DUKE POWER COMPANY

OCONEE NUCLEAR STATION

ATTACHMENT 1

TECHNICAL SPECIFICATIONS

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## LIST OF FIGURES

# 2 SAFETY LIMITS AND LIMITING SAFETY SYSTEM SETTINGS

## 2.1 SAFETY LIMITS, REACTOR CORE

### Applicability

Applies to reactor thermal power, reactor power imbalance, reactor coolant system pressure, coolant temperature, and coolant flow during power operation of the plant.

### Objective

To maintain the integrity of the fuel cladding.

### Specification

The maximum local fuel pin centerline temperature shall be less than 5080 - $(6.5 \times 10^{-3}) \times$(Burnup, MWD/MTU) °F. Operation within this limit is assured by compliance with the Axial Power Imbalance Protective Limits as specified in the Core Operating Limits Report.

The DNBR shall be maintained greater than the correlation limits of 1.3 for BAW-2 and 1.18 for BWC. Operation within this limit is assured by compliance with the Axial Power Imbalance Protective Limits and Variable Low RCS Pressure Protective Limits as specified in the Core Operating Limits Report.

### Bases

To maintain the integrity of the fuel cladding and to prevent fission product release, it is necessary to prevent overheating of the cladding under normal operating conditions and anticipated transients. This is accomplished by operating within the nuclear boiling heat transfer regime where the heat transfer coefficient is large and the cladding temperature is only slightly greater than the coolant temperature.

Operation above the upper boundary of the nucleate boiling regime could result in excessive cladding temperatures because of the onset of departure from nucleate boiling (DNB) and the resultant sharp reduction in heat transfer coefficient. DNB is not a directly measurable parameter during operation, but neutron power and reactor coolant pressure and temperature can be related to DNB using a critical heat flux (CHF) correlation. The local DNB heat flux ratio (DNBR), defined as the ratio of the heat flux that would cause DNB at a particular core location to the actual local heat flux, is indicative of the margin to DNB.

The BAW-2 and BWC CHF correlations(1,2) have been developed to predict DNB for axially uniform and non-uniform heat flux distributions. The BAW-2 correlation applies to Mark-B fuel and the BWC correlation applies to Mark-BZ fuel. The minimum value of the DNBR, during steady-state operation, normal operational transients, and anticipated transients is limited to 1.30 (BAW-2) and 1.18 (BWC). A DNBR of 1.30 (BAW-2) or 1.18 (BWC) corresponds to a 95 percent probability at a 95 percent confidence level that DNB will not occur.

The Variable Low RCS Pressure Protective Limits presented in the Core Operating Limits Report represent the conditions at which the minimum allowable DNBR is predicted to occur for the limiting combination of thermal power and number of operating reactor coolant pumps. This curve is based upon the design nuclear peaking factors provided in the Core Operating Limits Report.

Since power peaking is not a directly measurable quantity, DNBR limited power peaks and fuel melt limited power peaks are separately correlated to measurable reactor power and power imbalance. The Axial Power Imbalance Protective Limits presented in the Core Operating Limits Report define the values of reactor power as a function of axial imbalance that correspond to the more restrictive of two thermal limits - MDNBR equal to the DNBR limit or the linear heat rate equal to the centerline fuel melt limit.

The core protection safety limits are based on an RCS flow less than or equal to 385,440 gpm (4 pump operation). Three pump operation is analyzed assuming 74.7 percent of four pump flow. The maximum thermal power for three pump operation is provided with the Axial Power Imbalance Protective Limits in the Core Operating Limits Report.

References

(1) Correlation of Critical Heat Flux in a Bundle Cooled by Pressurized Water, BAW-10000, March, 1970.

(2) Correlation of 15x15 Geometry Zircaloy Grid Rod Bundle CHF Data with the BWC Correlation, BAW-10143P, Part 2, August 1981.

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Page 2.1-3 Deleted by Amendment 191/191/188
dated September 16, 1991

FIGURE RELOCATED TO COLR

Figure 2.1-1

Variable Low Pressure

Protective Limits

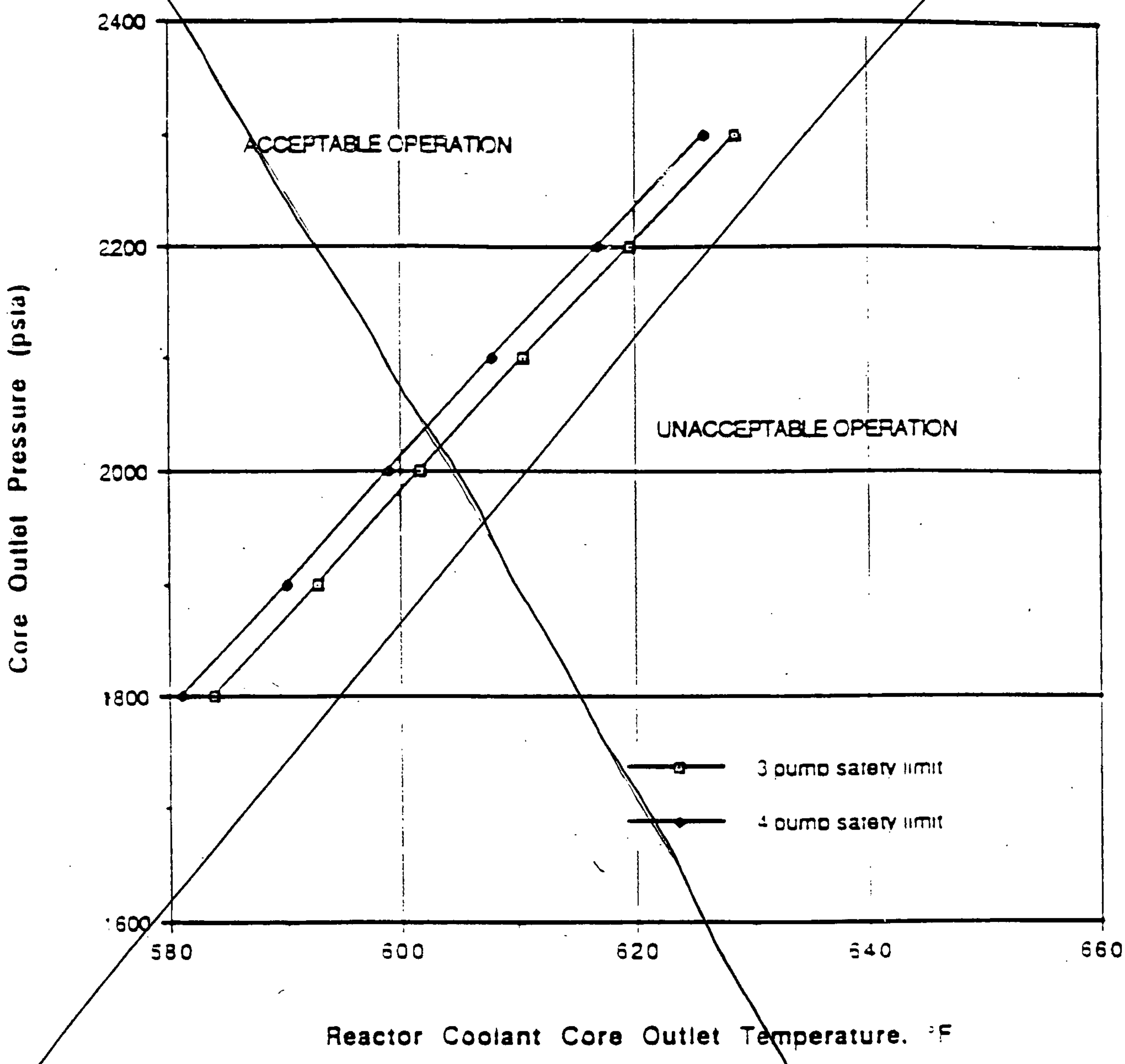
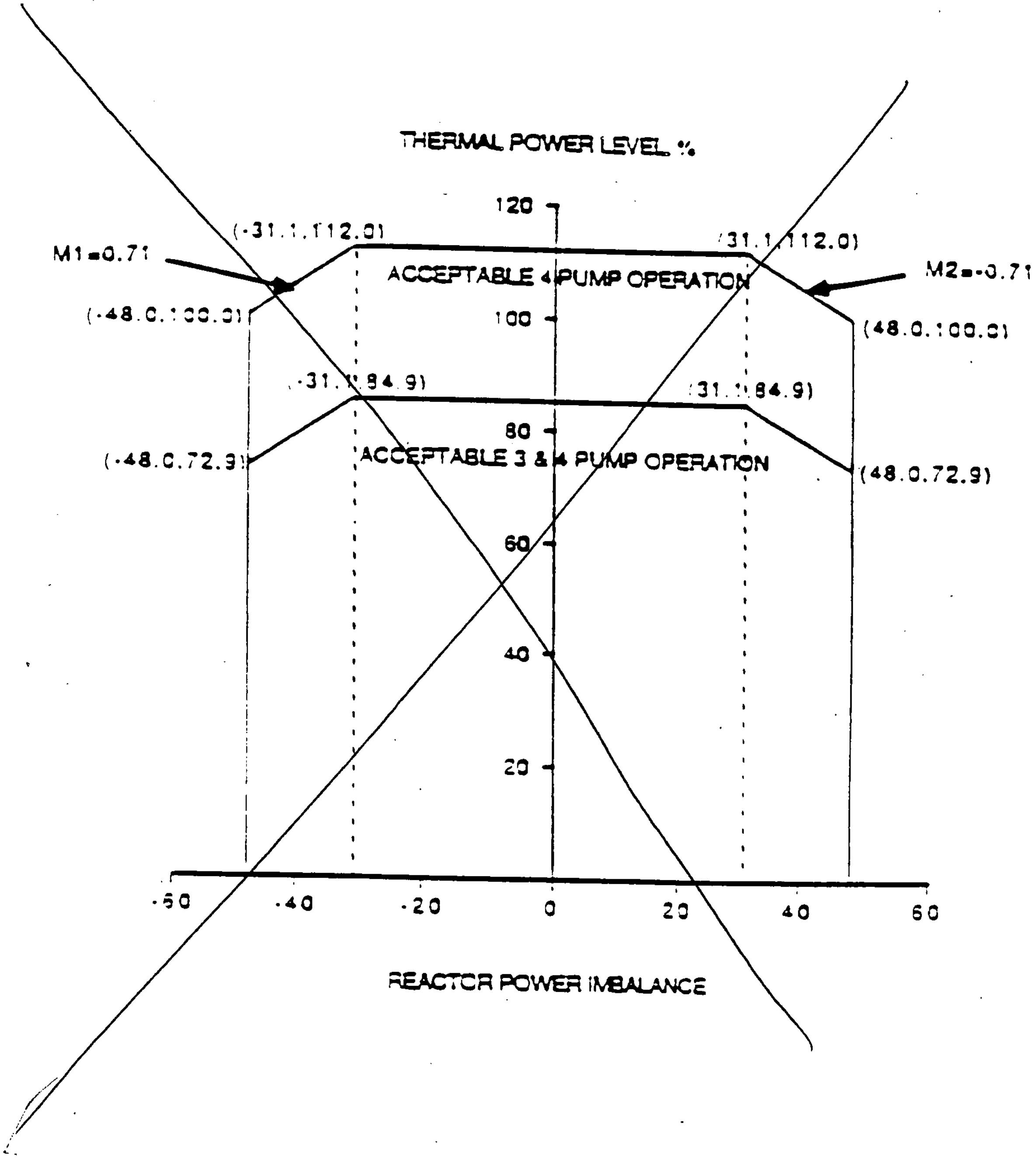


FIGURE RELOCATED TO COLR

Figure 2.1-2

Axial Power

Imbalance Protective Limits



Overpower Trip Based on Flow and Imbalance

Following the loss of one or more reactor coolant pumps, the core is prevented from violating the minimum DNBR criterion by a reactor trip initiated by exceeding the allowable reactor power to reactor coolant flow (flux/flow) ratio setpoint. Loss of one or more reactor coolant pumps is also detected by the pump monitors. The power level trip produced by the flux/flow ratio provides DNB protection for all modes of pump operation.

The power level trip setpoint produced by the flux/flow ratio provides both high power level and low flow protection. For every flow rate there is a maximum permissible power level, and for every power level there is a minimum permissible flow rate. For example, typical power level and flow rate combinations for different pump situations are as follows (actual values are given in the Core Operating Limits Report):

1. Assuming a flux/flow ration of 1.07, a reactor trip would occur when four reactor coolant pumps are operating if power is 107% and reactor flow rate is 100%, or flow rate is 93.46% and power level is 100%.

2. Trip would occur when three reactor coolant pumps are operating if power is 79.9% and reactor flow rate is 74.7% or flow rate is 70.09% and power level is 75%.

   The analysis to determine the flux/flow setpoint accounts for calibration and instrument errors and the variation in RC flow in such a manner as to ensure a conservative setpoint. Statistical methods are used to determine the combined effects of calibration and instrument uncertainties with the final string uncertainties used in the analysis corresponding to the 95/95 tolerance limits.

The reactor power imbalance (power in the top half of the core minus the power in the bottom half) reduces the power level trip produced by the flux/flow ratio as shown in the Axial Power Imbalance RPS Maximum Allowable Setpoints figure in the Core Operating Limits Report. The flux/flow ratio reduces the power level trip and associated power-imbalance boundaries to account for any reduction in RCS flow. The power-imbalance boundaries shown in the Axial Power Imbalance RPS Maximum Allowable Setpoints figure in the COLR are established to prevent fuel thermal limits, DNBR and centerline fuel melt limits, from being exceeded.

Pump Monitors

The pump monitors trip the reactor due to the loss of reactor coolant pump(s) to ensure the DNBR remains above the minimum allowable DNBR. The pump monitors provide redundant trip protection of DNB; tripping the reactor on a signal diverse from that of the flux/flow trip. The pump monitors also restrict the power level depending on the number of operating reactor coolant pumps.

Reactor Coolant System Pressure

During a startup accident from low power or a slow rod withdraw from high power, the reactor coolant system (RCS) high pressure setpoint is reached before the nuclear overpower trip setpoint. The high RCS pressure trip setpoint (2355 psig) ensures that the pressure remains below the safety limit (2750 psig) for any design transient. (2) The low pressure (1800 psig) and variable low pressure trip setpoints shown in the Variable Low RCS Pressure RPS Maximum Allowable Setpoints figure in the Core Operating Limits Report ensure that the minimum DNBR is greater than or equal to minimum allowable DNBR for those accidents that result in a reduction in pressure. (3,4) The limits shown in the Variable Low RCS Pressure RPS Maximum Allowable Setpoints figure in the Core Operating Limits Report bound the pressure-temperature curves calculated for 4 and 3 pump operation.

The safety analyses use a variable low RCS pressure trip setpoint which accounts for calibration and instrumentation uncertainties.

Coolant Outlet Temperature

The high reactor coolant outlet temperature trip setting limit (618°F) shown in the Variable Low RCS Pressure RPS Maximum Allowable Setpoints figure in the Core Operating Limits Report has been established to prevent excessive core coolant temperatures. Accounting for calibration and instrumentation errors, the safety analysis used a trip setpoint of 620°F.

Reactor Building Pressure

The high reactor building pressure trip setpoint (4 psig) provides positive assurance that a reactor trip will occur in the unlikely event of a loss-of-coolant accident, even in the absence of a low reactor coolant system pressure trip.

Shutdown Bypass

In order to startup the reactor and to be able to perform control rod drive tests and zero power physics tests (see Technical Specification 3.1.9), there is provision for bypassing certain segments of the reactor protective system (RPS). The RPS segments which can be bypassed are given in Table 2.3-1. Two conditions are imposed when the RPS is bypassed:

1. By administrative control the nuclear overpower trip setpoint is reduced to a value of $\leq$ 5.0% of rated power.

2. The high reactor coolant system pressure trip setpoint is automatically lowered to 1720 psig.

The high RCS pressure trip setpoint is reduced to prevent normal operation with part of the RPS bypassed. The reactor must be tripped before the bypass is initiated since the high pressure trip setpoint is lower than the normal low pressure trip setpoint (1800 psig).

TABLE 2.3-1

Reactor Protective System Trip Setting Limits

| | RPS Trip | RPS Trip Setpoint | Shutdown Bypass |
|---|---|---|---|
| 1. | Nuclear Overpower | 105.5% Rated Power | 5.0% Rated Power[1] |
| 2. | Flux/Flow/Imbalance | Axial Power Imbalance RPS Maximum Allowable Setpoints in the Core Operating Limits Report | Bypassed |
| 3. | Pump Monitors | At power operation >2.0% Rated Power and loss of two pumps | Bypassed |
| 4. | High Reactor Coolant System Pressure | 2355 psig | 1720[2] |
| 5. | Low Reactor Coolant System Pressure | 1800 psig | Bypassed |
| 6. | Variable Low Reactor Coolant System Pressure | Variable Low RCS Pressure RPS Maximum Allowable Setpoints in the Core Operating Limits Report | Bypassed |
| 7. | High Reactor Coolant Temperature | 618°F | 618°F |
| 8. | High Reactor Building Pressure | 4 psig | 4 psig |

(1) Administratively controlled reduction set only during reactor shutdown.

(2) Automatically set when other segments of the RPS are bypassed.

## 3.2 HIGH PRESSURE INJECTION AND CHEMICAL ADDITION SYSTEMS

Applicability

Applies to the high pressure injection and the chemical addition systems.

Objective

To provide for adequate boration under all operating conditions to assure ability to bring the reactor to a cold shutdown condition.

Specification

The reactor shall not be critical unless the following conditions are met:

3.2.1 Two high pressure injection pumps per unit are operable except as specified in 3.3.

3.2.2 One source per unit of concentrated soluble boric acid in addition to the borated water storage tank is available and operable.

This source will be the concentrated boric acid storage tank with the volume and boron concentration within the limits of the Core Operating Limits Report with a temperature at least 10°F above the crystallization temperature. System piping and valves necessary to establish a flow path from the tank to the high pressure injection system shall be operable and shall have the same temperature requirement as the concentrated boric acid storage tank. At least one channel of heat tracing capable of meeting the above temperature requirement shall be in operation. One associated boric acid pump shall be operable.

If the concentrated boric acid storage tank with its associated flowpath is unavailable, but the borated water storage tank is available and operable, the concentrated boric acid storage tank shall be restored to operability within 72 hours or the reactor shall be placed in a hot shutdown condition and be borated to a shutdown margin equivalent to 1% $\Delta k/k$ at 200°F within the next twelve hours; if the concentrated boric acid storage tank has not been restored to operability within the next 7 days the reactor shall be placed in a cold shutdown condition within an additional 30 hours.

If the concentrated boric acid storage tank is available but the borated water storage tank is neither available nor operable, the borated water storage tank shall be restored to operability within one hour or the reactor shall be placed in a hot shutdown condition within 6 hours and in a cold shutdown condition within an additional 30 hours.

## Bases

The high pressure injection system and chemical addition system provide control of the reactor coolant system boron concentration.(1) This is normally accomplished by using any of the three high pressure injection pumps in series with a boric acid pump associated with either the boric acid mix tank or the concentrated boric acid storage tank. An alternate method of boration will be the use of the high pressure injection pumps taking suction directly from the borated water storage tank.(2)

The quantity of boric acid in storage in the concentrated boric acid storage tank or the borated water storage tank is sufficient to borate the reactor coolant system to a 1% $\Delta k/k$ subcritical margin at cold conditions (33°F) with the maximum worth stuck rod and no credit for xenon at the worst time in core life. The current cycles for each unit are analyzed with the limits presented in the Core Operating Limits Report. The cycle specific analyses determine the volume and boron concentration requirements for the BWST and CBAST necessary to borate to cold shutdown. The volume requirements include a 10% margin and, in addition, allow for a deviation of 10 EFPD in the cycle length. The specification assures that two supplies are available whenever the reactor is critical so that a single failure will not prevent boration to a cold condition.

The concentration of boron in the concentrated boric acid storage tank may be higher than the concentration which would crystallize at ambient conditions. For this reason, and to assure a flow of boric acid is available when needed, these tanks and their associated piping will be kept at least 10°F above the crystallization temperature for the concentration present. Once in the high pressure injection system, the concentrate is sufficiently well mixed and diluted so that normal system temperatures assure boric acid solubility.

## REFERENCES

(1) FSAR, Sections 9.3.1, and 9.3.2
(2) FSAR, Figure 6.0.2
(3) Technical Specification 3.3

3.3.3 Core Flood Tank (CFT) System

When the RCS is in a condition with pressure above 800 psig both CFT's shall be operable with the electrically operated discharge valves open and breakers locked open and tagged; a minimum level of 13 $\pm$ .44 feet (1040 $\pm$ 30 $ft.^3$) and one level instrument channel per CFT; a minimum boron concentration within the limit specified in the Core Operating Limits Report in each CFT; and pressure at 600 $\pm$ 25 psig with one pressure instrument channel per CFT.

3.3.4 Borated Water Storage Tank (BWST)

When the RCS, with fuel in the core, is in a condition with pressure equal to or greater than 350 psig or temperature equal to or greater than 250°F:

a. The BWST shall have operable two level instrument channels.

(1) Tests or maintenance shall be allowed on one channel of BWST level instrumentation provided the other channel is operable.

(2) If the BWST level instrumentation is not restored to meet the requirements of Specification 3.3.4.a above within 24 hours, the reactor shall be placed in a hot shutdown condition within 12 hours. If the requirements of Specification 3.3.4.a are not met within 24 hours following hot shutdown, the reactor shall be placed in a condition with RCS pressure below 350 psig and RCS temperature below 250°F within an additional 24 hours.

b. The BWST shall contain a minimum level of 46 feet of water having a minimum concentration of boron within the limit specified in the Core Operating Limits Report at a minimum temperature of 50°F. The manual valve, LP-28, on the discharge line shall be locked open. If these requirements are not met,the BWST shall be considered unavailable and action initiated in accordance with Specification 3.2.

3.3.5 Reactor Building Cooling (RBC) System

a. When the RCS, with fuel in the core, is in a condition with pressure equal to or greater than 350 psig or temperature equal to or greater than 250°F and subcritical:

(1) Two independent RBC trains, each comprised of an RBC fan, associated cooling unit, and associated ESF valves shall be operable.

Bases

Specification 3.3 assures that, for whatever condition the reactor coolant system is in, adequate engineered safety feature equipment is operable.

For operation up to 60% FP, two high pressure injection pumps are specified. Also, two low pressure injection pumps and both core flood tanks are required.

In the event that the need for emergency core cooling should occur, functioning of one high pressure injection pump, one low pressure injection pump, and both core flood tanks will protect the core, and in the event of a main coolant loop severance, limit the peak clad temperature to less than 2,200°F and the metal-water reaction to that representing less than 1 percent of the clad. (1) Both core flooding tanks are required as a single core flood tank has insufficient inventory to reflood the core.

The requirement to have three HPI pumps and two HPI flowpaths operable during power operation above 60% FP is based on considerations of potential small breaks at the reactor coolant pump discharge piping for which two HPI trains (two pumps and two flow paths) are required to assure adequate core cooling. (2) The analysis of these breaks indicates that for operation at or below 60% FP only a single train of the HPI system is needed to provide the necessary core cooling.

The requirement for a flowpath from LPI discharge to HPI pump suction is provided to assure availability of long term core cooling following a small break LOCA in which the BWST is depleted and RCS pressure remains above the shutoff head of the LPI pumps.

The borated water storage tanks are used for two purposes:

(a) As a supply of borated water for accident conditions.

(b) As a supply of borated water for flooding the fuel transfer canal during refueling operation.(3)

Three-hundred and fifty thousand (350,000) gallons of borated water ( a level of 46 feet in the BWST) are required to supply emergency core cooling and reactor building spray in the event of a loss-of-core cooling accident. This amount fulfills requirements for emergency core cooling. The borated water storage tank capacity of 388,000 gallons is based on refueling volume requirements. Heaters maintain the borated water supply at a temperature above 50°F to lessen the potential for thermal shock of the reactor vessel during high pressure injection system operation. The boron concentration is set at the amount of boron required to maintain the core 1 percent $\Delta k/k$ subcritical at 33°F without any control rods in the core. The minimum boron concentration is specified in the Core Operating Limits Report.

It has been shown for the worst design basis loss-of-coolant accident (a 14.1 $ft^2$ hot leg break) that the Reactor Building design pressure will not be exceeded with one spray and two coolers operable. (4) Therefore, a maintenance period of seven days is acceptable for one Reactor Building cooling fan

## 6.9 CORE OPERATING LIMITS REPORT

Specification

6.9.1 Core operating limits shall be established prior to each reload cycle, or prior to any remaining part of a reload cycle, for the following:

(1) Axial Power Imbalance Protective Limits and Variable Low RCS Pressure Protective Limits for Specification 2.1.

(2) Reactor Protective System Trip Setting Limits for the Flux/Flow/Imbalance and Variable Low Reactor Coolant System Pressure trip functions in Specification 2.3.

(3) Power Dependent Rod Insertion Limits for Specifications 3.1.3.5, 3.1.11, 3.5.2.1.b, 3.5.2.2.d.2.c, 3.5.2.3, and 3.5.2.5.c.

(4) Concentrated Boric Acid Storage Tank volume and boron concentration for Specification 3.2.2.

(5) Core Flood Tank boron concentration for Specification 3.3.3.

(6) Borated Water Storage Tank boron concentration for Specification 3.3.4.

(7) Quadrant Power Tilt Limits for Specification 3.5.2.4.a, 3.5.2.4.b, 3.5.2.4.d, 3.5.2.4.e, and 3.5.2.4.f.

(8) Power Imbalance Limits for Specification 3.5.2.6

and shall be documented in the CORE OPERATING LIMITS REPORTS.

6.9.2 The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically:

(1) DPC-NE-1002A, Reload Design Methodology II, October 1985.

(2) NFS-1001A, Reload Design Methodology, April 1984.

(3) DPC-NE-2003A, Oconee Nuclear Station Core Thermal Hydraulic Methodology Using VIPRE-01, July 1989.

6.9.3 The core operating limits shall be determined such that all applic able limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, ECCS limits, nuclear limits such as shutdown margin, and transient and accident analysis limits) of the safety analysis are met.

6.9.4 The CORE OPERATING LIMITS REPORT, including any mid-cycle revisions or supplements shall be provided, upon issuance for each reload cycle, to the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector.

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

ATTACHMENT 2

TECHNICAL JUSTIFICATION AND
NO SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

TECHNICAL JUSTIFICATION
NO SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

Background:

GL 88-16 provides guidance for the removal of cycle-specific parameter limits from Technical Specifications (TS). Amendment numbers 172/172/169 and 191/191/188 for Oconee Units 1, 2, and 3 respectively revised the ONS TS to replace the values of certain cycle-specific parameter limits with a reference to the Core Operating Limits Report (COLR) which provides the values of these limits. The following parameter limits are currently included in the TS and are evaluated with each reload core: Figure 2.1-1 "Variable Low Pressure Protective Limits"; Figure 2.1-2 "Axial Power Imbalance Protective Limits"; TS 3.2.2 Concentrated Boric Acid Storage Tank (CBAST) volume and boron concentration; TS 3.3.3 Core Flood Tank (CFT) boron concentration; and TS 3.3.4 Borated Water Storage Tank (BWST) boron concentration. The proposed revision to TS provided in Attachment 1 relocates these cycle-specific parameter limits to the COLR. Associated administrative changes are included to the List of Figures and to TS 6.9.1. Associated Bases changes are also provided in Attachment 1.

For the past several years, Duke Power Company has been designing the cores for Oconee Nuclear Station to a 400 to 410 EFPD cycle length. Because of the fairly stable cycle length, relatively few reload-related Technical Specification changes have been necessary. However, Oconee Nuclear Station is currently transitioning from the 410 EFPD cycle length to a cycle length of 480 EFPD. The increased cycle length will increase the required boron concentrations for the BWST, CBAST, and CFTs. Since the required boron concentration for these tanks will vary from cycle to cycle, Duke Power Company requests that these limits be relocated from the Technical Specifications and placed in the COLR.

Similarly, the predicted power distributions for the transition fuel cycles and equilibrium 480 EFPD cycles will differ to some extent from the power distributions based on a cycle length of 410 EFPD. These differences can affect the variable low pressure protective limit and axial power imbalance protective limits given in Figures 2.1-1 and 2.1-2 of Technical Specification 2.1. Thus, Duke Power Company requests that these limits be relocated from the Technical Specifications and placed in the COLR. It should be noted that the safety limits given in Technical Specification 2.1 are not changing; only the associated protective limits which ensure that the safety limits of Technical Specification 2.1 are not exceeded may change. The DNBR and centerline fuel temperature safety limits will not be changed without prior approval from the NRC.

In addition to the above changes, the Bases have been revised in response to concerns raised in INPO SER 90-17 regarding temperature assumptions in shutdown margin analyses. The Bases have been revised to indicate the shutdown margin requirements are based on a RCS temperature of 33°F rather than 70°F.

Discussion of Changes:

The following summarizes TS and Bases revisions in Attachments 1 and 2:

List of Figures, page vii:
Changes to the list of Figures are provided consistent with changes to Specification 2.1. This change is considered to be administrative in nature.

TS 2.1, page 2.1-1:
The first paragraph of Specification 2.1 has been changed to show the relocation of Figure 2.1-2 "Axial Power Imbalance Protective Limits" to the COLR. Note that the fuel centerline temperature reactor core safety limit has been retained in the Technical Specifications in accordance with 10CFR50.36. The axial power imbalance protective limit is the cycle-specific parameter limit which corresponds to the fuel centerline temperature safety limit and is determined using the NRC approved methodology identified in TS 6.9.2. Therefore, the cycle-specific limit has been relocated to the COLR. The RPS trip setpoint which corresponds to this cycle-specific protective limit has previously been relocated to the COLR by amendment number 191/191/188. This RPS trip setpoint is developed from the protective limit by error adjustment. This change conforms to the guidance of GL 88-16 and is considered to be administrative in nature.

The second paragraph of Specification 2.1 has been changed to show the relocation of Figure 2.1-1 "Variable Low RCS Pressure Protective Limit" and Figure 2.1-2 "Axial Power Imbalance Protective Limits" to the COLR. Note that the DNBR reactor core safety limit has been retained in the Technical Specifications in accordance with 10CFR50.36. The variable low RCS pressure protective limit and axial power imbalance protective limit are the cycle-specific parameter limits which correspond to the DNBR safety limit and are determined using the NRC approved methodology identified in TS 6.9.2. Therefore, the cycle-specific limits have been relocated to the COLR. The RPS trip setpoints which correspond to these cycle-specific protective limits have previously been relocated to the COLR by amendment number 191/191/188. These RPS trip setpoints are developed from the protective limits by error adjustment. This change conforms to the guidance of GL 88-16 and is considered to be administrative in nature.

2.1 Bases, page 2.1-2:
Changes to the 2.1 Bases are provided consistent with changes to TS 2.1. This change is considered to be administrative in nature.

Page 2.1-3:
This page has been deleted consistent with the relocation of Figures 2.1-1 and 2.1-2 on pages 2.1-4 and 2.1-5 respectively. This change is considered to be administrative in nature.

Figure 2.1-1, page 2.1-4
This page has been deleted consistent with the relocation of Figure 2.1-1. This change is considered to be administrative in nature.

Figure 2.1-2, page 2.1-5
This page has been deleted consistent with the relocation of Figure 2.1-2. This change is considered to be administrative in nature.

TS 2.3 Bases, pages 2.3-2 and 2.3-3:
These pages have been revised to identify the title of the appropriate COLR figures consistent with changes to Table 2.3-1. This change is purely administrative in nature.

Table 2.3-1, page 2.3-5:
This Table has been revised to identify the title of the appropriate COLR figures rather than the COLR Figure number for item 2, "Flux/Flow/Imbalance RPS Trip" and item 6, "Variable Low RCS Pressure RPS Trip." This change is purely administrative in nature.

TS 3.2.2, page 3.2-1:
Specification 3.2.2 has been changed to show the relocation of Concentrated Boric Acid Storage Tank (CBAST) volume and boron concentration limits to the COLR. These cycle-specific parameter limits are determined using the NRC approved methodology identified in TS 6.9.2. Therefore, the cycle-specific limit has been relocated to the COLR. This change conforms to the guidance of GL 88-16 and is considered to be administrative in nature.

3.2 Bases, page 3.2-2:
INPO SER 90-17 identified the potential for the RCS temperature decreasing below the minimum value used in the reactor shutdown margin analysis. In response, the Bases which describe shutdown margin assumptions have been revised to indicate the shutdown margin requirements are based on a RCS temperature of 33°F rather than 70°F. This change is an additional restriction not presently included in the Technical Specifications.

The remainder of the changes to the 3.2 Bases are provided consistent with changes to TS 3.2.2 and describe the cycle-specific nature of the CBAST and BWST volume and boron concentration requirements. The examples of boric acid injection capabilities and crystallization temperature, and redundant information (regarding available boration flowpaths) has been deleted. This change is considered to be administrative in nature.

TS 3.3.3, page 3.3-3:
Specification 3.3.3 has been changed to show the relocation of the Core Flood Tank (CFT) boron concentration limit to the COLR. This cycle-specific parameter limit is determined using the NRC approved methodology identified in TS 6.9.2. Therefore, this cycle-specific limit has been relocated to the COLR. This change conforms to the guidance of GL 88-16 and is considered to be administrative in nature.

TS 3.3.4, page 3.3-3:

Specification 3.3.4 has been changed to show the relocation of the Borated Water Storage Tank (BWST) boron concentration limit to the COLR. This cycle-specific parameter limit is determined using the NRC approved methodology identified in TS 6.9.2. Therefore, this cycle-specific limit has been relocated to the COLR. This change conforms to the guidance of GL 88-16 and is considered to be administrative in nature.

3.3 Bases, page 3.3-6:

INPO SER 90-17 identified the potential for the RCS temperature decreasing below the minimum value used in the reactor shutdown margin analysis. In response, the Bases which describe shutdown margin assumptions have been revised to indicate the shutdown margin requirements are based on a RCS temperature of 33°F rather than 70°F. This change is an additional restriction not presently included in the Technical Specifications.

The remainder of changes to the 3.3 Bases are either provided to be consistent with changes to TS 3.3.4, or are editorial. These changes are considered to be administrative in nature.

TS 6.9.1, page 6.9-1:

Specification 6.9.1 has been changed to identify the additional cycle-specific parameter limits which have been relocated to the COLR. This change conforms to the guidance of GL 88-16 and is considered to be administrative in nature. In addition, a typographical error in (new) item number 2 is corrected ("functions" rather than "function").

<u>Evaluation:</u>

Duke Power Company (Duke) has made the determination that this amendment request involves a No Significant Hazards Consideration by applying the standards established by NRC regulations in 10CFR50.92. This ensures that operation of the facility in accordance with the proposed amendment would not:

(1) <u>Involve a significant increase in the probability or consequences of an accident previously evaluated:</u>

Each accident analysis addressed within the Oconee Final Safety Analysis Report (FSAR) has been examined with respect to the change proposed within this amendment request. The Technical Specifications will continue to require operation within the bounds of the cycle-specific parameter limits. The cycle-specific parameter limits will be calculated using NRC approved methodology. Therefore, the probability of any Design Basis Accident (DBA) is not affected by this change, nor are the consequences of a DBA affected by this change since the relocation of cycle-specific parameter limits from the Technical Specifications to the COLR is not considered to be an initiator or contributor to any accident analysis addressed in the Oconee FSAR.

(2) <u>Create the possibility of a new or different kind of accident from any kind of accident previously evaluated:</u>

Operation of ONS in accordance with these Technical Specifications will not create any failure modes not bounded previously evaluated accidents. Consequently, this change will not create the possibility of a new or different kind of accident from any kind of accident previously evaluated.

(3) <u>Involve a significant reduction in a margin of safety:</u>

The Technical Specifications will continue to require operation within the bounds of the cycle-specific parameter limits. The cycle-specific parameter limits will be calculated using NRC approved methodology. In addition, each future reload will require a 10CFR50.59 safety review to assure that operation of the Unit within the cycle-specific limits will not involve a reduction in a margin of safety. Therefore, no margins of safety are affected by the relocation of cycle-specific parameter limits to the COLR.

Duke has concluded based on the above that there are no significant hazards considerations involved in this amendment request.

DUKE POWER COMPANY

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ATTACHMENT 3

EXAMPLE CORE OPERATING LIMITS REPORT

DRAFT

## 1.0 CORE OPERATING LIMITS

This Core Operating Limits Report for O1C14 has been prepared in accordance with the requirements of Technical Specification 6.9. The core operating limits have been developed using NRC-approved methodology (References 1, 2, and 3) and are documented in Reference 4. The setpoints for O1C14 are documented in References 5 and 6. The Reactor Coolant System design flow used in Reference 4 for O1C14 is 109.5% (of 88,000 gpm per RCP). The core operating limits have been developed with a radial local peaking factor ($F_{\Delta H}$) of 1.714 and an axial peaking factor ($F_z$) of 1.5.

The following cycle-specific core operating limits are included in this report:

1) Axial power imbalance and variable low pressure protective limits (Figures 1.1 and 1.2),

2) RPS maximum allowable setpoints (Figures 1.3 and 1.4),

3) Quadrant power tilt limits,

4) Steady state operating band,

5) Operational power imbalance limits,

6) Operational and shutdown margin-limited control rod position limits,

7) BWST, CBAST, and CFT boron requirements.

## 1.1 REFERENCES


1. DPC-NE-1002A, Reload Design Methodology II, October 1985.

2. NFS-1001A, Reload Design Methodology, April 1984.

3. DPC-NE-2003A, Oconee Nuclear Station Core Thermal Hydraulic Methodology Using VIPRE-01, July 1989.

4. O1C14 Maneuvering Analysis, Duke Power Company calculational file, OSC-4137, Rev. 0, 13MAR91.

5. Variable Low Pressure Safety Limit, Duke Power Company calculational file, OSC-4048, Rev. 0, 24JUL90.

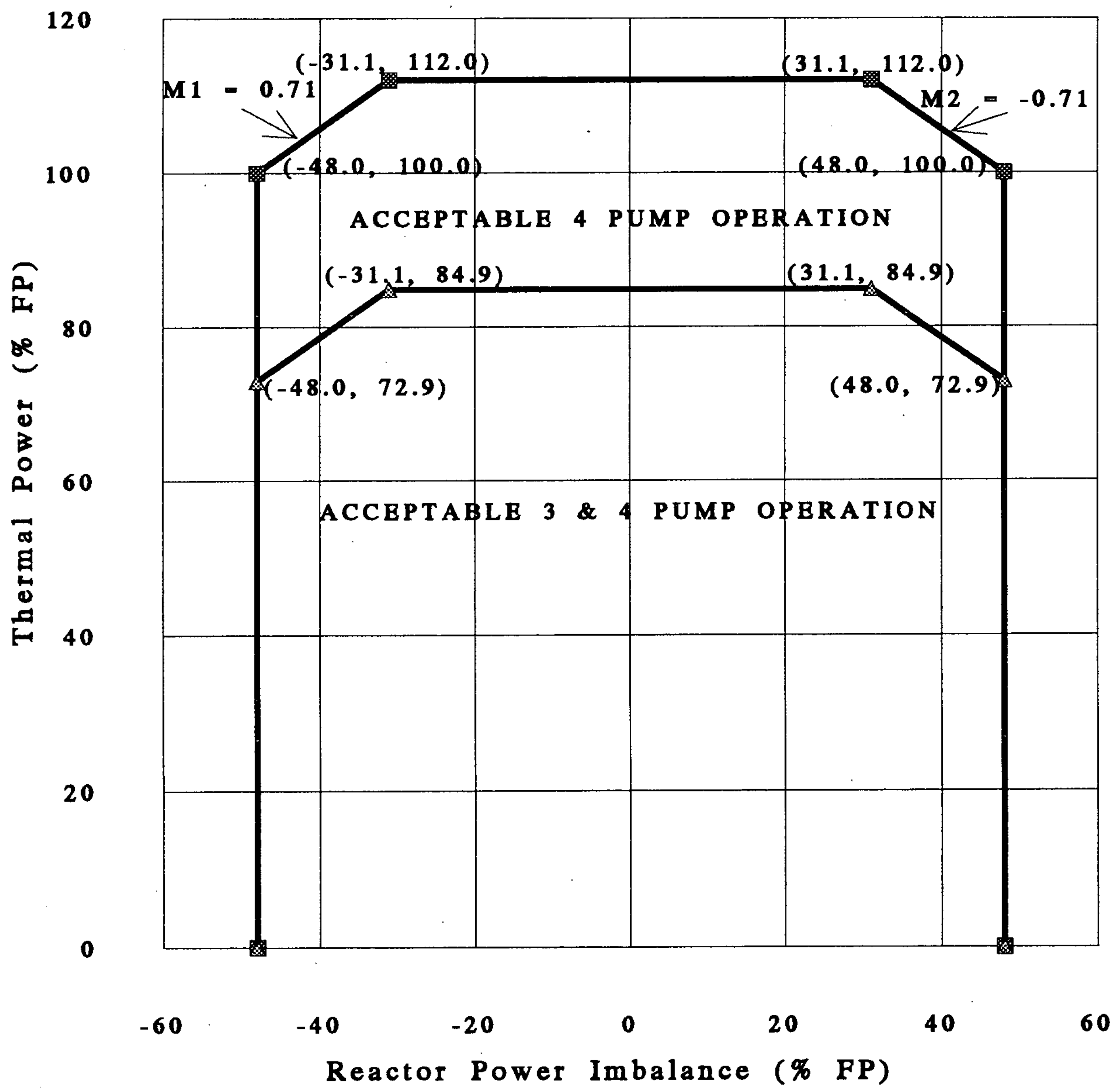
6. O1C14 RPS Setpoints and Safety Review, Duke Power Company calculational file, OSC-4275, Rev. 0, 25MAR91.

DRAFT

Figure 1.1

Unit 1 Axial Power Imbalance Protective Limits

Note: Operation outside the acceptable region is considered a violation of the DNBR and fuel centerline temperature safety limits given in Technical Specification 2.1.



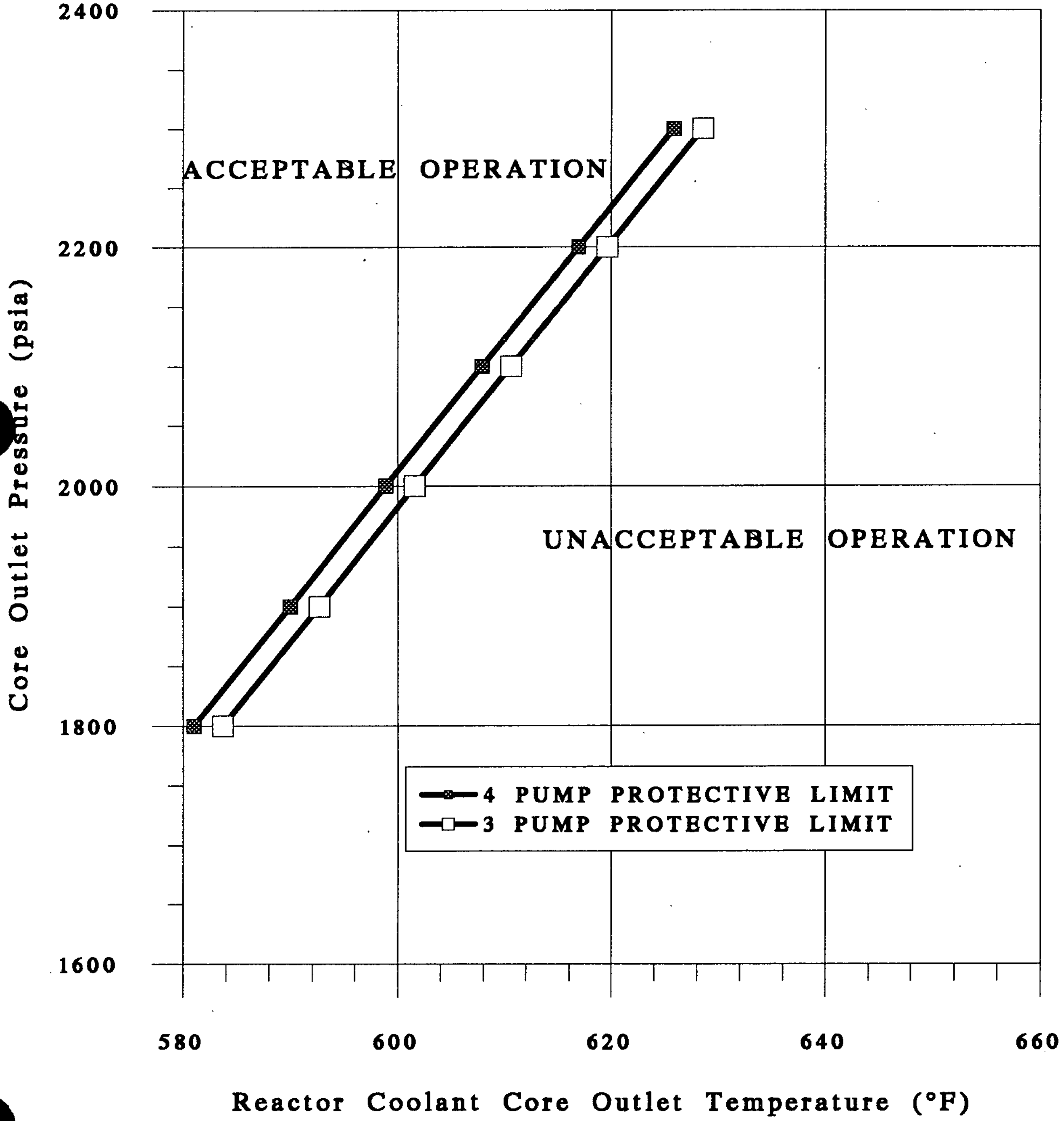

Referred to by Tech. Spec. 2.1

Figure 1.2

DRAFT

## Unit 1 Variable Low RCS Pressure Protective Limits

Note: Operation in the unacceptable region is considered a violation of the DNBR safety limit given in Technical Specification 2.1.

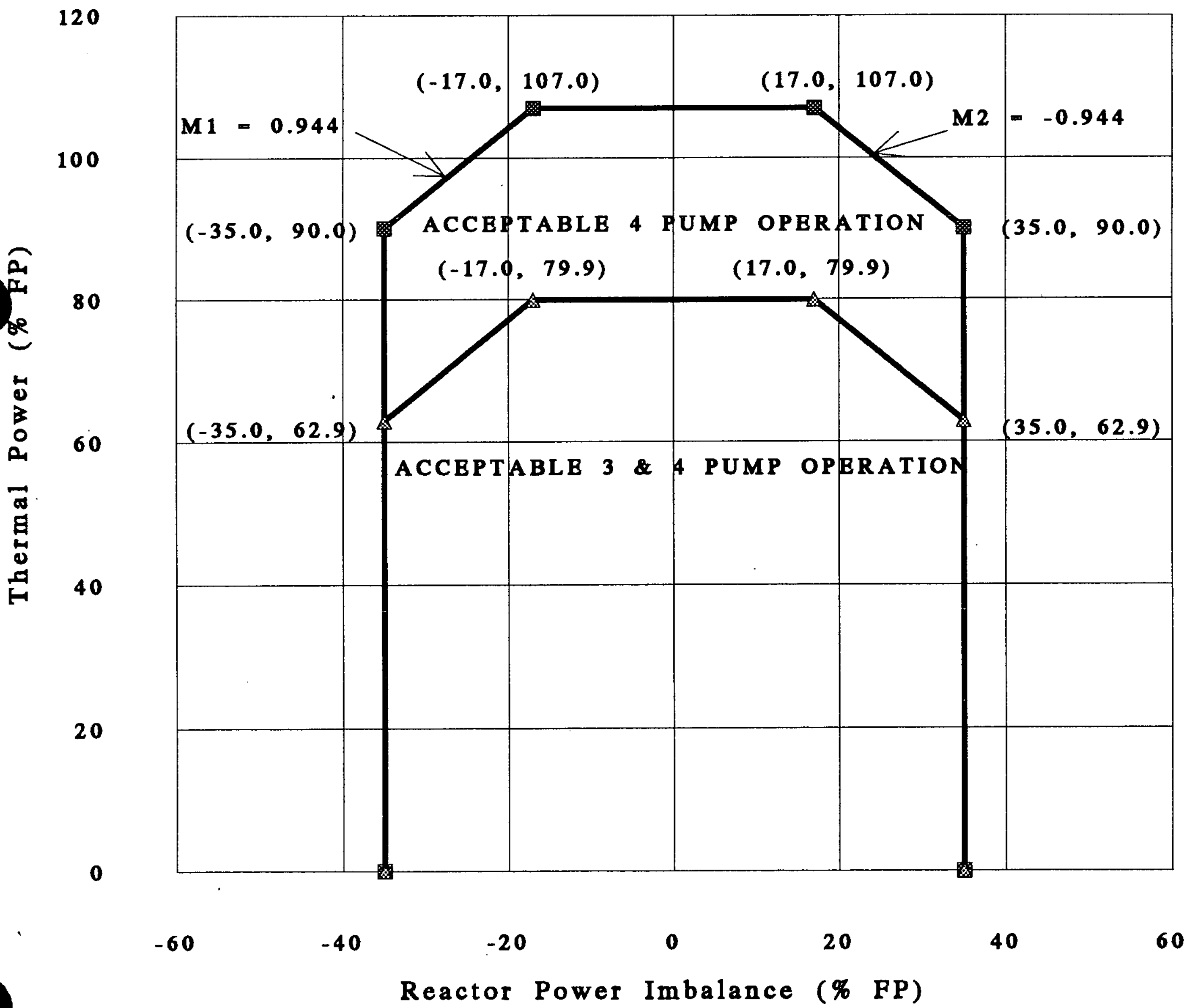



Referred to by Tech. Spec. 2.1

DRAFT

Figure 1.3

Unit 1 Axial Power Imbalance RPS Maximum Allowable Setpoints

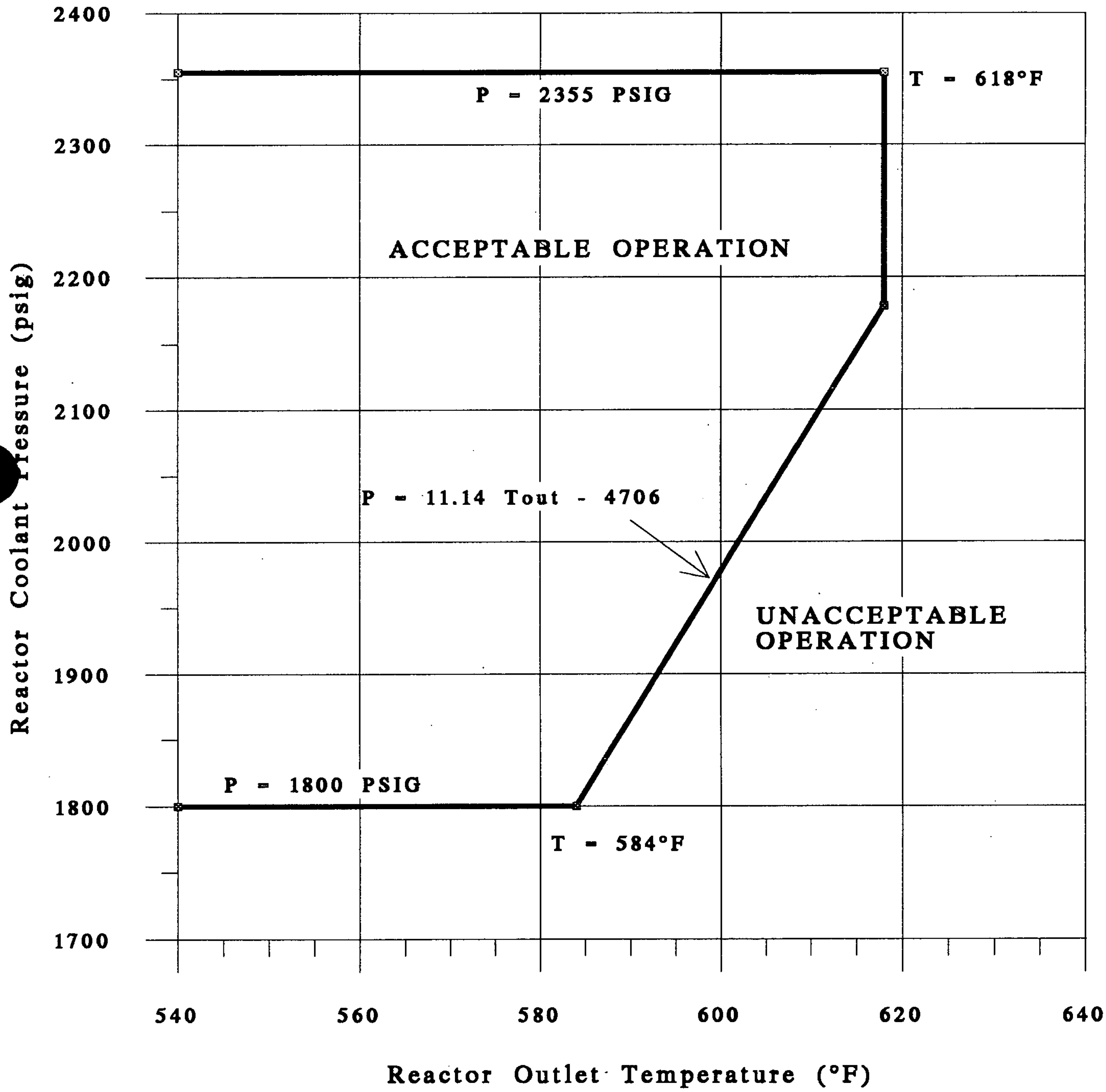



Referred to by Tech. Spec. 2.3

Figure 1.4

DRAFT

Unit 1 Variable Low RCS Pressure RPS Maximum Allowable Setpoints




Referred to by Tech Spec. 2.3

DRAFT

Oconee 1 Cycle 14

QUADRANT POWER TILT LIMITS

| Steady State Limit | Transient Limit | Maximum Limit |
|---|---|---|
| 5.00 | 9.44 | 20.00 |

Referred to by Tech. Spec.:
3.5.2.4.a
3.5.2.4.b
3.5.2.4.d
3.5.2.4.e
3.5.2.4.f

DRAFT

Oconee 1 Cycle 14

STEADY STATE OPERATING BAND

| RI, % WD | | APSR, %WD | |
|---|---|---|---|
| MIN | MAX | MIN | MAX |
| 292 | 300 | 30 | 40 |

DRAFT

Oconee 1 Cycle 14

OPERATIONAL POWER IMBALANCE BREAKPOINTS

| | POWER (% of 2568 MW) | IMBALANCE LIMITS |
|---|---|---|
| 4 PUMP | 0.0 | -40.67 |
| | 80.0 | -40.67 |
| | 90.0 | -38.09 |
| | 102.0 | -25.57 |
| | 102.0 | 20.46 |
| | 90.0 | 24.50 |
| | 80.0 | 26.10 |
| | 0.0 | 26.10 |
| 3 PUMP | 0.0 | -40.67 |
| | 77.0 | -40.67 |
| | 77.0 | 26.10 |
| | 0.0 | 26.10 |

Referred to by Tech. Spec. 3.5.2.6

DRAFT

Oconee 1 Cycle 14

ROD INDEX OPERATIONAL LIMITS

0 EFPD to EOC

| | Power (% of 2568 MW) | RI, %WD MIN | MAX |
|---|---|---|---|
| 4 PUMP | 102 | 260.0 | 300.0 |
| | 90 | 260.0 | 300.0 |
| | 80 | 240.0 | 300.0 |
| | 50 | 200.0 | 300.0 |
| | 15 | 90.0 | 300.0 |
| | 5 | 0.0 | 300.0 |
| 3 PUMP | 77 | 236.0 | 300.0 |
| | 50 | 200.0 | 300.0 |
| | 15 | 90.0 | 300.0 |
| | 5 | 0.0 | 300.0 |

Referred to by Tech. Spec.:
3.1.3.5
3.1.11
3.5.2.1.b
3.5.2.2.d.2.c
3.5.2.3
3.5.2.5.c

DRAFT

Oconee 1 Cycle 14

ROD INDEX SHUTDOWN MARGIN LIMITS

0 EFPD to EOC

| | Power (% of 2568 MW) | RI, %WD MIN | MAX |
|---|---|---|---|
| 4 PUMP | 102 | 220.0 | 300.0 |
| | 50 | 160.0 | 300.0 |
| | 15 | 90.0 | 300.0 |
| | 5 | 0.0 | 300.0 |
| 3 PUMP | 77 | 210.0 | 300.0 |
| | 50 | 160.0 | 300.0 |
| | 15 | 90.0 | 300.0 |

Referred to by Tech. Spec.:
3.1.3.5
3.1.11
3.5.2.1.b
3.5.2.2.d.2.c
3.5.2.3
3.5.2.5.c

DRAFT

Oconee 1 Cycle 14

BWST, CBAST, and CFT Boron Requirements

0 EFPD to EOC

1. The BWST boron concentration shall be greater than 1950 ppm (referred to by Tech. Spec. 3.3.4).

2. The equivalent of at least 1100 $ft^3$ of 11,000 ppm boron shall be maintained in the CBAST (referred to by Tech. Spec. 3.2.2)

3. The boron concentration in each CFT shall be greater than 1835 ppm (referred to by Tech. Spec. 3.3.3)

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ATTACHMENT 4

MARKUP OF CURRENT TECHNICAL SPECIFICATIONS

## LIST OF FIGURES

## 2.1 SAFETY LIMITS, REACTOR CORE

### Applicability

Applies to reactor thermal power, reactor power imbalance, reactor coolant system pressure, coolant temperature, and coolant flow during power operation of the plant.

### Objective

To maintain the integrity of the fuel cladding.

### Specification

The maximum local fuel pin centerline temperature shall be less than 5080 - $(6.5\times10^{-3})\times$(Burnup, MWD/MTU) °F. Operation within this limit is assured by compliance with the Axial Power Imbalance Protective Limits as specified in ~~Figure 2.1-2~~the Core Operating Limits Report.

The DNBR shall be maintained greater than the correlation limits of 1.3 for BAW-2 and 1.18 for BWC. Operation within this limit is assured by compliance with the Axial Power Imbalance Protective Limits and Variable Low RCS Pressure Protective Limits as specified in ~~Figures 2.1-2 and 2.1-1 respectively~~the Core Operating Limits Report.

### Bases

To maintain the integrity of the fuel cladding and to prevent fission product release, it is necessary to prevent overheating of the cladding under normal operating conditions and anticipated transients. This is accomplished by operating within the nuclear boiling heat transfer regime where the heat transfer coefficient is large and the cladding temperature is only slightly greater than the coolant temperature.

Operation above the upper boundary of the nucleate boiling regime could result in excessive cladding temperatures because of the onset of departure from nucleate boiling (DNB) and the resultant sharp reduction in heat transfer coefficient. DNB is not a directly measurable parameter during operation, but neutron power and reactor coolant pressure and temperature can be related to DNB using a critical heat flux (CHF) correlation. The local DNB heat flux ratio (DNBR), defined as the ratio of the heat flux that would cause DNB at a particular core location to the actual local heat flux, is indicative of the margin to DNB.

The BAW-2 and BWC CHF correlations(1,2) have been developed to predict DNB for axially uniform and non-uniform heat flux distributions. The BAW-2 correlation applies to Mark-B fuel and the BWC correlation applies to Mark-BZ fuel. The minimum value of the DNBR, during steady-state operation, normal operational transients, and anticipated transients is limited to 1.30 (BAW-2) and 1.18 (BWC). A DNBR of 1.30 (BAW-2) or 1.18 (BWC) corresponds to a 95 percent probability at a 95 percent confidence level that DNB will not occur.

The ~~curve~~Variable Low RCS Pressure Protective Limits presented in ~~Figure 2.1-1~~the Core Operating Limits Report represent~~s~~ the conditions at which the minimum allowable DNBR is predicted to occur for the limiting combination of thermal power and number of operating reactor coolant pumps. This curve is based upon the design nuclear peaking factors provided in the Core Operating Limits Report.

Since power peaking is not a directly measurable quantity, DNBR limited power peaks and fuel melt limited power peaks are separately correlated to measurable reactor power and power imbalance. The Axial Power Imbalance Protective Limits~~reactor power imbalance limits, Figure 2.1-2(5),~~ presented in the Core Operating Limits Report define the values of reactor power as a function of axial imbalance that correspond to the more restrictive of two thermal limits - MDNBR equal to the DNBR limit or the linear heat rate equal to the centerline fuel melt limit.

The core protection safety limits are based on an RCS flow less than or equal to 385,440 gpm (4 pump operation). Three pump operation is analyzed assuming 74.7 percent of four pump flow. The maximum thermal power for three pump operation is provided with the Axial Power Imbalance Protective Limits in the Core Operating Limits Report~~in Figure 2.1-2~~.

References

(1) Correlation of Critical Heat Flux in a Bundle Cooled by Pressurized Water, BAW-10000, March, 1970.

(2) Correlation of 15x15 Geometry Zircaloy Grid Rod Bundle CHF Data with the BWC Correlation, BAW-10143P, Part 2, August 1981.

Overpower Trip Based on Flow and Imbalance

Following the loss of one or more reactor coolant pumps, the core is prevented from violating the minimum DNBR criterion by a reactor trip initiated by exceeding the allowable reactor power to reactor coolant flow (flux/flow) ratio setpoint. Loss of one or more reactor coolant pumps is also detected by the pump monitors. The power level trip produced by the flux/flow ratio provides DNB protection for all modes of pump operation.

The power level trip setpoint produced by the flux/flow ratio provides both high power level and low flow protection. For every flow rate there is a maximum permissible power level, and for every power level there is a minimum permissible flow rate. For example, typical power level and flow rate combinations for different pump situations are as follows (actual values are given in the Core Operating Limits Report):

1. Assuming a flux/flow ration of 1.07, a reactor trip would occur when four reactor coolant pumps are operating if power is 107% and reactor flow rate is 100%, or flow rate is 93.46% and power level is 100%.

2. Trip would occur when three reactor coolant pumps are operating if power is 79.9% and reactor flow rate is 74.7% or flow rate is 70.09% and power level is 75%.

   The analysis to determine the flux/flow setpoint accounts for calibration and instrument errors and the variation in RC flow in such a manner as to ensure a conservative setpoint. Statistical methods are used to determine the combined effects of calibration and instrument uncertainties with the final string uncertainties used in the analysis corresponding to the 95/95 tolerance limits.

The reactor power imbalance (power in the top half of the core minus the power in the bottom half) reduces the power level trip produced by the flux/flow ratio as shown in ~~Figure 1.3 of~~the Axial Power Imbalance RPS Maximum Allowable Setpoints figure in the Core Operating Limits Report. The flux/flow ratio reduces the power level trip and associated power-imbalance boundaries to account for any reduction in RCS flow. The power-imbalance boundaries shown in ~~Figure 1.3 of~~ the Axial Power Imbalance RPS Maximum Allowable Setpoints figure in the COLR are established to prevent fuel thermal limits, DNBR and centerline fuel melt limits, from being exceeded.

Pump Monitors

The pump monitors trip the reactor due to the loss of reactor coolant pump(s) to ensure the DNBR remains above the minimum allowable DNBR. The pump monitors provide redundant trip protection of DNB; tripping the reactor on a signal diverse from that of the flux/flow trip. The pump monitors also restrict the power level depending on the number of operating reactor coolant pumps.

Reactor Coolant System Pressure

During a startup accident from low power or a slow rod withdraw from high power, the reactor coolant system (RCS) high pressure setpoint is reached before the nuclear overpower trip setpoint. The high RCS pressure trip setpoint (2355 psig) ensures that the pressure remains below the safety limit (2750 psig) for any design transient. (2) The low pressure (1800 psig) and variable low pressure trip setpoints shown in ~~Figure 1.4~~the Variable Low RCS Pressure RPS Maximum Allowable Setpoints figure in ~~of~~ the Core Operating Limits Report ensure that the minimum DNBR is greater than or equal to minimum allowable DNBR for those accidents that result in a reduction in pressure. (3,4) The limits shown in ~~Figure 1.4~~the Variable Low RCS Pressure RPS Maximum Allowable Setpoints figure in ~~of~~ the Core Operating Limits Report bound the pressure-temperature curves calculated for 4 and 3 pump operation.

The safety analyses use a variable low RCS pressure trip setpoint which accounts for calibration and instrumentation uncertainties.

Coolant Outlet Temperature

The high reactor coolant outlet temperature trip setting limit (618°F) shown in ~~Figure 1.4~~the Variable Low RCS Pressure RPS Maximum Allowable Setpoints figure in ~~of~~ the Core Operating Limits Report has been established to prevent excessive core coolant temperatures. Accounting for calibration and instrumentation errors, the safety analysis used a trip setpoint of 620°F.

Reactor Building Pressure

The high reactor building pressure trip setpoint (4 psig) provides positive assurance that a reactor trip will occur in the unlikely event of a loss-of-coolant accident, even in the absence of a low reactor coolant system pressure trip.

Shutdown Bypass

In order to startup the reactor and to be able to perform control rod drive tests and zero power physics tests (see Technical Specification 3.1.9), there is provision for bypassing certain segments of the reactor protective system (RPS). The RPS segments which can be bypassed are given in Table 2.3-1. Two conditions are imposed when the RPS is bypassed:

1. By administrative control the nuclear overpower trip setpoint is reduced to a value of ≤ 5.0% of rated power.

2. The high reactor coolant system pressure trip setpoint is automatically lowered to 1720 psig.

The high RCS pressure trip setpoint is reduced to prevent normal operation with part of the RPS bypassed. The reactor must be tripped before the bypass is initiated since the high pressure trip setpoint is lower than the normal low pressure trip setpoint (1800 psig).

TABLE 2.3-1

Reactor Protective System Trip Setting Limits

| | RPS Trip | RPS Trip Setpoint | Shutdown Bypass |
|---|---|---|---|
| 1. | Nuclear Overpower | 105.5% Rated Power | 5.0% Rated Power(1) |
| 2. | Flux/Flow/Imbalance | ~~Figure 1.3 of~~Axial Power Imbalance RPS Maximum Allowable Setpoints in the Core Operating Limits Report | Bypassed |
| 3. | Pump Monitors | At power operation >2.0% Rated Power and loss of two pumps | Bypassed |
| 4. | High Reactor Coolant System Pressure | 2355 psig | 1720(2) |
| 5. | Low Reactor Coolant System Pressure | 1800 psig | Bypassed |
| 6. | Variable Low Reactor Coolant System Pressure | ~~Figure 1.4 of~~Variable Low RCS Pressure RPS Maximum Allowable Setpoints in the Core Operating Limits Report | Bypassed |
| 7. | High Reactor Coolant Temperature | 618°F | 618°F |
| 8. | High Reactor Building Pressure | 4 psig | 4 psig |

(1) Administratively controlled reduction set only during reactor shutdown.

(2) Automatically set when other segments of the RPS are bypassed.

## 3.2 HIGH PRESSURE INJECTION AND CHEMICAL ADDITION SYSTEMS

Applicability

Applies to the high pressure injection and the chemical addition systems.

Objective

To provide for adequate boration under all operating conditions to assure ability to bring the reactor to a cold shutdown condition.

Specification

The reactor shall not be critical unless the following conditions are met:

3.2.1 Two high pressure injection pumps per unit are operable except as specified in 3.3.

3.2.2 One source per unit of concentrated soluble boric acid in addition to the borated water storage tank is available and operable.

This source will be the concentrated boric acid storage tank with the volume and boron concentration within the limits of the Core Operating Limits Report~~containing at least the equivalent of 1100 ft³ of 11,000 ppm boron as boric acid solution~~ with a temperature at least 10°F above the crystallization temperature. System piping and valves necessary to establish a flow path from the tank to the high pressure injection system shall be operable and shall have the same temperature requirement as the concentrated boric acid storage tank. At least one channel of heat tracing capable of meeting the above temperature requirement shall be in operation. One associated boric acid pump shall be operable.

If the concentrated boric acid storage tank with its associated flowpath is unavailable, but the borated water storage tank is available and operable, the concentrated boric acid storage tank shall be restored to operability within 72 hours or the reactor shall be placed in a hot shutdown condition and be borated to a shutdown margin equivalent to 1% $\Delta k/k$ at 200°F within the next twelve hours; if the concentrated boric acid storage tank has not been restored to operability within the next 7 days the reactor shall be placed in a cold shutdown condition within an additional 30 hours.

If the concentrated boric acid storage tank is available but the borated water storage tank is neither available nor operable, the borated water storage tank shall be restored to operability within one hour or the reactor shall be placed in a hot shutdown condition within 6 hours and in a cold shutdown condition within an additional 30 hours.

## Bases

The high pressure injection system and chemical addition system provide control of the reactor coolant system boron concentration.(1) This is normally accomplished by using any of the three high pressure injection pumps in series with a boric acid pump associated with either the boric acid mix tank or the concentrated boric acid storage tank. An alternate method of boration will be the use of the high pressure injection pumps taking suction directly from the borated water storage tank.(2)

The quantity of boric acid in storage in the concentrated boric acid storage tank or the borated water storage tank is sufficient to borate the reactor coolant system to a 1% $\Delta k/k$ subcritical margin at cold conditions (~~70~~33°F) with the maximum worth stuck rod and no credit for xenon at the worst time in core life. The current cycles for each unit ~~were~~are analyzed with the limits presented in the Core Operating Limits Report. The cycle specific analyses determine the volume and boron concentration requirements for the BWST and CBAST necessary to borate to cold shutdown~~most limiting case selected as the basis for all three units. Since only the present cycles were analyzed, the specifications will be re-evaluated with each reload. A minimum of 1100 ft³ of 11,000 ppm boric acid in the concentrated boric acid storage tank, or a minimum of 350,000 gallons of 1950 ppm boric acid in the borated water storage tank (3) will satisfy the requirements~~. The volume requirements include a 10% margin and, in addition, allow for a deviation of 10 EFPD in the cycle length. The specification assures that two supplies are available whenever the reactor is critical so that a single failure will not prevent boration to a cold condition. ~~The required amount of boric acid can be added in several ways. Using only one 10 gpm boric acid pump taking suction from the concentrated boric acid storage tank would require approximately 12.7 hours to inject the required boron. An alternate method of addition is to inject boric acid from the borated water storage tank using the makeup pumps. The required boric acid can be injected in less than six hours using only one of the makeup pumps.~~

The concentration of boron in the concentrated boric acid storage tank may be higher than the concentration which would crystallize at ambient conditions. For this reason, and to assure a flow of boric acid is available when needed, these tanks and their associated piping will be kept at least 10°F above the crystallization temperature for the concentration present. ~~The boric acid concentration of 11,000 ppm in the concentrated boric acid storage tank corresponds to a crystallization temperature of 88°F and therefore a temperature requirement of 98°F.~~ Once in the high pressure injection system, the concentrate is sufficiently well mixed and diluted so that normal system temperatures assure boric acid solubility.

## REFERENCES


(1) FSAR, Sections 9.3.1, and 9.3.2
(2) FSAR, Figure 6.0.2
(3) Technical Specification 3.3

3.3.3 Core Flood Tank (CFT) System

When the RCS is in a condition with pressure above 800 psig both CFT's shall be operable with the electrically operated discharge valves open and breakers locked open and tagged; a minimum level of 13 ± .44 feet (1040 ± 30 ft.$^3$) and one level instrument channel per CFT; a minimum boron concentration within the limit specified in the Core Operating Limits Report ~~of borated water~~ in each CFT ~~of 1835 ppm boron~~; and pressure at 600 ± 25 psig with one pressure instrument channel per CFT.

3.3.4 Borated Water Storage Tank (BWST)

When the RCS, with fuel in the core, is in a condition with pressure equal to or greater than 350 psig or temperature equal to or greater than 250°F:

a. The BWST shall have operable two level instrument channels.

(1) Tests or maintenance shall be allowed on one channel of BWST level instrumentation provided the other channel is operable.

(2) If the BWST level instrumentation is not restored to meet the requirements of Specification 3.3.4.a above within 24 hours, the reactor shall be placed in a hot shutdown condition within 12 hours. If the requirements of Specification 3.3.4.a are not met within 24 hours following hot shutdown, the reactor shall be placed in a condition with RCS pressure below 350 psig and RCS temperature below 250°F within an additional 24 hours.

b. The BWST shall contain a minimum level of 46 feet of water having a minimum concentration of ~~1950 ppm~~ boron within the limit specified in the Core Operating Limits Report at a minimum temperature of 50°F. The manual valve, LP-28, on the discharge line shall be locked open. If these requirements are not met,the BWST shall be considered unavailable and action initiated in accordance with Specification 3.2.

3.3.5 Reactor Building Cooling (RBC) System

a. When the RCS, with fuel in the core, is in a condition with pressure equal to or greater than 350 psig or temperature equal to or greater than 250°F and subcritical:

(1) Two independent RBC trains, each comprised of an RBC fan, associated cooling unit, and associated ESF valves shall be operable.

Bases

Specification 3.3 assures that, for whatever condition the reactor coolant system is in, adequate engineered safety feature equipment is operable.

For operation up to 60% FP, two high pressure injection pumps are specified. Also, two low pressure injection pumps and both core flood tanks are required.

In the event that the need for emergency core cooling should occur, functioning of one high pressure injection pump, one low pressure injection pump, and both core flood tanks will protect the core, and in the event of a main coolant loop severance, limit the peak clad temperature to less than 2,200°F and the metal-water reaction to that representing less than 1 percent of the clad. (1) Both core flooding tanks are required as a single core flood tank has insufficient inventory to reflood the core.

The requirement to have three HPI pumps and two HPI flowpaths operable during power operation above 60% FP is based on considerations of potential small breaks at the reactor coolant pump discharge piping for which two HPI trains (two pumps and two flow paths) are required to assure adequate core cooling. (2) The analysis of these breaks indicates that for operation at or below 60% FP only a single train of the HPI system is needed to provide the necessary core cooling.

The requirement for a flowpath from LPI discharge to HPI pump suction is provided to assure availability of long term core cooling following a small break LOCA in which the BWST is depleted and RCS pressure remains above the shutoff head of the LPI pumps.

The borated water storage tanks are used for two purposes:

(a) As a supply of borated water for accident conditions.

(b) As a supply of borated water for flooding the fuel transfer canal during refueling operation.(3)

Three-hundred and fifty thousand (350,000) gallons of borated water ( a level of 46 feet in the BWST) are required to supply emergency core cooling and reactor building spray in the event of a loss-of-core cooling accident. This amount fulfills requirements for emergency core cooling. The borated water storage tank capacity of 388,000 gallons is based on refueling volume requirements. Heaters maintain the borated water supply at a temperature above 50°F to lessen the potential for thermal shock of the reactor vessel during high pressure injection system operation. The boron concentration is set at the amount of boron required to maintain the core 1 percent $\Delta k/k$ subcritical at ~~70~~33°F without any control rods in the core. The minimum ~~value~~boron concentration is specified in the Core Operating Limits Report~~tanks is 1950 ppm boron~~.

It has been shown for the worst design basis loss-of-coolant accident (a 14.1 $ft^2$ hot leg break) that the Reactor Building design pressure will not be exceeded with one spray and two coolers operable. (4) Therefore, a maintenance period of seven days is acceptable for one Reactor Building cooling fan

## 6.9 CORE OPERATING LIMITS REPORT

### Specification

6.9.1 Core operating limits shall be established prior to each reload cycle, or prior to any remaining part of a reload cycle, for the following:

(1) Axial Power Imbalance Protective Limits and Variable Low RCS Pressure Protective Limits for Specification 2.1.

(2) Reactor Protective System Trip Setting Limits for the Flux/Flow/Imbalance and Variable Low Reactor Coolant System Pressure trip functions in Specification 2.3.

(~~2~~3) Power Dependent Rod Insertion Limits for Specifications 3.1.3.5, 3.1.11, 3.5.2.1.b, 3.5.2.2.d.2.c, 3.5.2.3, and 3.5.2.5.c.

(4) Concentrated Boric Acid Storage Tank volume and boron concentration for Specification 3.2.2.

(5) Core Flood Tank boron concentration for Specification 3.3.3.

(6) Borated Water Storage Tank boron concentration for Specification 3.3.4.

(~~3~~7) Quadrant Power Tilt Limits for Specification 3.5.2.4.a, 3.5.2.4.b, 3.5.2.4.d, 3.5.2.4.e, and 3.5.2.4.f.

(~~4~~8) Power Imbalance Limits for Specification 3.5.2.6

and shall be documented in the CORE OPERATING LIMITS REPORTS.

6.9.2 The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically:

(1) DPC-NE-1002A, Reload Design Methodology II, October 1985.

(2) NFS-1001A, Reload Design Methodology, April 1984.

(3) DPC-NE-2003A, Oconee Nuclear Station Core Thermal Hydraulic Methodology Using VIPRE-01, July 1989.

6.9.3 The core operating limits shall be determined such that all applic able limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, ECCS limits, nuclear limits such as shutdown margin, and transient and accident analysis limits) of the safety analysis are met.

6.9.4 The CORE OPERATING LIMITS REPORT, including any mid-cycle revisions or supplements shall be provided, upon issuance for each reload cycle, to the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector.

ENCLOSURE A
CHANGES TO ELECTRICAL TECHNICAL SPECIFICATIONS
EXECUTIVE SUMMARY

The Tech Spec number in the current Oconee Tech Specs is indicated in [brackets]. The Tech Spec number in the revised 3.7 is indicated as TS 3.7.x.

**General Changes**

- The entire section has been split into separate TS by system and APPLICABILITY, including Required Actions and Surveillance Requirements:

  TS 3.7.1 AC Sources - Operating
  TS 3.7.2 AC Distribution - Operating
  TS 3.7.3 EPSL Automatic Transfer Functions
  TS 3.7.4 EPSL Voltage Sensing Circuits
  TS 3.7.5 EPSL N and SL Breakers
  TS 3.7.6 EPSL Keowee Emergency Start Function
  TS 3.7.7 EPSL Degraded Grid Voltage Protection
  TS 3.7.8 EPSL CT-5 Degraded Grid Voltage Protection
  TS 3.7.9 Vital I&C DC Sources and Distribution - Operating
  TS 3.7.10 230kV Switchyard DC Sources and Distribution
  TS 3.7.11 AC Vital Distribution - Operating
  TS 3.7.12 Battery Cell Parameters
  TS 3.7.13 AC Sources - Shutdown/High Decay Heat/Reduced Inventory
  TS 3.7.14 AC Sources - Shutdown
  TS 3.7.15 AC Distribution - Shutdown/High Decay Heat/Reduced Inventory
  TS 3.7.16 AC Distribution - Shutdown
  TS 3.7.17 Vital I&C DC Sources and Distribution - Shutdown/High Decay Heat/Reduced Inventory
  TS 3.7.18 Vital I&C DC Sources and Distribution - Shutdown

- The Bases have been expanded from 8 pages in the current 3.7 to 88 pages in the new 3.7. For each TS the Bases now provide:
  - A Background which includes a general system description,
  - A discussion of the relationship of the TS requirement to the accident analysis,
  - A detailed description of system requirements for meeting the TS,
  - A discussion regarding when the TS requirements are applicable,
  - A discussion of the basis for each Action required by the TS, and
  - A description of each of the surveillance requirements.

[3.7.1]

- Emergency power path requirements are defined in detail in the Bases. Keowee Aux Transformer CX is required for the underground. One channel of SY isolate complete is required for the overhead.

- The EPSL "Functional Units" Table has been replaced by individual TS with Required Actions specified for the individual EPSL components.

[3.7.1] **continued**

- I&C batteries, chargers, distribution centers, diodes, and panelboards are included in the same TS.

- Keowee DC is included as part of emergency power path operability.

[3.7.2]

- Test frequency of one emergency power path when the other path is inoperable is extended from 8 to 12 hours, consistent with the shift schedule.

- More than one EPSL "Functional Unit" is permitted to be inoperable simultaneously for reasons other than an inoperable panelboard.

- A single Condition is specified for startup transformer inoperability rather than "planned" and "unplanned."

[3.7.4]

- During the Keowee special inoperability period, the requirement to maintain the operable Keowee Unit (which is aligned to the underground) "available" to the overhead has been deleted.

- The Keowee special inoperability period may be used more than once in a three year period, provided that the total amount of time remains within the current 45 day limit.

[3.7.5]

- Restriction on restart (based on $T_{av}$) during "loss of all 230kV lines" is deleted.

[3.7.6 **and** 3.7.7]

- The special inoperability periods for both Keowee Units inoperable due to "planned" or "unplanned" reasons has been combined into a single Condition.

[3.7.8]

- The 28 day special inoperability period for inoperability of the Keowee CX transformer has been deleted. The AOT will be limited to 72 hours.

[3.7.9]

- The flexibility to enter 3.7.9, which appeared to permit indefinite noncompliance with the requirements of the electrical technical specifications, rather than 3.0 has been deleted.

[Table 3.7-1]

- The main feeder bus monitor panel UV relays are relocated to a selected licensee commitment. The MFB UV relays which input to the Load Shed and Transfer to Standby Logic are added to the TS.

[4.6.3]

- The External Grid Trouble Protection System Logic surveillance requirement has been relocated to a SLC.

<u>New Requirements not currently in 3.7</u>

- TS 3.7.0 is added to prohibit startup when the requirements of TS 3.7 are not met. An exception is provided for the Keowee special inoperability periods.

- SL Breaker trip coil operability is required when the SL breakers are closed into the standby bus.

- TS 3.7.7 is added to require operability of the new 230kV switchyard degraded grid protection system.

- TS 3.7.8 is added to require operability of the new CT-5 degraded grid protection system.

- TS 3.7.12 includes battery cell electrolyte requirements for battery operability. Current requirements only identify when a cell is degraded.

- Requirements during cold shutdown and refueling are added. The 3.7 Task Force met with the NRC staff in December '91 to discuss the philosophy of our shutdown requirements, the staff indicated that the ONS approach appeared consistent with that taken by the NRC shutdown risk group.

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

ATTACHMENT 1

TECHNICAL SPECIFICATIONS

| Remove Pages | Insert Pages |
| --- | --- |
| 3.7-1 through -8<br>3.7-17<br>4.6-1 through -3 | 3.7-1 through -37 |