OPERATION

4. Scintillation Detector For Monitoring Radioiodine

A sodium-iodide scintillation detector contained in an instrument rack is used to monitor the release of radioiodine in the drywell and torus. A high radiation

3.11.B. Linear Heat Generation Rate (LHGR)
(Continued)

LHGR is not returned to within the prescribed limits within two (2) hours, then reduce reactor power to less than 25% of rated thermal power within the next four (4) hours. If the limiting condition for operation is restored prior to expiration of the specified time interval, then further progression to less than 25% of rated thermal power is not required.

C. Minimum Critical Power Ratio (MCPR)

The MCPR limit is specified throughout the cycle. From BOC4 to EOC4-2000 MWD/t the MCPR limit is 1.26 for 7 x 7, 1.24 for 8 x 8, and 1.21 for 8 x 8R fuels.* During power operation, MCPR shall be as above at rated power and flow. If at any time during operation it is determined by normal surveillance that the limiting value for MCPR is being exceeded, action shall be initiated within 15 minutes to restore operation to within the prescribed limits. If the steady state MCPR is not returned to within the prescribed limits within two (2) hours, then reduce reactor power to less than 25% of rated thermal power within the next four (4) hours. If the Limiting Condition for Operation is restored prior to expiration of the specified time interval, then further progression to less than 25% of rated thermal power is not required. For core flows other than rated the MCPR shall be K_f times the MCPR value applicable above, where K_f is as shown in Figure 3.11-3.

D. Reporting Requirements

If any of the limiting values identified in Specifications 3.11.A., B., or C. are exceeded, a Reportable Occurrence report shall be submitted.

If the corrective action is taken, as described, a thirty-day written report will meet the requirements of this specification.

4.11.C Minimum Critical Power Ratio (MCPR)

MCPR shall be determined daily during reactor power operation at $\geq 25\%$ rated thermal power and following any change in power level or distribution that would cause operation with a limiting control rod pattern as described in the bases for Specification 3.3.F.

*MCPR values for EOC4-2000 MWD/t to EOC4 are identical to BOC4 to EOC4-2000 MWD/t after installation of EOC-RPT as authorized by Amendment No. 76.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORTING AMENDMENT NO. 76 TO FACILITY OPERATING LICENSE NO. DPR-57

GEORGIA POWER COMPANY
OGLETHORPE POWER CORPORATION
MUNICIPAL ELECTRIC AUTHORITY OF GEORGIA
CITY OF DALTON, GEORGIA

EDWIN I. HATCH NUCLEAR PLANT UNIT NO. 1

DOCKET NO. 50-321

Introduction

By letter dated March 22, 1979, as supplemented by letters dated May 11 and 16, June 4, 1979, and February 28, 1980, Georgia Power Company (the licensee) requested an amendment to the Technical Specifications appended to Facility Operating License No. DPR-57 for the Edwin I. Hatch Nuclear Plant Unit No. 1. The request involved Cycle 4 operation of Hatch 1. The licensee's analysis for Cycle 4 operation included the effect of an End-of-Cycle Recirculation Pump Trip (EOC-RPT) as a supplement to the Reactor Trip System. On August 6, 1979, we issued Amendment No. 69 to DPR-57 for Cycle 4 operation. However, that amendment included a restriction on Minimum Critical Power Ratios (MCPR) pending the completion of our review of hardware implementation of the EOC-RPT feature. This amendment completes our actions on the licensee's March 22, 1979, application and involves: (1) removal of the restriction on MCPR, and (2) addition of limits and surveillance of the EOC-RPT feature.

Evaluation

Various transient events can reduce the MCPR from its normal operating level. To assure that the fuel cladding integrity Safety Limit MCPR would not be violated during any abnormal operational transient, the most limiting transients were reanalyzed by the licensee. The analysis presumed the beneficial effect of the EOC-RPT initiated by turbine stop valve closure or control valve fast closure. Our detailed evaluation of the licensee's transient analysis results was provided in the Safety Evaluation supporting Amendment No. 69 to DPR-57 and is incorporated herein by reference. That evaluation supports a single MCPR limit for each type fuel for the entire cycle assuming an acceptable hardware implementation of the EOC-RPT.

The acceptability of the Hatch 1 EOC-RPT feature was reviewed for the NRC staff by Lawrence Livermore Laboratory (LLL). The basis for acceptance is documented in "Technical Evaluation of the End-of-Cycle Recirculation Pump Trip" which is incorporated herein by reference. We have reviewed the report and agree with its conclusion that the EOC-RPT feature for Hatch 1 meets the criteria of IEEE Std-279-1971, IEEE Std-323-1974, and General Design Criteria 13, 20 through 24, and 29 of Appendix A to 10 CFR 50 and is therefore an acceptable design. However, during our review, we identified certain changes to the licensee's proposed Technical Specifications that should be made to more clearly identify limiting conditions for operation (LCOs) action statements and surveillance requirements. These changes involved: (1) inclusion of action statements for inoperable EOC-RPT channels in Table 3.2-9 vice the licensee's recommendation for inclusion in Table 4.2-9; (2) designation of response time testing as a calibration vice a functional test; and (3) minor editorial changes. Each of these NRC staff recommended changes was discussed with the licensee and he agreed.

We also discussed with the licensee the LLL conclusion that circuit breaker time-response tests should verify that the EOC-RPT response time is no greater than the response time used in the transient calculations for the corresponding fuel cycle. This verification includes a correlation between unloaded and loaded conditions for the EOC-RPT circuit breakers. The licensee agreed.

Based on the above, we find the design of the Hatch 1 EOC-RPT system and the associated Technical Specifications, as amended by the NRC staff, are acceptable.

Environmental Considerations

We have determined that the amendment does not involve a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and pursuant to 10 CFR §51.5(d)(4) that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of the amendment.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: June 10, 1980

TECHNICAL EVALUATION OF THE END-OF-CYCLE
RECIRCULATION PUMP TRIP
FOR
EDWIN I. HATCH NUCLEAR PLANT UNIT 1
(Docket No. 50-321)

L. R. Peterson

May 1980

ABSTRACT

This report documents the technical evaluation of the end-of-cycle recirculation pump trip for the Edwin I. Hatch Nuclear Plant Unit No. 1. The review criteria are based on IEEE Std-279-1971, IEEE Std-323-1974, IEEE Std-338-1977, and General Design Criteria 13, 20 through 24, and 29 of the Code of Federal Regulations, Title 10, Part 50, Appendix A requirements for determining the acceptability of the proposed system.

FOREWORD

This report is supplied as part of the Selected Electrical, Instrumentation, and Control Systems Issues (SEICSI) Program being conducted for the U. S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of Licensing, by Lawrence Livermore Laboratory, Engineering Research Division of the Electronics Engineering Department.

The U. S. Nuclear Regulatory Commission funded the work under the authorization entitled "Electrical, Instrumentation and Control System Support," B&R 20 19 04 031, FIN A-0231.

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TECHNICAL EVALUATION OF THE END-OF-CYCLE
RECIRCULATION PUMP TRIP
FOR
EDWIN I. HATCH NUCLEAR PLANT UNIT 1

(Docket No. 50-321)

L. R. Peterson
Lawrence Livermore Laboratory, Nevada

1. INTRODUCTION

Georgia Power Company (GPC) by its letter dated May 11, 1979 [Ref. 1], requested approval of installation of an end-of-cycle (EOC) recirculation pump trip (RPT) feature at Edwin I. Hatch Nuclear Plant, Unit 1 (Hatch 1) as an amendment to the Reload 3 Licensing Application for that unit which had been submitted March 22, 1979 [Ref. 2].

As a result of NRC staff and consultant questions and the need for additional information from the licensee, NRC review of the EOC-RPT proposal was separated from the Reload-3 Licensing Application to prevent delay of plant restart and fuel cycle-4 operation.

The EOC-RPT feature is installed to improve the thermal margin of a boiling water reactor (BWR) near the end of each fuel cycle by reducing the severity of possible pressurization transients. The two most limiting

pressurization transients near the end-of-cycle would be produced by turbine trip without bypass and generator load rejection without bypass.

The EOC-RPT rapidly cuts off power to the recirculation pump motors during generator load rejection (turbine control valve fast closure) or turbine trip (stop valve closure). This action results in a rapid reduction in recirculation flow and increases the core void content during a pressurization transient, thereby reducing the peak transient power and heat flux.

Operation of the EOC-RPT system reduces the change in reactor critical power ratio (Δ CPR) that would be produced by a pressurization transient. Analyses by General Electric Company (GE) indicate that adding the EOC-RPT feature will result in significant reduction in Δ CPR for pressurization transients involving turbine stop valve closures or turbine control valve closures with assumed bypass failure.

It should be noted that EOC-RPT is not related to the RPT that is associated with an anticipated transient without scram (ATWS-RPT).

2. CORRESPONDENCE AND COMMUNICATIONS

On May 11, 1979, Georgia Power Company amended its March 22, 1979, Reload-3 Licensing Application for Edwin I. Hatch Nuclear Plant Unit 1 [Refs. 1 and 2] to include the EOC-RPT feature. A description of the Hatch 1 EOC-RPT [Ref. 3] and proposed changes to the Hatch 1 Technical Specifications for operation with the EOC-RPT installed [Ref. 4] were included as enclosures in the May 11, 1979, submittal.

As a result of discussions with GPC representatives the NRC staff requested further information on the design logic and equipment qualification standards for the Hatch 1 EOC-RPT installation and requested a comparison of their EOC-RPT design with that of Brown's Ferry 1. The Brown's Ferry 1 EOC-RPT had been approved by NRC as the first design for an operating reactor where safety credit was given for the EOC-RPT protection feature.

The licensee's June 4, 1979 letter [Ref. 5] stated that the RPT logic design for Hatch 1 was the same as that approved for Brown's Ferry 1. GPC also stated that the equipment to be installed on Hatch 1 would be identical to that which is installed on Hatch 2. The licensee stated that in their view the equipment is qualified, based on previous NRC approval of the Hatch 2 EOC-RPT design and that a comparison with the equipment installed on Brown's Ferry 1 was unnecessary. The licensee also submitted an undated document, "Edwin I. Hatch Nuclear Plant Unit 1, Electrical Control and Instrumentation Aspects of End of Cycle Recirculation Pump Trip" [Ref. 6].

NRC staff and LLL consultant review of the Hatch 1 EOC-RPT plans found significant differences in RPT circuit design between the Hatch 1 and the Brown's Ferry 1 installations. The most significant differences involved fusing to provide reactor protective system isolation and equipment protection, means of making the RPT systems inoperable, and system status indications to the reactor operator. Furthermore, the proposed changes to the Technical

Specifications were judged to have an inappropriate EOC-RPT association with AWS-RPT, inadequate EOC-RPT surveillance requirements, inadequate definition of EOC-RPT system inoperable status, and inadequate limitations on plant operation when one or both EOC-RPT systems are inoperable.

A letter from NRC that detailed changes needed in the proposed Technical Specifications and requesting additional information on the Hatch 1 EOC-RPT trip breaker circuits and their operation was sent to the licensee August 17, 1979 [Refs. 7 and 8).

Georgia Power Company by its letter dated February 28, 1980 [Ref. 9] submitted revised Hatch 1 Technical Specifications for operation with the EOC-RPT feature and responses to the NRC August 17, 1979 request for additional information on the Hatch 1 EOC-RPT installation.

A conference call on May 2, 1980 [Ref. 10] between the LLL consultant, the NRC ORB #3 Project Manager, an NRC Plant Systems Branch reviewer, and GPC engineering staff discussed the fuse protection arrangement of the Hatch 1 EOC-RPT breaker control and trip circuits. System time response measurements and verification that the EOC-RPT system is a Class 1E installation were also discussed.

On May 5, 1980, the NRC Project Manager for Hatch 1 informed LLL by telephone [Ref. 11] of Georgia Power Company's commitment to make needed improvements in the protective fusing of the Hatch 1 EOC-RPT system at the first scheduled reactor downtime opportunity, to be no later than the next fuel reload outage.

3. DESIGN DESCRIPTION

The generic design philosophy for the EOC-RPT feature is described in General Electric Company (GE) report NEDO-24119, Basis for Installation of Recirculation Pump Trip System, Brown's Ferry Nuclear Plant, April 1978 [Ref. 12].

The design of the Hatch 1 EOC-RPT installation is described in References 4 and 6 and shown on Hatch 1 drawing number H 17822 [Ref. 13]. The EOC-RPT is part of the reactor protection system (RPS) because it is an essential supplement to the reactor scram system. All components of the EOC-RPT system are Class 1E.

To mitigate the pressurization transient that would be produced by a turbine trip without bypass or a generator load rejection without bypass the EOC-RPT is required to quickly interrupt power to shut down both BWR coolant recirculation pumps when closure of all four turbine stop valves occurs, or when fast closure of all four turbine control valves occurs. An EOC-RPT trip may occur, but is not required, when one turbine stop valve or one turbine control valve remains open. To mitigate pressurization transient effects, the EOC-RPT must shut down the recirculation pumps within approximately 175 ms after initial closure movement of either the turbine stop valves or the turbine control valves.

The EOC-RPT installation is composed of sensors that detect closure of the turbine stop valves or fast closure of the turbine control valves combined with relays, logic circuits, and fast-acting circuit breakers that interrupt the current from the recirculation pump motor-generator set generators to the recirculation pump motors. When the RPT breakers trip open, the recirculation pumps coast down under their own inertia. To satisfy the reactor protection system single-failure criterion, the EOC-RPT has two almost identical divisions that actuate RPT in a one-out-of-two configuration. Either of the two RPT divisions operates independent breakers in the supply circuits of both recirculation pumps motors.

Turbine stop valve closure is detected by four position switches that open when the associated stop valves are less than 90 percent open. Turbine control valve fast closure is detected by four pressure switches in the hydraulic control system for the valves. The pressure switches open when the hydraulic control fluid pressure decreases below the trip level. The stop valve position sensors and the control valve hydraulic pressure sensors for RPT are the same ones used in the reactor scram system to initiate scram when turbine stop valve closure or turbine control valve fast closure occurs.

The actuation of any RPT sensor causes an associated electromagnetic relay to de-energize. The contacts of these relays are combined in logic circuits with contacts from an operating bypass and contacts from a key-controlled manual bypass switch. The logic circuits control current to the trip circuits of the RPT circuit breakers. The operating bypass disables the RPT system when turbine first-stage pressure is less than that for 30 percent reactor power. The same operating bypass concurrently disables the turbine inputs to the scram system. A manual bypass switch allows each RPT division to be disabled and placed out of service for maintenance or testing.

The fast-closure sensors from each of two turbine control valves provide inputs to one RPT division and the sensors from the other two turbine control valves provide inputs to the second RPT division. Similarly, the position switches from each of two turbine stop valves provide inputs to one RPT division and position switches from the other two stop valves provide inputs to the other RPT division. The sensor relay contacts for each RPT division are arranged to form a two-out-of-two logic for the fast closure of control valves and a two-out-of-two logic for closure of the stop valves. The operation of either logic in an RPT division will actuate the EOC-RPT feature.

4. EVALUATION

The EOC-RPT feature is part of the reactor protection system and is an essential supplement to the reactor scram function. The EOC-RPT is required to comply with the criteria of IEEE Std-279-1971 [Ref. 23], IEEE Std-323-1974 [Ref. 24], and IEEE Std-338-1977 [Ref. 25] and with General Design Criteria 13, 20 through 24, and 29 of 10 CFR 50, Appendix A [Ref. 26].

The EOC-RPT system at Edwin I. Hatch Nuclear Plant Unit 1 is similar to that previously approved by NRC for Browns Ferry, Unit 1. The two RPT divisions are physically and electrically independent. The sensors and relays providing inputs to the RPT systems originate from separate Class 1E scram channels. The signal channels are properly grouped and separated to provide independence between the corresponding scram channels and the associated RPT divisions. The sensor relays which actuate both the scram logic and RPT logic are fail-safe and will go to the tripped state on loss-of-power or loss-of-input signal from each sensor.

The RPT circuit breaker control and trip circuits will not trip on loss of power and thus are not fail-safe. The RPT circuit breakers that interrupt the current to the recirculation pump motors require power to actuate. For this reason, the RPT logic circuits, control circuits, and trip circuits operate on 125 Vdc. Each RPT division is supplied by a separate Class 1E-rated 125 Vdc battery power supply with 30 amp inline fuses for the positive and negative lines from the battery supply. A relay in each RPT division senses loss of power to the trip circuit in that division and actuates an "RPT Out of Service or Loss of Control Power" annunciator and alarm for that RPT division in the control room. In addition, indicating lights are provided in the control room to monitor the trip coil circuits and the position of the trip breakers. The NRC has previously found that this departure from fail-safe design is acceptable.

To better meet IEEE 279 Section 4.7 Control and Protection System Interaction criteria GPC has committed to install branch fuses in the EOC-RPT breaker closing circuits. These branch fuses will isolate the EOC-RPT breaker closing circuits from the breaker trip circuits so that a short circuit in the elevating or closing functions of the breaker during reactor operation will not disable breaker trip actuation. GPC plans to install this improvement during the next scheduled reactor downtime, to be no later than the next refueling outage. We consider this satisfactory.

There is one other interconnection between each EOC-RPT division and a non-safety system. When each RPT breaker trips, auxiliary relay contacts in the RPT breaker actuate a control circuit for the recirculation pump motor-generator (M-G) set to de-energize the M-G set after the RPT breaker interrupts the current from the M-G set to the recirculation pump motor. This interlock is adequately isolated so that no credible failure can prevent proper RPT action.

An operating bypass automatically disables the RPT system when the reactor is operating at less than 30 percent power. The operating bypass is annunciated automatically in the control room.

Each RPT division can be bypassed manually by use of an out-of-service keyswitch which is administratively controlled. Use of the out-of-service keyswitch bypass produces a suitable annunciator indication in the control room when the keyswitch is turned to the "RPT SYS INOP" position.

The proposed technical specifications for the Edwin I. Hatch Nuclear Plant Unit No. 1 provide suitable restrictions to limit operating power when one or both of the EOC-RPT divisions are inoperable.

Capability to check the RPT sensors and logic is provided by operating each valve, one at a time. Lights across the relay contacts in the logic indicate proper operation at that point. The RPT divisions do not need to be bypassed to conduct such tests. During the periodic testing

of the scram logic, when two valves are operated simultaneously, the affected RPT division must be bypassed briefly to prevent RPT actuation. The bypass is accomplished by use of the EOC-RPT system out-of-service key switch during the scram-logic test.

The proposed technical specifications for Hatch 1 specify monthly functional checks of the EOC-RPT initiate logic. We consider monthly testing of the EOC-RPT input sensors and logic circuits to be adequate for providing timely indications of component failure.

Although the purpose of the RPT is to mitigate a core-wide pressurization transient, the desired thermal margin advantage can be realized only if the initiating events are sensed on an anticipatory basis, rather than by monitoring reactor pressure directly. The use of pressure switches to sense the loss of hydraulic control fluid pressure to each turbine control valve is adequate to anticipate fast closure of those valves. Similarly, position switches set to trip at 90 percent open will adequately anticipate closure of the turbine stop valves. The EOC-RPT is not given safety credit for any other initiating events.

To be effective, the RPT must be initiated almost immediately. GE states that their analysis shows that manual initiation of a prompt trip of the recirculation pumps, at any reasonable point after the time when automatic action should have occurred, will not produce a significant improvement on the situation. The power to the recirculation pump motor-generator sets can be tripped manually from the control room. Therefore, provisions for manual initiation of the EOC-RPT feature are unnecessary. The NRC has previously approved this position.

The RPT feature is required to reduce recirculation-pump flow after either the turbine control valves or the stop valves start closing, and within a delay time assumed in the transient calculations for that operating cycle. The licensee has specified that the RPT circuit breakers

will have 175 ms maximum response time measured from initial movement of turbine control valves or turbine stop valves until the RPT breaker interrupts current to the recirculation pump motor. The remainder of EOC-RPT system response time will include the time for recirculation pump coastdown after current to the pump is interrupted by the RPT breaker.

We concur with the surveillance requirement in the proposed Edwin I. Hatch Nuclear Plant Unit 1 Technical Specifications that functional and time response tests of the EOC-RPT circuit breakers be conducted once per operating cycle. The GPC plan to test the breakers separately in an unloaded condition is satisfactory for the functional and time response tests provided suitable correlation is made with a reference measurement of response time under load. The GPC procedure to do the time response testing in sections and then add the resulting times of sensor response, logic response, and system action is acceptable. To meet the criteria of IEEE Std-338-1977, Section 6.3.4, suitable correlation of these separate time response measurements must be made to verify that the actual overall EOC-RPT system response time is no greater than the response time in the transient calculations for the corresponding operating cycle. The time response tests and correlation to transient calculations should be made prior to each operating cycle.

5. CONCLUSIONS

Considering the separation, independence, and isolation of the two EOC-RPT divisions and their respective inputs, circuits, and power supplies, the EOC-RPT feature for the Edwin I. Hatch Nuclear Plant Unit 1 meets the criteria of IEEE Std-279-1971, IEEE Std-323-1974, and General Design Criteria 13, 20 through 24, and 29 of 10 CFR 50, Appendix A. We recommend approval of the EOC-RPT system design as submitted by the licensee with the installation of the branch fuses in the EOC-RPT breaker closing circuits to be added during the next scheduled reactor downtime as proposed by the licensee.

We also recommend approval of the proposed change for the addition of an EOC-RPT feature to the Hatch 1 Technical Specifications.

To fulfill the criteria of IEEE Std-338-1977, the separate measurements made during the EOC-RPT circuit breaker time-response tests must be correlated suitably to verify that the EOC-RPT overall system response time is no greater than the response time in the applicable transient calculations for the corresponding operating cycle.

REFERENCES

1. Georgia Power Company letter (C. F. Whitmer) to Director of Nuclear Reactor Regulation NRC/NRR dated May 11, 1979.
2. Georgia Power Company, "Edwin I. Hatch Nuclear Plant, Unit 1, Reload-3 Licensing Application," March 22, 1979
3. Georgia Power Company, "Edwin I. Hatch Nuclear Plant Unit 1 Recirculation Pump Trip," enclosure 2 to GPC letter dated May 11, 1979.
4. Georgia Power Company, "NRC Docket 50-321, Operating License DPR-57, Edwin I. Hatch Nuclear Plant Unit 1, Proposed Changes to Technical Specifications," enclosure 3 to GPC letter dated May 11, 1979.
5. Georgia Power Company letter (C. F. Whitmer) to NRC/NRR dated June 4, 1979.
6. Georgia Power Company, "Edwin I. Hatch Nuclear Plant Unit 1, Electrical Control and Instrumentation Aspects of End-of-Cycle (EOC) Recirculation Pump Trip (RPTR)," undated, received by NRR/PSB reviewer July 3, 1979.
7. G. Lainas (DOR/PSB) memorandum to T. Ippolito (DOR/ORB #3), "Hatch-1 End-of-Cycle Recirculation Pump Trip," August 14, 1979.
8. Nuclear Regulatory Commission letter (T. Ippolito) to Georgia Power Company (C. F. Whitmer) dated August 17, 1979.
9. Georgia Power Company letter (W. A. Widner) to Director of Nuclear Reactor Regulation NRC/NRR dated February 28, 1980.
10. Conference call between D. Verrelli (NRC), J. T. Beard (NRC), L. R. Peterson (LLL), R. Baker (GPC), and G. Doyle (GPC), May 2, 1980.

11. Telephone conversation D. Verrelli (NRC) and L. R. Peterson (LLL)
May 5, 1980.
12. General Electric Company, Nuclear Power Systems Division, "Basis for
Installation of Recirculation Pump Trip System, Brown's Ferry Nuclear
Plant," report NEDO-24119, 78 NED 261, Class I, April 1978.
13. Bechtel, Southern Services Inc. drawing for Georgia Power Co.,
"Edwin I, Hatch Nuclear Plant Unit No. 1, Reactor Protection System
C71, Elementary Diagram, Sh. 17 of 17," drawing number 10-502 H17822,
dated May 1, 1978, Revision OC dated June 18, 1979.

UNITED STATES NUCLEAR REGULATORY COMMISSIONDOCKET NO. 50-321GEORGIA POWER COMPANY, ET AL.NOTICE OF ISSUANCE OF AMENDMENT TO FACILITY
OPERATING LICENSE

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 76 to Facility Operating License No. DPR-57, issued to Georgia Power Company, Oglethorpe Power Corporation, Municipal Electric Authority of Georgia, and City of Dalton, Georgia, which revised Technical Specifications for operation of the Edwin I. Hatch Nuclear Plant Unit No. 1 (the facility) located in Appling County, Georgia. The amendment is effective as of its date of issuance.

The amendment consists of changes to the Technical Specifications to (1) remove the current restriction on the Operating Limit Minimum Critical Power Ratios, and (2) add limiting conditions for operation and surveillance requirements for End-of-Cycle Recirculation Pump Trip.

The application for the amendment complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment. Prior public notice of this amendment was not required since the amendment does not involve a significant hazards consideration.

The Commission has determined that the issuance of this amendment will not result in any significant environmental impact and that pursuant to 10 CFR §51.5(d)(4) an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with issuance of this amendment.

For further details with respect to this action, see (1) the application for amendment dated March 22, 1979, as supplemented May 11 and 16, June 4, 1979, and February 28, 1980, (2) Amendment No.76 to License No. DPR-57, and (3) the Commission's related Safety Evaluation. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D. C. and at the Appling County Public Library, Parker Street, Baxley, Georgia. A copy of items (2) and (3) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Licensing.

Dated at Bethesda, Maryland, this 10th day of June, 1980.

FOR THE NUCLEAR REGULATORY COMMISSION



Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Licensing