GE Nuclear Energy

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Extended Power Uprate Safety Analysis Report for E. I. Hatch Plant Units 1 & 2

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EXTENDED POWER UPRATE SAFETY ANALYSIS REPORT FOR EDWIN I. HATCH PLANT UNITS 1 & 2

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IMPORTANT NOTICE REGARDING CONTENTS OF THIS REPORT

PLEASE READ CAREFULLY

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EXECUTIVE SUMMARY

Uprating the power level of nuclear power plants can be done safely within certain plant-specific limits and is a cost effective way to increase installed electrical generating capacity. An increase in electrical output of a BWR plant is accomplished primarily by generation and supply of higher steam flow to the turbine generator. The modified high pressure turbines at Plant Hatch were designed to accommodate the increased steam flow at uprated conditions with adequate pressure control margin without increasing the maximum operating reactor vessel dome pressure or turbine inlet pressure.

Detailed evaluations of the reactor, engineered safety features, power conversion, emergency power, support systems, environmental issues, design basis accident analyses and previous licensing evaluations were performed. This report summarizes the results of all significant safety evaluations performed that justify uprating the licensed thermal power at Edwin I. Hatch Plant Units 1 and 2 by 8% to 2763 MWt. This is the second phase of power uprate. Both units at Plant Hatch implemented the first phase of uprating in late 1995 and early 1996. The original power uprate increased the licensed power level 5% to 2558 MWt. This report is very similar in format and content to that submitted for the Plant Hatch 5% original power uprate.

It is not the intent of this report to address all the details of the analyses and evaluations reported herein. Event and analysis descriptions that are already provided in other licensing reports are not repeated within this report.

This evaluation concludes that the second phase of uprate can be accommodated without a significant increase in the probability or consequences of an accident previously evaluated, without creating the possibility of a new or different kind of accident from any accident previously evaluated, and without exceeding any presently existing regulatory limits applicable to the plant which might cause a significant reduction in a margin of safety.

1. OVERVIEW

1.1 FUEL DESIGN AND OPERATION

Uprating the power level of nuclear power plants can be done safely within certain plant-specific limits. Most GE BWR plants, including Plant Hatch, have the capability and margins for a power uprate of up to 20% without major nuclear steam supply system (NSSS) hardware modifications. Both units at Plant Hatch have already implemented an original power uprate of 5%.

The evaluation presented in this report justifies a power uprate to 2763 MWt, which corresponds to 108% of the current rated reactor thermal power for Plant Hatch, Units 1 and 2 and approximately 13% above the original licensed power level of 2436 MWt.

A glossary of terms is provided in Table 1-1.

1.2 PURPOSE AND APPROACH

An increase in electrical output of a Boiling Water Reactor (BWR) plant is accomplished primarily by generation and supply of higher steam flow to the turbine generator. Most BWRs have as-designed equipment and system capability to accommodate steam flow rates above the original plant design. In addition, continuing improvements in the analytical techniques (computer codes) based on several decades of BWR safety technology, plant performance feedback, and improved fuel and core designs have resulted in a significant increase in the difference between the calculated safety analyses results and the licensing limits. The Hatch specific uprate parameters are listed in Table 1-2.

Plant Hatch is currently licensed at 2558 MWt. The extended uprate power level evaluated in this report is 2763 MWt, an 8% thermal power increase. The safety analyses of design basis accidents (DBAs) and operational transients are based on a power level 102% above the proposed uprated power level of 2763 MWt, unless the 2% power factor is already accounted for in the analysis methods.

The evaluation of transient events, as well as the evaluation of plant instrumentation setpoints, has also been performed assuming a plant steady-state power level of 2763 MWt.

Since the maximum operating reactor pressure is not increased for extended power uprate, the initial reactor dome pressure was assumed to be 1050 psia for DBA safety analyses.

The extended power uprate analysis basis assures that the power-dependent safety margin prescribed by the Code of Federal Regulations (CFR) will be maintained by meeting the appropriate regulatory criteria. NRC-accepted computer codes and calculational techniques are used to make the calculations that demonstrate meeting the stipulated criteria.

The planned approach to achieving the higher power level consists of: (1) an increase in the core thermal power to create increased steam flow to the turbine, (2) a corresponding increase in the feedwater system flow, (3) no increase in maximum core flow, and (4) reactor operation primarily along equivalent rod/flow control lines. Plant-unique evaluations were based on a review of plant design and operating data to confirm excess design capabilities. The results of these evaluations are presented in the subsequent sections of this report.

1.3 EXTENDED POWER UPRATE PLANT OPERATING CONDITIONS

The thermal-hydraulic performance of a BWR reactor core is characterized by the operating power, operating pressure, total core flow, and coolant thermodynamic state. The rated values of these parameters are used to establish the steady-state operating conditions and as initial and boundary conditions for the required safety analyses. They are determined by performing heat (energy) balance calculations for the reactor system at extended power uprate conditions.

The extended power uprate heat balances were determined such that the core thermal power is 108% of the current licensed power. The reactor heat balances are coordinated with the turbine heat balances. Figures 1-1 and 1-2 show the heat balance at 100% of the new uprated power (2763 MWt) and 100% rated core flow for Units 1 and 2, respectively. Table 1-2 provides a summary of the reactor thermal-hydraulic parameters for the current rated condition and the extended power uprate condition.

1.4 SUMMARY AND CONCLUSIONS

This report supports the conclusion that this extended power uprate can be accommodated without a significant increase in the probability or consequences of an accident previously evaluated, without creating the possibility of a new or different kind of accident from any accident previously evaluated, and without exceeding any existing regulatory limits applicable to the plant which might cause a reduction in a margin of safety. An extended power uprate of the amount described herein involves no significant hazard consideration.

Table 1-1

Glossary of Terms

Term	Definition
AC	Alternating Current
APRM	Average Power Range Monitor
ARTS	APRM/RBM/Technical Specifications
ASME	American Society of Mechanical Engineers
ATWS	Anticipated Transient Without Scram
BOP	Balance-of-Plant
BTU	British Thermal Unit
BWR	Boiling Water Reactor
CAD	Containment Atmosphere Dilution
CDF	Core Damage Frequency
CFR	Code of Federal Regulations
CRD	Control Rod Drive
CRDA	Control Rod Drop Accident
CS	Core Spray
DBA	Design Basis Accident
ECCS	Emergency Core Cooling System
FAC	Flow-Assisted Corrosion
FCS	Feedwater Control System
FES	Final Environmental Statement
FHA	Fire Hazards Analysis
FSAR	Final Safety Analysis Report
GE	General Electric Company
GPC	Georgia Power Company
HELB	High Energy Line Break
HEPA	High Efficiency Particulate Adsorber
HPCI	High Pressure Coolant Injection
HVAC	Heating, Ventilating and Air Conditioning
IEB	Inspection and Enforcement Bulletin
IEC	Information And Enforcement Circular

Table 1-1

Glossary of Terms

Term	Definition
IEN	Inspection and Enforcement Notice
IPE	Individual Plant Evaluation
IRM	Intermediate Range Monitor
LOCA	Loss-of-Coolant Accident
LPCI	Low Pressure Coolant Injection
MCR	Main Control Room
MCRECS	Main Control Room Environmental Control System
MELB	Moderate Energy Line Break
MG	Motor Generator
Mlb/hr	Million Pounds Per Hour
MSIV	Main Steam Isolation Valve
MSLBA	Main Steam Line Break Accident
MWt	Megawatt-thermal
NPSH	Net Positive Suction Head
NRC	Nuclear Regulatory Commission
NSSS	Nuclear Steam Supply System
NUREG	Nuclear Regulatory Commission Topical Report
OLMCPR	Operating Limit Minimum Critical Power Ratio
OOS	Out of Service
OPRM	Oscillating Power Range Monitor
PASS	Post-Accident Sampling System
PCS	Pressure Control System
PCT	Peak Clad Temperature
PRA	Probabilistic Risk Assessment
PRNM	Power Range Neutron Monitor
PSIG	Pounds Per Square Inch Gauge
PSW	Plant Service Water
RBCCW	Reactor Building Closed Cooling Water
RBM	Rod Block Monitor

Table 1-1

Glossary of Terms

Term	Definition
RCIC	Reactor Core Isolation Cooling
RCPB	Reactor Coolant Pressure Boundary
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
RICSIL	Rapid Information Communication Service Information Letter
RPV	Reactor Pressure Vessel
RRS	Reactor Recirculation System
RWCU	Reactor Water Cleanup
RWE	Rod Withdrawal Error
RWM	Rod Worth Minimizer
SBO	Station Blackout
SGTS	Standby Gas Treatment System
SIL	Services Information Letter
SLCS	Standby Liquid Control System
SRM	Source Range Monitor
SRV	Safety/Relief Valve
SRVDL	Safety/Relief Valve Discharge Line
SSAR	Safe Shutdown Analysis Report
TMI	Three Mile Island
TSC	Technical Support Center
UHS	Ultimate Heat Sink

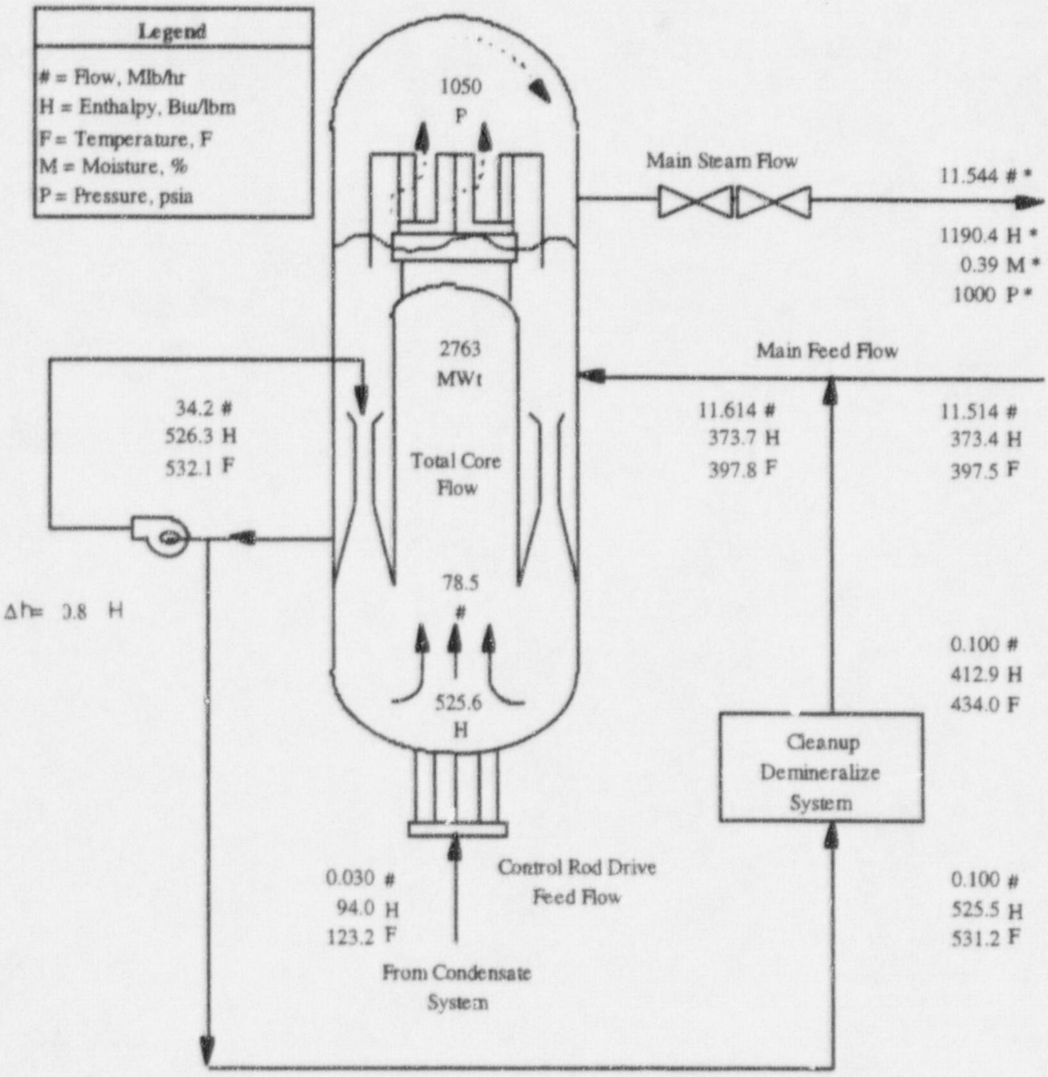
Table 1-2
Current and Extended Power Uprate Plant Operating Conditions

Parameter	Unit 1 Current Condition	Unit 1 Extended Uprate Condition	Unit 2 Current Condition	Unit 2 Extended Uprate Condition
Thermal Power (MWt)	2558	2763	2558	2763
Vessel Steam Flow (Mlb/hr)*	10.6	11.5	11.1	12.0
Full Power Core Flow Range				
Mlb/hr	68.3 to 82.4	71.4 to 82.4	67.0 to 80.9	70.0 to 80.9
% Rated	87 to 105	91 to 105	87 to 105	91 to 105
Dome Pressure (psia)	1050	1050	1050	1050
Dome Temperature (°F)	551	551	551	551
Turbine Inlet Pressure (psig)***	985	985	985	985
Full Power Feedwater**				
Flow (Mlb/hr)	10.7	11.6	11.2	12.1
Temperature (°F)	393	398	424	425
Core Inlet Enthalpy (Btu/lb)	527	526	530	529

* At normal feedwater heating and 100% core flow condition.

** Includes RWCU flow.

*** Turbine inlet pressure may be reduced slightly at higher steam flows due to losses (proportional to the flow squared).



* Represent Turbine Inlet Conditions

Figure 1-1 Unit 1 Reactor Heat Balance (Nominal) at 2763 MWt and 100% Rated Core Flow

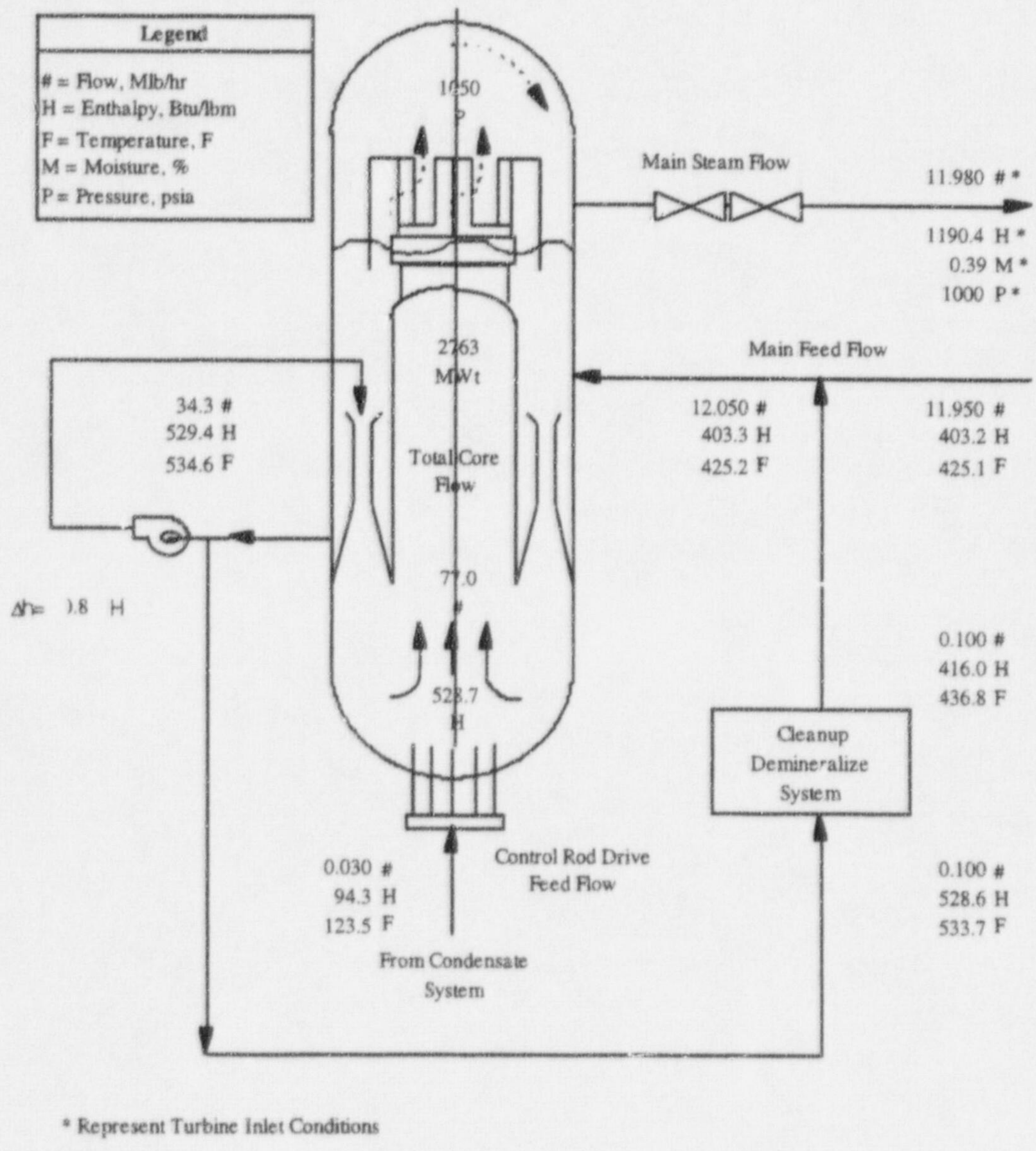


Figure 1-2 Unit 2 Reactor Heat Balance (Nominal) at 2763 MWt and 100% Rated Core Flow

2. REACTOR CORE AND FUEL PERFORMANCE

This section focuses on information requested in Regulatory Guide 1.70, Chapter 4, that applies to extended power uprate.

2.1 FUEL DESIGN AND OPERATION

At current or extended power uprate conditions, all fuel and core design limits will continue to be met by planned employment of fuel enrichment and burnable poison, and supplemented by core management control rod pattern or core flow adjustments. Revised loading patterns, larger batch sizes, and potentially new fuel designs may be used to provide additional operating flexibility and maintain fuel cycle length.

2.2 THERMAL LIMITS ASSESSMENT

Operating limits are established to assure that regulatory and/or safety limits are not exceeded for a range of postulated events (e.g., transients, LOCA, etc.). Cycle-specific core configurations will be evaluated for each reload to establish or confirm cycle-specific limits, as is currently the practice. The evaluation of thermal limits for the uprated core show that the current thermal margin design limits can be maintained. Operational flexibility options change with respect to the higher rod line; however, with appropriate bundle designs, operating flexibility can be improved.

2.3 REACTIVITY CHARACTERISTICS

The uprated power-flow operating map (Figure 2-1) includes the operating domain changes for uprated power and the plant performance improvement features addressed in Section 1.3. The maximum thermal operating power and maximum core flow shown on Figure 2-1, correspond to the extended uprate power.

Figure 2-1 shows the current maximum licensed rod line and the proposed maximum rod line for extended power uprate on an absolute power basis. The proposed rod line for extended power uprate corresponds to approximately the 120% rod line-relative to the original licensed power of 2436 MWt and approximately the 115% rod line relative to the current rated power of 2558 MWt.

2.4 STABILITY

Plant Hatch Units 1 and 2 have installed a digital power range neutron monitor (PRNM) system with an oscillating power range monitor (OPRM). The new OPRM was installed to address the issue of BWR thermal-hydraulic stability

2.5 REACTIVITY CONTROL

The Control Rod Drive (CRD) System controls core reactivity by positioning neutron absorbing control rods within the reactor. It is also required to scram the reactor by rapidly inserting withdrawn rods into the core.

Since extended power uprate involves no increase in reactor operating pressure the CRD mechanism structural and functional integrity is not changed by operation at extended power uprate conditions. The limiting stress component of the CRD mechanism remains unchanged, while the calculated stress remains within the allowable values as documented in Reference 1.

The components of the CRD mechanism, which form part of the primary pressure boundary, have been designed in accordance with the ASME Boiler and Pressure Vessel (B&PV) Code, Section III. The extended power uprate engineering analyses show that all stresses and fatigue usage factors remain within their original design allowable values.

Based on the above, the CRD System will continue to carry out all its functions at extended power uprate conditions and no change in performance is expected.

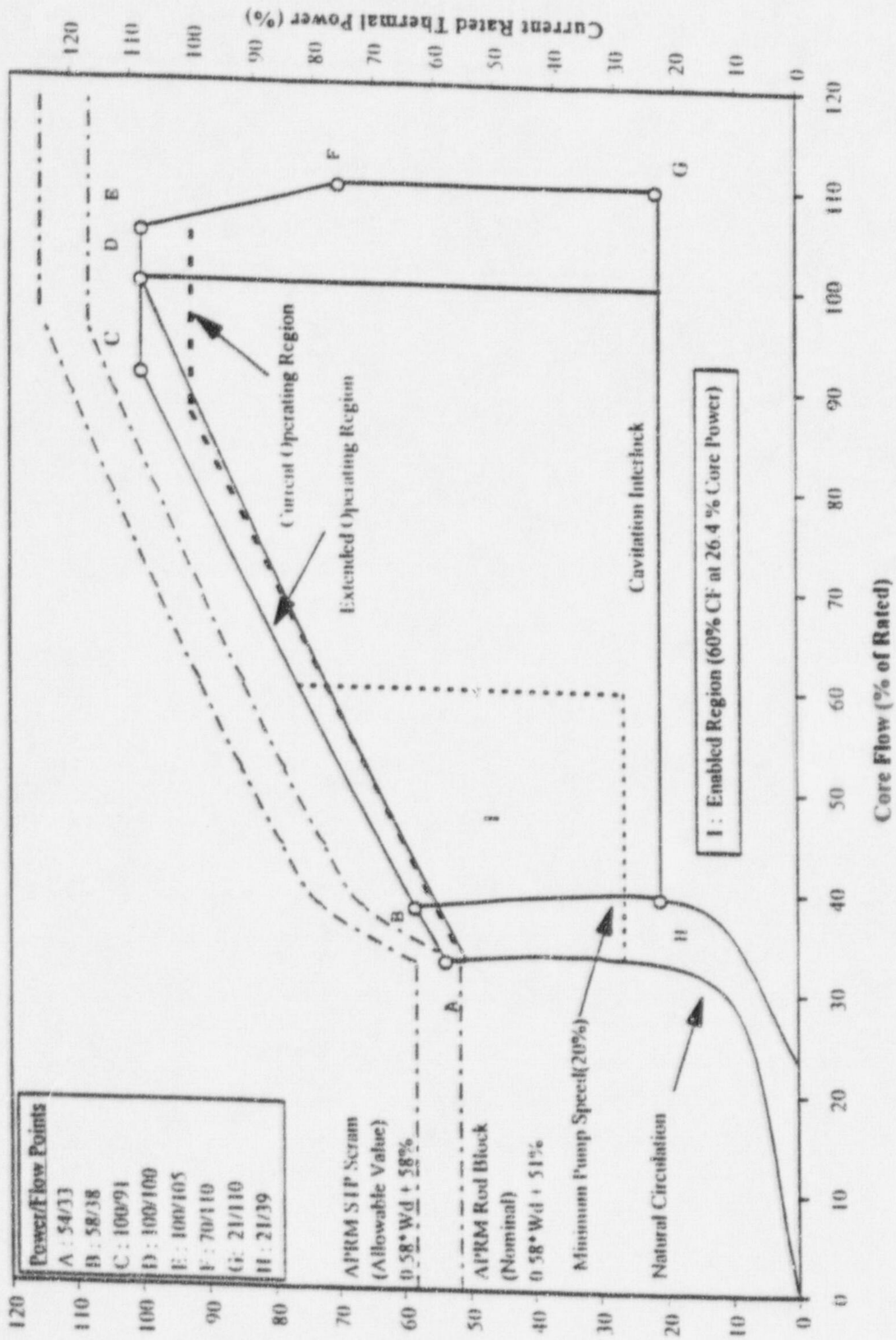


Figure 2-1 Power-Flow Operating Map For Extended Power Uprate

3. REACTOR COOLANT SYSTEM AND CONNECTED SYSTEMS

This section focuses on information requested in Regulatory Guide 1.70, Chapter 5, and, to a limited extent, Chapter 3, which applies to extended power uprate.

3.1 NUCLEAR SYSTEM PRESSURE RELIEF

The purpose of the nuclear system pressure relief is to prevent overpressurization of the nuclear system during abnormal operational transients. The plant safety/relief valves (SRVs), together with scram, provide this protection.

3.2 REACTOR OVERPRESSURE PROTECTION

The design pressure of the reactor vessel and reactor pressure coolant boundary remains at 1250 psig. The ASME code allowable peak pressure is 1375 psig (110% of design value), which is the acceptance limit for pressurization events. The limiting pressurization event remains the MSIV closure with a failure of valve position scram. One SRV out of service (OOS) is assumed in the overpressure protection analysis for consistency with previous analyses. At uprated conditions, a higher peak RPV pressure results, but remains below the 1375 psig ASME limit. Reactor steam dome pressure remains below 1325 psig (Reference Units 1 and 2 Technical Specifications 2.1.2). Therefore, there is no decrease in margin of safety.

3.3 REACTOR VESSEL AND INTERNALS

An evaluation of the reactor vessel and vessel internals concluded that the corresponding peak vessel loads and fluence conditions resulting from this extended power uprate were within the existing desing bases of these structures.

The estimated fluence at the vessel wall for extended power uprate conditions was determined to be higher than the Final Safety Analysis Report (FSAR) end-of-life value. Therefore, the higher fluence was used to evaluate the vessel against the requirements of 10CFR50 Appendix G in accordance with Regulatory Guide 1.99 Revision 2. The results of these evaluations indicate that operation at extended power uprate conditions will not have an adverse effect on the reactor vessel fracture toughness.

3.4 REACTOR RECIRCULATION SYSTEM (RRS)

An evaluation of the RRS concluded that the existing design margin of the RRS is well within the slight changes in conditions resluting from extended power uprate.

3.5 REACTOR COOLANT PIPING

The effects of extended power uprate have been evaluated for the reactor coolant piping systems which are part of the primary reactor coolant pressure boundary (RCPB) and which could be affected by an uprate-related increase in flow, pressure, or operating temperature. These evaluations concluded that extended power uprate does not have an adverse effect on the primary piping systems design.

3.6 MAIN STEAM FLOW RESTRICTORS

An evaluation of the main steam line flow restrictors concluded that the existing design margin of the flow restrictors is well within the slight changes in conditions resluting from extended power uprate.

3.7 MAIN STEAM ISOLATION VALVES (MSIVS)

The MSIVs are part of the reactor coolant pressure boundary and must be able to close within specific limits at all design and operating conditions upon receipt of a closure signal.

The existing design pressure and temperature for the MSIVs is the same as the reactor coolant pressure boundary, and will bound the maximum operating pressure and temperature under extended power uprate conditions.

3.8 REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

The RCIC System provides core cooling in the event of a transient where the RPV is isolated from the main condenser concurrent with the loss of all feedwater flow. For extended power uprate, the reactor dome pressure and the SRV setpoints remain unchanged. Consequently, there is no change to the RCIC high pressure injection process parameters and no change to the overspeed trip margins.

3.9 RESIDUAL HEAT REMOVAL (RHR) SYSTEM

The RHR System is designed to restore and maintain the coolant inventory in the reactor vessel and to provide primary system decay heat removal following reactor shutdown for both normal and post-accident conditions.

Draft Regulatory Guide 1.139, "Guidance for Residual Heat Removal," recommends demonstration of cold shutdown (212°F reactor fluid temperature) capability within 36 hours. For extended power uprate , a shutdown cooling analysis based on 1 RHR loop in service and 95°F RHR service water temperature was performed. The results of this analysis show that the reactor can be cooled to 212°F in less than the 36-hour criterion, the time required with 1 RHR loop in service.

Other comprehensive analyses have been performed which demonstrate that the proposed power uprate does not prevent any of the RHR modes from performing their intended functions.

3.10 REACTOR WATER CLEANUP (RWCU) SYSTEM

This system is designed to remove solid and dissolved impurities from recirculated reactor coolant, thereby reducing the concentration of radioactive and corrosive species in the reactor coolant. Operation of the plant at the extended uprate power level does not increase the temperature or the pressure within the RWCU System nor is the radioactive content of the reactor water significantly increased; therefore, it is concluded that the proposed power uprate will not prevent the system from performing its intended function.

3.11 MAIN STEAM AND FEEDWATER PIPING

The main steam and feedwater piping within the reactor coolant pressure boundary were evaluated and the effects of power uprate were determined to have no adverse effects on the system design.

3.12 BALANCE-OF-PLANT (BOP) PIPING

This section addresses the adequacy of the following BOP piping inside primary containment: main steam, feedwater, recirculation suction and discharge, RWCU branch to the recirculation system, and ECCS. The analytical codes, methodology, and assumptions used to evaluate the BOP piping components were the same as that utilized for the original power uprate.

Operation at the proposed extended power uprate conditions increases pipe stresses due to slightly higher operating temperatures, pressures, and flow rates internal to the pipes. For all systems, the maximum stress levels and fatigue analysis results were reviewed based on specific increases in temperature, pressure, and flow rate and were found to meet the appropriate code criteria for the uprated conditions.

Operation at extended power uprate conditions causes a slight increase in the pipe support loadings due to increases in the temperature of the affected piping systems. However, when considering the loading combination with other loads that are not affected by extended power uprate, such as seismic and deadweight, the overall combined support load increase is insignificant except for the main steam and feedwater piping in Unit 1, and main steam piping in Unit 2. The supports for the main steam and feedwater systems were reviewed to determine if there is sufficient margin to accommodate the increased loadings. This review shows that there is adequate margin between the original design stresses and code limits of the supports to accommodate the load increase within the appropriate code criteria. It is therefore concluded that the design of the above piping systems is adequate to accommodate the proposed power uprate.

4. ENGINEERED SAFETY FEATURES

This section focuses on the information requested in Regulatory Guide 1.70, Chapter 6, as it applies to power uprate.

4.1 CONTAINMENT SYSTEM PERFORMANCE

The extended power uprate analysis was performed using the same decay heat model used in the original power uprate analysis. The calculated peak bulk suppression pool temperatures show that extended power uprate results in peak bulk pool temperatures which are well below the wetwell structural design temperatures for Units 1 and 2.

The calculated peak bulk pool temperature for the most limiting DBA-LOCA case with extended power uprate was used to evaluate the net positive suction head (NPSH) for extended power uprate. The peak bulk pool temperature with extended power uprate was found acceptable from both NPSH and structural design standpoints for both units.

The local pool temperature limit for SRV discharge is specified in NUREG-0783 because of concerns resulting from unstable condensation observed at high pool temperatures in plants without quenchers. Reference 2 provides justification for elimination of this limit for plants with quenchers on the SRV discharge lines. Reference 3 eliminated the maximum local pool temperature recommendation for plants with quenchers on the SRV discharge lines. Since both units have quenchers, no evaluation of this limit is necessary.

The SRV air-clearing loads include SRV discharge line (SRVDL) loads, suppression pool boundary pressure loads and drag loads on submerged structures. For first SRV actuations following an event involving RPV pressurization, the only change that might be introduced by a power uprate which can affect the SRV loads is an increase in SRV opening setpoint pressure.

The only additional parametric change with extended power uprate which is specific to SRV loads for subsequent actuations is the time between SRV actuations which might affect the SRV discharge line water level at the time of subsequent actuations.

Extended power uprate will not increase the SRV opening setpoints. An evaluation for the current SRV mechanical opening setpoint determined that the currently implemented setpoint will not result in exceeding the allowable SRV loads for the Plant Hatch torus or for the SRV discharge line piping originally reported in References 4 and 5. Therefore, the SRV discharge loads for initial SRV actuations with extended power uprate will not result in exceeding the design loads.

The effect of extended power uprate on subsequent actuation loads due to changes in the SRV discharge line water level and time between actuations was also evaluated and loads were found to remain within design loads.

The system designs for containment isolation are not affected by power uprate. The capability of the actuation devices to perform at extended power uprate conditions has been evaluated and determined to be acceptable. All other MOVs included in GL 89-10 were evaluated for extended power uprate. Extended power uprate will not increase operating pressure or SRV setpoints, nor will the static loads increase due to extended power uprate. The impact of extended power uprate on other MOV issues (e.g., thermal binding and pressure lock) has also been evaluated and found to be insignificant.

4.2 EMERGENCY CORE COOLING SYSTEMS (ECCS)

The Emergency Core Cooling Systems (ECCS) are designed to provide protection against hypothetical LOCAs caused by ruptures in the primary system piping. The ECCS performance under all LOCA conditions, and their analysis models, satisfy the requirements of 10CFR50.46 and 10CFR50 Appendix K. Recently, the ECCS/LOCA analysis for Plant Hatch has been updated to reflect a maximum reactor power increase to 2763 MWt. The results of this analysis show that extended power uprate has a negligible effect on the peak cladding temperature (PCT).

4.3 ECCS PERFORMANCE

The results of the ECCS performance evaluation show that the requirements of 10CFR50.46 and 10CFR50 Appendix K are satisfied for a bounding reactor power increase to 2763 MWt; thus, extended power uprate for Plant Hatch is acceptable.

4.4 STANDBY GAS TREATMENT SYSTEM (SGTS)

The Standby Gas Treatment System (SGTS) is designed to minimize offsite and control room doses during venting and purging of the primary and secondary containment atmosphere under accident or abnormal conditions. The capacity of the SGTS was selected to maintain the secondary containment at a slight negative pressure. This capability is not impacted by the uprate to 2763 Mwt.

4.5 OTHER ESF SYSTEMS

Control of combustible gas concentrations for Unit 1 is attained by containment atmosphere dilution (CAD). This method adds nitrogen to the containment to dilute the oxygen concentration below the flammability limit. The Unit 2 combustible gas control system is provided by hydrogen recombiners which maintain a safe level of hydrogen inside the primary containment. Sufficient capacity in the Unit 1 CAD system exists to account for the increase in oxygen generation due to extended power uprate. Under the most conservative analytical assumptions, extended power uprate may require the Unit 1 CAD system to be initiated earlier in the accident. Initiation of the Unit 2 recombiners is also controlled and monitored based on gas concentration and not by time. The impact of an 8% increase in thermal power prior to the postulated accident would cause the Unit 2 recombiners to be initiated earlier, which is well within the operating conditions for this system.

The Main Control Room Environmental Control System (MCRECS) will be affected by extended power uprate. Although the heat load in the control room and the toxic chemical study of control room habitability are unaffected by extended power uprate, the increase in radioactivity levels caused by operating at the higher power level would result in an increase in the control room operator dose under post-LOCA conditions. Revised analytical methods and assumptions, consistent with regulatory guidance, were used for the evaluation of the radiological consequences of the design basis LOCA event. A separate submittal has been made to the NRC to address the revised control room dose analysis [Reference 6]. The revised analysis demonstrates that control room dose guidelines are satisfied for extended power uprate

5. INSTRUMENTATION AND CONTROL

This section focuses on the information requested in Regulatory Guide 1.70, Chapter 7, as it applies to extended power uprate.

5.1 NUCLEAR STEAM SUPPLY SYSTEM

The 5% original power uprate involved a 3% increase in reactor operating pressure, and pressure-dependent setpoints were adjusted accordingly. This extended power uprate involves no increase in reactor pressure, and the pressure-dependent setpoints do not require modification. However, increases in core thermal power and steam flow affect some instrument setpoints.

The average power range monitor (APRM) power signals will be recalibrated to the 2763 MWt power level. The maximum APRM scram setpoints will remain the same in terms of percent of rated core thermal power.

The current power-dependent rod block monitor (RBM) setpoints at the uprated power level were assumed in the rod withdrawal error (RWE) transient analysis. The results of that analysis demonstrate that RBM performance at extended power uprate conditions is adequate to ensure that local power excursions due to any potential RWE are maintained within acceptable limits.

Extended power uprate will have little effect on the intermediate range monitor (IRM) overlap with the source range monitors (SRMs) and the APRMs. Using normal plant surveillance procedures, the IRMs may be adjusted, as required, so that overlap with the SRMs and APRMs remains adequate. No change is needed in the APRM downscale setting.

The determination of instrument setpoints is based on plant operating experience and conservative safety analyses. Each setting is selected with sufficient margin between the system setting and the actual value in the safety analysis to preclude inadvertent initiation of the protective. This is the same methodology used for the previous 5% original power uprate, which was described in Reference 1.

The impact of power uprate was evaluated for the following instrument setpoints:

(1) No change to the pressure regulator setpoint is required for the extended power uprate.

(2) The reactor operating dome pressure will not be increased for extended power uprate; therefore, the current SRV analytical limits for setpoints will be maintained.

(3) The APRM flow-biased rod block and simulated thermal power scram will be redefined to reflect the change in the maximum allowable load line region. The Rod Block Monitor (RBM) System was originally modified to have three power-dependent ranges when Plant Hatch incorporated the APRM/RBM/Technical Specifications (ARTS) program in the mid-1980s.

(4) The analytical limit and allowable value for the high flow isolation remains at 140% and 138% of the uprated steam flow, respectively. The setpoint value will be raised to account for the increase in rated steam flow.

(5) The transient analysis for extended power uprate was performed with the turbine stop valve closure and turbine control valve fast closure scram bypass analytical limit at 28% power. As discussed in Section F.4.2, paragraph (c) of Reference 1, this approach maintains the safety basis for the setpoint, and does not make any significant difference in the transient analysis results.

(6) The rod block monitor (RBM) automatically initiates a rod block signal during rod withdrawal errors (RWEs) at power to prevent local violations of fuel thermal limits. A RWE analysis is performed for each cycle to determine the Operating Limit Minimum Critical Power Ratio (OLMCPR) requirements and corresponding RBM setpoints. The RBM setpoints were determined to remain acceptable for extended power uprate.

(7) The function of the rod worth minimizer (RWM) is to support the operator by enforcing rod patterns until reactor power has increased to the low power setpoint. The change in terms of percent of reactor power for extended power uprate will not reduce the low power setpoint below the conservative analytical limit; thus, extended power uprate has no adverse effect on the RWM.

(8) The reactor water level alarms and Level 3 and Level 8 (feedwater and main turbine trip) functions were reevaluated for extended power uprate. The alarms and the Level 3 setpoint remain the same as the current values. For Level 8, the analytical limit and allowable value remain the same as the current values; however, the nominal trip setpoint may be procedurally adjusted, in accordance with steam separator-dryer performance considerations, to a value lower than the maximum value permitted by the applicable setpoint methodology.

5.2 BALANCE-OF-PLANT (BOP) – POWER CONVERSION AND AUXILIARY SYSTEMS

Operation of the plant at the extended uprate power level of 2763 MWt has minimal effect on the BOP system instrumentation and control devices. Any required changes will be performed prior to operation at the uprate power level of 2763 MWt.

(1) The objective of the the Pressure Control System (PCS) is to provide a stable response to pressure and steam flow disturbances so that the reactor pressure is controlled within its allowed high and low limits. During power ascension to

extended power conditions, specific testing and monitoring will confirm the capability of PCS and assure that sufficient pressure control margin is available.

(2) For extended power uprate, the turbine throttle pressure is not changed; thus, no modifications to the turbine control valves or turbine bypass valves are required.

(3) The Feedwater Control System (FCS) is the operational water supply that is used to maintain water level control in the reactor. The current controller adjustments are expected to be satisfactory for extended power uprate; however, this will be confirmed by performing unit tests during the power ascension to extended power uprate conditions.

(4) The instrument setpoints associated with primary system leak detection have been evaluated with respect to the slightly higher operating steam flow that will accompany power uprate. No Technical Specifications allowable values need to be modified to provide adequate trip avoidance and maintain current protection capability.

6. ELECTRICAL POWER AND AUXILIARY SYSTEMS

This section focuses on information requested in Regulatory Guide 1.70, Chapters 8 and 9, as they apply to extended power uprate.

6.1 AC POWER

The onsite power distribution system consists of transformers, buses, and switchgear. AC power to the distribution system is provided from the transmission system or from onsite diesel generators. DC power to the distribution system is provided by station batteries. Plant electrical characteristics are given in Table 6-1.

Station loads under normal operation/distribution conditions are computed based on equipment nameplate data. Since extended power uprate does not require equipment operation above the nameplate rating, the electrical supply and distribution components are adequate.

Station loads under emergency operation/distribution conditions (diesel generators) are based on equipment nameplate data except for core spray, plant service water pumps, and RHR pumps, where a higher flow brake horse power (BHP) than required is used. Operation at the extended uprate power level is achieved by utilizing existing equipment operating at or below the nameplate rating and within the calculated BHP for the stated pumps; therefore, under emergency conditions, the electrical supply and distribution components are adequate.

No increase in flow or pressure is required of any AC-powered ECCS equipment for extended power uprate. Therefore, the amount of power required to perform safety-related functions (pump and valve loads) will not be increased with extended power uprate, and the current emergency power system will remain adequate.

Since there are no modifications associated with the extended power uprate which would increase electrical loads beyond those levels previously included, conformance to General Design Criterion 17 (10CFR50, Appendix A) is not affected.

6.2 DC POWER

Operation at the extended uprate power level will not increase any loads beyond nameplate rating or revise any control logic; therefore, the DC power distribution system is adequate.

6.3 FUEL POOL COOLING

An evaluation was performed that considered the expected heat load in the spent fuel pool and confirmed the capability of the fuel pool system to maintain adequate fuel pool cooling at extended power uprate conditions. The normal radiation levels around the pool will increase slightly, primarily during fuel handling operations. This increase is acceptable and will not significantly increase the operational doses to personnel or equipment. There will be no impact on the design of the fuel racks, since the original design fuel pool temperature will not be exceeded.

In summary, the changes as a result of extended power uprate are small and within the design capability of the affected systems and components.

6.4 WATER SYSTEMS

An evaluation of the Plant Service Water (PSW) Systems was performed to determine the impact of extended power uprate of these systems. The results of this evaluation concluded that: (1) the environmental effects of extended power uprate will be controlled within the levels presently allowed by federal limits and state permits, and (2) with the exception of modifying existing tube staking in the main turbine condenser, no modifications are required to the PSW systems. These conclusions are based on the following considerations.

(1) The Plant Service Water (PSW) System is provided to remove the heat generated by the operation of safety-related and non-safety-related systems, and to provide makeup to the plant circulating water system.

(2) The safety-related portion of the PSW System piping provides a reliable supply of cooling water to the following major equipment (Some of these loads are not functionally safety-related.):

Diesel Generator Coolers

RHR Pump Coolers

RHR/CS, HPCI, RCIC, and CRD Pump Room Coolers

Essential LPCI Inverter Room Coolers

Main Control Room Air Conditioners

RCP M-G Set Coolers (Unit 1)

Drywell Air Coolers (Unit 1)

Drywell Chiller Condenser (Unit 2)

PSW Pump Motors

Spent Fuel Pool Emergency Makeup

(3) The diesel generator loads and cooling loads remain virtually the same as that for current rated operation because the equipment and system performance remains unchanged. The building cooling heat loads remain the same as that for current rated operation because the equipment performance in these areas has remained unchanged for post-LOCA conditions.

(4) The PSW heat load increase from extended power uprate reflects an increase in main generator losses rejected to the stator water coolers, hydrogen coolers and exciter coolers. However, the increase in heat loads for the hydrogen coolers and exciter coolers will remain within original design margins.

(5) Evaluation results predict that there will be an increase in heat loads for the Unit 1 and 2 isophase bus duct coolers and the Unit 1 and 2 RBCCW heat exchangers. However, these results also demonstrate that the PSW System is adequate for extended power uprate conditions.

(6) The RHR Service Water (RHRSW) System is designed to provide a reliable supply of cooling water to the RHR System under normal and post-accident conditions.

The containment cooling analysis concluded that extended power uprate will not significantly increase the cooling requirements on the RHR and its associated service water system.

During shutdown cooling with the RHR System, the greater decay heat generation may require a longer time to cool the reactor following extended power uprate operation; however, the impact is expected to be small. Therefore, the design cooling capacity of the RHRSW System is adequate for extended power uprate conditions.

(7) Performance of the main condenser was evaluated for extended power uprate. This evaluation is based on a design duty over the actual yearly range of the closed loop circulating water inlet temperatures, and confirms that the condenser, circulating water system and cooling towers are adequate for extended power uprate operation. However, to ensure adequate protection of the tube bundles against tube vibration damage at extended power uprate conditions, the existing tube staking will be modified. Auxiliary cooling towers have been installed to improve tower and overall performance of the units. Based on performance predictions, the condenser backpressure will not exceed the maximum allowable backpressure and is acceptable for extended power uprate operations.

(8) Both units at Plant Hatch operate with the forced draft cooling towers in the "closed cycle" mode. Discharge criteria discussed in the Final Environmental Statements

[References 7 and 8] were compared to values for the current rated and extended uprate power as part of the environmental evaluation. This comparison demonstrates that the conclusions of the Final Environmental Statement (FES) remain valid for operation at extended power uprate conditions.

(9) Evaluations for the RBCCW System concluded that, while the total design heat load for the RBCCW System increases due to an increase in fuel pool heat loads, components will be adequately cooled by the RBCCW System.

(10) The ultimate heat sink (UHS) for the Plant Hatch plant service water and RHR service water is the Altamaha River. The temperature of the river is unaffected by uprate and will continue to provide a sufficient quantity of water at a temperature less than 95°F (design temperature) following a design basis LOCA. An evaluation of plant operating parameters impacted by the new licensed power concludes that no significant environmental impact will result from operation of Plant Hatch at the extended uprate power level. The environmental impacts of the power level increase are bounded by the criteria discussed in the Final Environmental Statement (FES) such that the conclusion of the FES remains valid for operation at 2763 MWt. The extended uprate power level does not constitute an unreviewed environmental question.

6.5 STANDBY LIQUID CONTROL SYSTEM (SLCS)

The operating capability of the SLCS is unaffected by the requested uprate power extension.

6.6 POWER-DEPENDENT HVAC

The HVAC systems consist mainly of cooling supply and exhaust and recirculation units in the reactor building, drywell, and turbine building. Heat loads processed by the HVAC systems will be impacted by extended power uprate.

Areas affected by extended power uprate are: the drywell, the condenser bay areas in the turbine building, and the areas near the isophase bus ducts.

The localized bulk average temperature in the vicinity of the reactor coolant pumps is estimated to increase by approximately 2°F due to the increased horsepower requirements of the Unit 1 recirculation pump motors. There will be no impact on the drywell temperatures for Unit 2, since the reactor coolant pump motor windings are water cooled. However, based on the review of the actual design capacity of the drywell coolers, the additional Unit 1 heat load is within the design capacity of the drywell cooling system. There will be no impact on the drywell pressure and relative humidity due to extended power uprate.

The results of the review indicate that the actual design capacity of the cooling units in the condenser bay area near the condensate and condensate booster pumps has sufficient margin to accommodate additional heat loads due to the increased horsepower requirements of the condensate and condensate booster pumps without any impact on the area temperatures. Also, the increased heat loads due to increase in isophase bus duct temperature is within the design capacity of the coolers in the area.

Based on the above discussion, the design of the HVAC systems is not adversely affected by extended power uprate.

6.7 FIRE PROTECTION

The Plant Hatch 10CFR50, Appendix R Fire Hazard Analysis (FHA) report was reviewed for possible impact due to extended power uprate. Also, the Safe Shutdown Analysis Report (SSAR) was reviewed for possible impact to Appendix R. It was concluded that operation at extended uprate power levels does not affect the ability of the Appendix R systems to perform their safe shutdown function.

6.8 SYSTEMS NOT IMPACTED BY EXTENDED POWER UPRATE

The following systems are not affected by operation of the plant at the uprated power level:

- Turbine Low Pressure Exhaust Spray Cooling System
- Mechanical Vacuum Pumps Lube Oil and Seal Water System
- Station Air Systems
- Interruptible and Non-interruptible Control Air Systems
- Emergency Breathing Air System
- Auxiliary Boiler System
- Turbine Oil Purification Transfer and Waste System
- Diesel Generator Auxiliary Systems - Divisions I and II
- Diesel Generator Fuel Oil Systems - Divisions I and II
- Primary Containment Pneumatic Supply System

The following systems are affected in a minor way at the extended uprate power level. For these systems, the effects are insignificant to the design or operation of the system and equipment:

- Service Water Makeup
- RCIC Turbine Lube Oil System
- HPCI Turbine Lube Oil System
- Reactor Feed Pump Turbine Lube Oil System
- Turbine Gland Steam Sealing System
- Generator Seal Oil System
- Turbine Lubricating Oil System
- Generator Gas System
- Condensate Storage and Transfer System
- Condensate Makeup Demineralizer System
- Process Sampling Systems
- Equipment Drains - All floors of turbine, control, drywell, radwaste, and reactor buildings
- Post-Accident Sampling System
- Nitrogen Inerting System

Table 6-1

Uprated Plant Electrical Characteristics

	Unit 1*	Unit 2*
Gross Generator Output (MWe)	915	935
Plant Net Output (MWe)	880	900
Rated Voltage (kV)	24	24
Power Factor	0.97	0.97
Current Output @ 22.8 kV (A)	23,887	24,409
Isolated Phase Bus Duct Rating:		
Main Section (A)	26,588	26,588
Branch Section (A)	15,350	15,350
Main Transformers Rating (MVA)	1008	998
Uprated Transformer Output (MVA)	907	928

*All values are nominal values.

7. POWER CONVERSION SYSTEMS

This section focuses on information requested in Regulatory Guide 1.70, Chapter 10, as it applies to extended power uprate.

The power conversion systems were originally designed to utilize the energy available from the nuclear steam supply system and to accept the system and equipment flows resulting from continuous operation at ≥105% of rated steam flow. The original power uprate, as well as this uprate, required turbine modifications to accommodate the higher steam flow. Other selected balance-of-plant (BOP) components will also require modifications.

7.1 TURBINE-GENERATOR

In 1995, the Plant Hatch Unit 1 turbine-generator was "rerated" to 105% of original. In order to achieve the full extended power uprate (~113% of original), the high pressure turbine steam path components will require modifications. These modifications will include first, second, and third-stage diaphragm physical area increases. In order to perform this modification, the diaphragms will need to be removed from the turbine and the throat areas ground open to the required values. Necessary modifications will be performed in the Spring of 1999 for Unit 1 and in the Fall of 1998 for Unit 2.

7.2 CONDENSER AND STEAM JET AIR EJECTORS

An evaluation of condenser performance for extended power uprate was performed and resulted in the following conclusions:

- Condenser hotwell capacities and level instrumentation are adequate.
- To ensure adequate protection against tube vibration the existing condenser staking will be modified.
- The design of the condenser air removal systems is not adversely affected and no modification to the systems is required.
- The physical size of the primary condensers and evacuation times are the main factors in establishing the capabilities of the vacuum pumps. These parameters do not change. Since flow rates will not change, there will be no change to the two-minute holdup time in the pump discharge line routed to the plant vent stack.

- The design capacities of the steam jet air ejectors (SJAE) will not be affected, since they were originally designed for operation at significantly greater than warranted flows.

7.3 TURBINE STEAM BYPASS

The small pressure increases due to extended power uprate are within the original design capabilities of both turbine bypass systems.

7.4 FEEDWATER AND CONDENSATE SYSTEMS

The Feedwater and Condensate Systems are designed to provide a reliable supply of feedwater at the temperature, pressure, quality, and flow rate as required by the reactor. The systems are not safety-related; however, their performance has a major effect on plant availability and capability to operate at the extended power uprate condition

A transient analysis was performed to determine the feedwater capacity available following a single feedwater pump trip and subsequent recirculation system runback. This transient was performed with and without the heater drain system operating. The results of the analysis show that the system response will be adequate during extended power uprate conditions.

7.5 FLOW-ASSISTED CORROSION (FAC)

The evaluation of and inspection for flow-induced erosion/corrosion in BOP systems is addressed by compliance with NRC Generic Letter 89-08, "Erosion/Corrosion in Piping." The Plant Hatch extended power uprate evaluations have confirmed that the higher power has no significant effect on flow-induced erosion/corrosion

8. RADWAS[illegible] AND RADIATION SOURCES

This section focuses [illegible] requested in Regulatory Guide 1.70, Chapters 11 and 12, as they apply to [illegible]ate.

8.1 LIQUID WASTE MANAGEMENT

Based on a review of plant operating effluent reports, revised Appendix I evaluations, and the slight increase expected from extended power uprate, it is concluded that the requirements of 10CFR20 and 10CFR50, Appendix I will be met. Therefore, extended power uprate will not have an adverse effect on the processing of liquid radwaste.

8.2 GASEOUS WASTE MANAGEMENT

The gaseous waste management systems include the Offgas System, the Standby Gas Treatment System (SGTS) (Section 4.4), and various building ventilation systems.

The non-condensable gases (which primarily consist of N-13, N-16, O-19 and various noble gases) are continuously removed from the main condensers by the steam jet air ejectors (SJAEs) which discharge into the Offgas System.

While the non-condensable release rate will increase approximately proportional with power, the system radiological release rate is administratively controlled, and is not changed with operating power. Therefore, extended power uprate will not affect the Offgas System design or operation.

Building ventilation systems control airborne radioactive gases by using combinations of devices such as high efficiency particular adsorbers (HEPA) and charcoal filters, and radiation monitors that signal automatic isolation dampers or trip supply and/or exhaust fans, or by maintaining negative air pressure, where required, to limit migration of gases. The activity of airborne effluents released through building vents is not expected to increase significantly with extended power uprate. This is because the amount of fission products released into the coolant depends on the number and nature of the fuel rod defects, and is approximately linear with respect to core thermal power. The release limit is an administratively controlled variable, and is not a function of core power.

8.3 RADIATION SOURCES IN THE REACTOR CORE

During power operation, the radiation sources in the core include radiation from the fission process, accumulated fission products and neutron reactions as a secondary result of fission.

Historically, these sources have been defined in terms of energy released per unit of reactor power. Therefore, the increase in the operating source term is no greater than the increase in power.

8.4 RADIATION SOURCES IN THE COOLANT

Radiation sources in the coolant are primarily a function of fuel defects, power level, and operation of the Reactor Water Cleanup System. Since the fuel defect rate for Units 1 and 2 has historically been well below the design bases fuel defect rate and since power uprate is not expected to significantly impact this rate, the coolant activity level should increase, at most, proportional to power. However, even if this occurs, the increased activity level will still be well below that level which would cause any concern to plant operation. Therefore, it is concluded that power uprate should have essentially no impact on day-to-day operation of the plant.

8.5 RADIATION LEVELS

At extended power uprate conditions, normal operation radiation levels increase slightly. For conservatism, many aspects of the plant were originally designed for higher-than-expected radiation sources. Thus, the increase in radiation levels does not affect radiation zoning or shielding in the various areas of the plant, since it is offset by conservatism in the original design basis source terms.

Post-operation radiation levels in most areas of the plant are expected to increase by no more than the percentage increase in power level. In a few areas, the increase could be slightly higher. Individual worker exposures will be maintained within acceptable limits by the site ALARA program, which controls access to radiation areas. Procedural controls compensate for increased radiation levels.

The change in core inventory resulting from extended power uprate is expected to increase post-accident radiation levels by no more than the percentage increase in power level. The slight increase in the post-accident radiation levels has no significant effect on the plant, nor on the habitability of the Technical Support Center (TSC). Reference 6 addresses the doses for the worst case accident (LOCA) for the Main Control Room (MCR) and the TSC.

The normal offsite doses were calculated at the uprated power level. They are not significantly affected by operation at the uprated power level, and remain below the limits of 10CFR20 and 10CFR50, Appendix I.

9. REACTOR SAFETY PERFORMANCE EVALUATIONS

This section focuses on information requested in Regulatory Guide 1.70, Chapter 15, as it applies to extended power uprate.

9.1 REACTOR TRANSIENTS

The FSARs evaluate the effects of a wide range of potential plant transients. Disturbances of the plant caused by a malfunction or a single failure of equipment or the operator are investigated according to the type of initiating event (Regulatory Guide 1.70, Chapter 15).

Due to the similarities between Plant Hatch Units 1 and 2 (i.e., vessel size, core power and SRV setpoints), the analysis was performed only for Unit 2. Trends with extended power uprate are expected to be the same for both units. The Unit 2 Reload 13 core was used as the representative fuel cycle for extended power uprate. Most of the transient events are analyzed at the full extended uprate power and maximum allowed core flow operating point on the power-flow map. For all transient events, one SRV is assumed to be out-of-service. Analytical results demonstrate the capability of the design to meet all transient safety criteria for uprated power conditions.

9.2 DESIGN BASIS ACCIDENTS

Plant-specific radiological analyses were performed at extended power uprate conditions for selected postulated accidents. The events reanalyzed were the Loss-of-Coolant Accident (LOCA), the Fuel Handling Accident (FHA), and the Control Rod Drop Accident (CRDA). The bounding doses resulting from the accidents are well below established regulatory limits and are contained in the SNC submittal to the NRC [Reference 6].

9.3 SPECIAL EVENTS

A Plant Hatch specific Anticipated Transient Without Scram (ATWS) calculation for the extended power uprate condition was performed, resulting in the peak vessel pressure meeting the acceptance criteria. The peak suppression pool temperature is also lower than that of the LOCA analysis. Therefore, the plant response to an ATWS event at 2763 MWt is acceptable.

Plant response and coping capabilities for a station blackout (SBO) event are impacted slightly by operation at the uprated power level due to an increase in the decay heat. There are no changes to the systems or equipment used to respond to an SBO event, nor is the required coping time changed. While the plant Hatch coping duration for SBO is four hours, onsite power (one diesel) is available in one hour.

As part of the extended power uprate, the SBO scenario was reanalyzed assuming that suppression pool cooling was initiated in one hour when the alternate AC is assumed available. Even if SPC is not initiated until four hours, the resulting peak pool temperature is acceptable for containment and ECCS pump operation.

None of the areas required to mitigate an SBO event will experience an increase in normal temperatures as a result of extended power uprate. Therefore, room heatup following an SBO event will remain unchanged and the equipment necessary for event mitigation is not affected

Based on the above discussion, the coping capabilities for a SBO event are not adversely affected by extended power uprate.

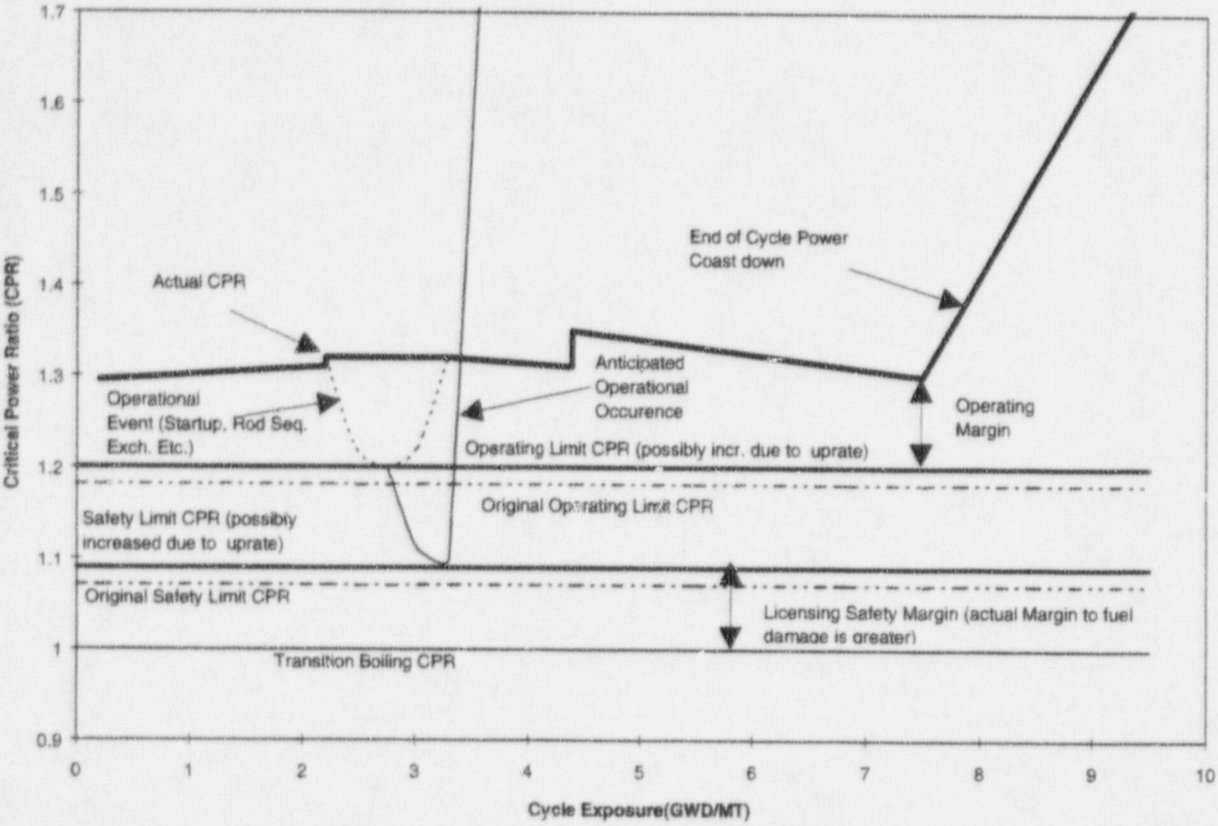


Figure 9-1. Typical CPR Response

10. ADDITIONAL ASPECTS OF POWER UPRATE

10.1 HIGH ENERGY LINE BREAK (HELB)

For extended power uprate, there will be no increase in the RPV dome operating pressure; consequently, there will be no increase in the mass and energy release rates following high energy line breaks. An evaluation of these piping systems resulted in the following:

- There is no change in postulated break locations.
- There are no new terminal ends.
- There are no new intermediate high stress points above the stress threshold.

At the extended uprate power level, the HELB outside the primary containment will not cause any of the existing subcompartment pressure, temperature and humidity profiles to change. Therefore, the resulting profiles are bounded by the existing profiles due to the conservatism in the original HELB analyses.

The evaluation of HELB structural/equipment analyses completed for the 5% original power uprate evaluated in the FSARs remains bounding for the proposed extended power uprate. The evaluation showed that the affected building and rooms that support the safety-related function are designed to withstand the resulting pressure and thermal loading following a HELB. The equipment and systems that support the safety-related functions are also qualified for the environmental conditions imposed upon them.

Calculations for Unit 2 supporting the dispositions of potential targets of pipe whip and jet impingement from the postulated HELBs were evaluated under the implemented 5% original power uprate program and determined to be adequate. The evaluation remains bounding for extended power uprate, since there is no increase in operating pressures for high energy lines.

The Moderate Energy Line Breaks (MELBs) in various areas of the plant were postulated and reviewed to determine their impact on the environmental conditions for equipment qualification. There is an insignificant impact on the results of the existing evaluations and equipment qualification program as a result of extended power uprate.

10.2 EQUIPMENT QUALIFICATION (EQ)

Equipment Qualification for safety-related electrical equipment located inside the containment is based on a main steam line break accident and/or DBA LOCA conditions and their resultant temperature, pressure, humidity, and radiation consequences, and includes the environment expected to exist during normal plant operation.

A review of the equipment qualification at the extended power uprate conditions identified some equipment located within the containment which is potentially affected by the higher radiation level. The qualification of this equipment has been reevaluated based on location specific dose calculations. These components have been found acceptable for extended power uprate conditions, although it will be necessary to decrease the qualified life of specific components because of increased radiation levels during extended power uprate conditions.

A review of the equipment qualification for the extended power uprate condition identified some equipment located outside containment which is potentially affected by the higher radiation level. The qualification of this equipment has been reevaluated and found acceptable for extended power uprate.

10.3 MECHANICAL COMPONENT DESIGN QUALIFICATION

The mechanical design of equipment/components (pumps, heat exchangers, etc.) in certain systems is affected by operation at the uprated power level due to slightly increased temperatures, pressure, and, in some cases, flow. The revised operating conditions do not significantly affect the cumulative usage fatigue factors of mechanical components. The dynamic loadings used in the equipment/component design do not change, since the existing design parameters bound the extended power uprate conditions.

The effects of increased fluid induced loads on safety-related components were evaluated within the piping assessments in Chapter 3. These increases in loads due to extended power uprate are insignificant, and become negligible when combined with the governing dynamic loads.

10.4 REQUIRED TESTING

The following testing will be performed at the time of implementation of extended power uprate:

- Surveillance testing will be performed on the instrumentation that requires recalibration for extended power uprate.
- Steady-state data will be taken at points from 90% up to the previous rated thermal power, so that operating performance parameters can be projected for extended uprate power before the previous power rating is exceeded.
- Power increases beyond the previous rating will be made along an established flow control/rod line in increments of ≤3%. Steady-state operating data will be taken and evaluated at each step

- Control system checks will be performed for the feedwater reactor water level controls and turbir. pressure controls and will be made at the original power uprate condition and at each power increment, to show acceptable adjustments and operational capability. The same performance criteria shall be used as in the original power uprate ascension tests, unless they have been replaced by updated criteria since the initial test program.

- The effects of flow-induced vibrations for the main steam and feedwater piping will be evaluated.

10.5 INDIVIDUAL PLANT EVALUATION (IPE)

This subsection addresses the possible impacts of an extended power uprate upon the Plant Hatch Level 1, Level 2, and external events (fire and seismic) probabilistic risk assessment (PRA) analyses.

A re-evaluation of the plant Hatch Level 1/Level 2 PRA was performed. The conclusions of this evaluation of the impacts of the proposed extended power uprate on the probabilistic risk analyses are:

- No readily discernible adverse effects will be realized for the frequency of initiating events.

- The current Level 1 success criteria are valid at the proposed higher power levels.

- Neither the CDF nor the LERF increases which may result as a consequence of the effects of the proposed power increase necessitate a revision to the PRA model with the exception of the case of a failure to emergency depressurize with a loss of high pressure injection (non-ATWS).

- There was no significant change in the Level 2 analysis as a result of the proposed extended power uprate.

Therefore, no significant impacts on the PRA analyses are believed to exist. The proposed power increase, when implemented, will be incorporated into the PRA models at a future periodic model update.

11. LICENSING EVALUATIONS

11.1 EVALUATION OF OTHER APPLICABLE LICENSING REQUIREMENTS

The analysis, design, and implementation of extended power uprate were reviewed for compliance with the plant's original licensing basis and for compliance with new regulatory requirements and operating experience in the nuclear industry. Plant unique evaluations have been performed for the subjects addressed below. The licensing requirements and plant-unique evaluations for extended uprate are very similar to those for the original power uprate.

All of the issues raised by the following sources are evaluated on a plant-specific basis as part of the extended power uprate program. These evaluations conclude that every issue is either: (1) not affected by extended power uprate, (2) already incorporated into the power uprate program, or (3) bounded by the original power (5%) uprate analyses.

Code of Federal Regulations (CFR)

Regulatory Guides

Generic Letters

TMI Action Items

Action Items (Formerly Unresolved Safety Issues)

New Generic Issues

Information and Enforcement Circulars (IECs)

Inspection and Enforcement Notices (IENs)

Inspection and Enforcement Bulletins (IEBs)

GE Services Information Letters (SILs)

GE RAPID Information Communication Service Information Letters (RICSILs)

In addition to the NRC and Industry Communications listed above, previous evaluations which could be affected by operation at the extended uprate power level have also been reviewed. These are the plant Emergency Operating Procedures, Safety Evaluations for work in progress and not yet integrated into the plant design basis, and Temporary Modifications which are not permanent changes, but could have been reviewed prior to the extended power uprate and still exist after uprate implementation. These items have been reviewed for possible impact by extended power uprate and were found to be either acceptable for extended power uprate or were revised to reflect the higher power condition.

11.2 IMPACT ON TECHNICAL SPECIFICATIONS

Implementation of extended power uprate will require revision of a number of Technical Specifications (TS) and TS Bases. Table 11-1 contains a list of TS locations, which should be changed to implement extended power uprate. The changes are similar (but less extensive) than the TS changes required for the original power uprate.

11.3 ENVIRONMENTAL ASSESSMENT

Environmental evaluations were performed, and it was determined that extended power uprate would not involve an unreviewed environmental issue and would meet the criteria established for a categorical exclusion to not require an environmental review.

11.4 SIGNIFICANT HAZARDS CONSIDERATION ASSESSMENT

An evaluation for Plant Hatch demonstrates that this uprate can be accommodated without a significant increase in the probability or consequences of an accident previously evaluated, without creating the possibility of a new or different kind of accident from any accident previously evaluated, and without exceeding any presently existing regulatory limits applicable to the plant which might cause a reduction in a margin of safety. Having arrived at negative declarations with regards to the criteria of 10CFR50.92, this assessment concludes that an uprate of the amount described herein does not involve a Significant Hazards Consideration.

Table 11-1

Technical Specifications and Bases Affected by Extended Power Uprate

Location	Effect
TS 1.1	Revise value of RTP definition to uprated power level of 2763 MWt
3.3.1.1 (plus Bases) Table 3.3.1.1-1 (plus Bases)	Revise power level at which turbine stop valve and control valve direct scram is bypassed from 30% RTP to 28% RTP.
3.3.4.1 (plus Bases)	Revise power level at which end-of-cycle recirculation pump trip is required operable (or where MCPR adder is required) from 30% RTP to 28% RTP.
Table 3.3.1.1-1	Revise APRM simulated thermal power-high from 0.58 W + 62% RTP to 0.58 W + 58% RTP.
Figures 3.4.9-1, 3.4.9-2, 3.4.9-3	Revise pressure-temperature limits.
5.5.12 (plus Bases)	Revise peak calculated containment internal pressure, P_a (slightly different for each unit).
B.3.3.2.2	Revise operability requirements for the Level 8 main turbine and RFP turbine trip from 30% RTP to 28% RTP.
B.3.3.6.1	Revise the Allowable Value (psid) for the main steam line and RCIC steam line high flow isolation (slightly different for each unit). The Tech Spec Allowable Value in % of rated flow does not change.
B3.7.6	Modify the Bases to state the current main condenser pretreatment offgas limit is conservative for the new licensed power.
B3.7.7	Revise the main turbine bypass capacity from "25%" to "approximately 21%" of the turbine design steam flow.

12. REFERENCES

1. GPC Letter HL-4812, J. T. Beckham, Jr. to NRC, "Response to Request for Additional Information: Power Uprate Submittal," April 5, 1995.

2. GE Nuclear Energy, "Elimination of Limit on Local Suppression Pool Temperature for SRV Discharge with Quenchers," NEDO-30832, Class I, December 1984.

3. NRC Letter, G. M. Halahan to R. Pinelli (BWROG), "Safety Evaluation Report by the Office of Nuclear Reactor Regulation on the Review of Two GE Topical Reports for the Elimination of Local Suppression Pool Temperature Limits and Raising Pool Temperature Technical Specification Limits," August 29, 1994. See also NEDO-30832-A, Class I, May 1995 (same title as Reference 19).

4. "Plant Unique Analysis Report, E. I. Hatch Nuclear Plant Unit 1," Revision 2, December 1989, Docket No. 50-321.

5. "Plant Unique Analysis Report, E. I. Hatch Nuclear Plant Unit 2," Revision 2, December 1982, Docket No. 50-366.

6. GPC Letter HL-5333, H. L. Sumner to NRC, "Revised Post-LOCA Doses," April 17, 1997.

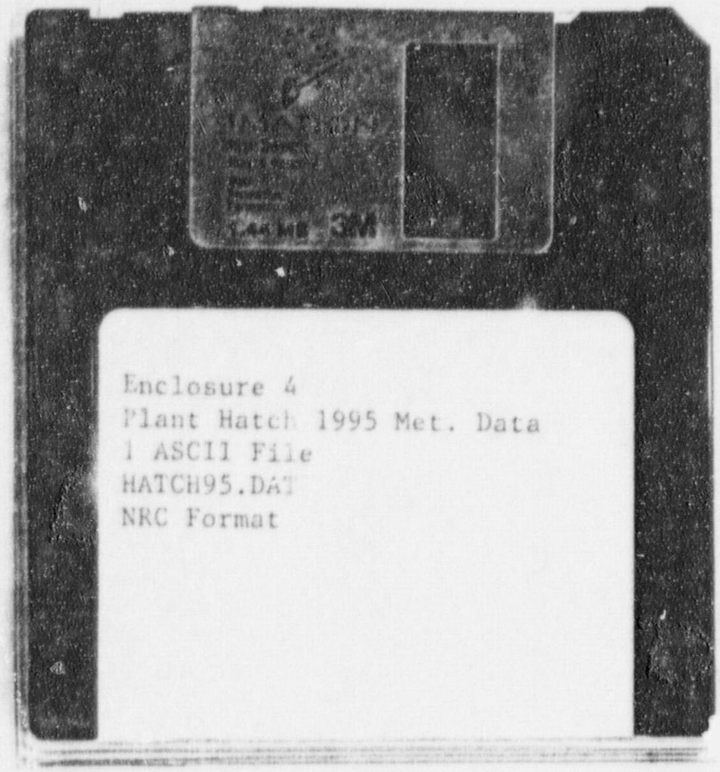
7. "Final Environmental Statement for the Edwin I. Hatch Nuclear Plant Units 1 and 2," (Docket Nos. 50-321 and 50-366), October 1972.

8. NUREG-0417, "Final Environmental Statement Related to Operation of Edwin I. Hatch Nuclear Plant Unit No. 2," (Docket No. 50-366), March 2, 1978.

ENCLOSURE 4

Response to Request for Additional Information on Extended Power Uprate License Amendment Request Plant Hatch 1995 Meteorological Data

Enclosure 4
Request for Additional Information on
Extended Power Uprate License Amendment
Request - Plant Hatch 1995 Met. Data



8. Perform adjustments to installed plant and switchyard instrumentation as necessary. Examples include the following:

    - Main steam line high flow.*

    - Bypass for turbine stop valve closure and turbine control bypass valve fast closure.*

    - APRM simulated thermal power scram.*

    - Main generator and switchyard protective devices.

9. Process computer software and data changes.

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* Proposed Technical Specifications changes (considered an NRC commitment).

Enclosure 2

Edwin I. Hatch Nuclear Plant
Request for Additional Information on
Extended Power Uprate License Amendment Request

Summary of Page Changes to Licensing Submittal

Please replace the following pages:

Enclosure 5

Page E5-2	Turbine control bypass valve "faster" closure was changed to turbine control bypass valve "fast" closure.

Enclosure 6

Page 1-13, Table 1-2	"Current and Extended Power Uprate Plant Operating Condition" - The Dome Pressure units referenced in Table 1-2 were changed from psig to psia.
Page 2-2, Section 2.2.1	Reference 2 was changed to Reference 1.
Page 2-3, Section 2.3.1	Reference 2 was changed to Reference 1.
Page 4-2, Section 4.1.1.1	The Local Pool Temperature with SRV Discharge section was revised to clarify the ECCS pump suctions are below the quenchers elevation.
Page 9-3, Section 9.3.1	Reference 1 was changed to Reference 2.
Page 9-4, Section 9.3.2	Peak suppression pool temperature changed from 194° to 206°F. See Response to NRC Question 3.
Page 9-8, Table 9-3	TSC doses and Table 9-3 notes were changed to reflect revised calculation results. See Response to NRC Question 37 for details.
Page 11-5 Table 11-1	"Technical Specifications and Bases Affected by Extended Power Uprate" - The reference to RCIC steam line high flow isolation was removed. The allowable value for the RCIC steam line high flow isolation does not change as a result of extended power uprate.