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SOUTHERN COMPANY
Energy to Serve Your World™

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50-425

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Vogtle Electric Generating Plant
Request to Revise Technical Specifications to
Relocate the Cold Overpressure Protection System Arming Temperature

Ladies and Gentlemen:

In accordance with the provisions of 10 CFR 50.90, Southern Nuclear Operating Company (SNC) proposes to revise the Vogtle Electric Generating Plant (VEGP) Unit 1 and Unit 2 Technical Specifications (TS) related to the Cold Overpressure Protection System (COPS) arming temperature. The proposed changes to the TS will relocate the COPS arming temperature to the Pressure and Temperature Limits Report (PTLR) to facilitate future licensee-controlled changes to the COPS arming temperature in accordance with an NRC-approved methodology. In addition to relocation to the PTLR, the COPS arming temperature will be lowered to 220°F from 350° F, which, in turn, requires changes to VEGP TS requirements. SNC submitted revised Unit 1 and Unit 2 PTLRs for review and approval by the NRC in NL-03-2177, dated February 26, 2004. Those revisions to the PTLR included revised heatup and cooldown limits and COPS setpoints. The changes proposed herein to relocate the COPS arming temperature are contingent on the approval of NL-03-2177. The PTLR methodology is discussed in NL-03-2177 and is consistent with WCAP-14040-A, Revision 4, "Methodology Used to Develop Cold Overpressure Mitigating System Setpoints and RCS Heatup and Cooldown Limit Curves." The COPS arming temperature was also determined utilizing the methodology contained in WCAP-14040-A, Revision 4.

The revisions to the TS that involve the relocation of the COPS arming temperature are based on NRC-approved changes to NUREG-1431, "Standard Technical Specifications Westinghouse Plants." These changes were submitted to the NRC via Technical Specification Task Force (TSTF) Traveler number TSTF-233, Revision 0, "Relocate Low Temperature Overpressure Protection (LTOP) Arming Temperature to PTLR." Traveler TSTF-233, Revision 0 was approved by the NRC on July 16, 1998.

Enclosure 1 provides the proposed Technical Specification (TS) and Bases changes. Enclosure 2 contains the Significant Hazards Consideration Evaluation and the Environmental Impact Analysis. Enclosure 3 contains marked-up pages from the TS and Bases reflecting the proposed changes. Enclosure 4 contains clean-typed copies of the affected TS and Bases pages.

A001

SNC requests approval of the proposed changes by April 15, 2005.

Mr. J. T. Gasser states he is a Vice President of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company, and to the best of his knowledge and belief, the facts set forth in this letter are true.

This letter contains no NRC commitments. If you have any questions, please advise.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

Jeffrey T. Gasser

Sworn to and subscribed before me this 28th *day of* April, *2004.*

Notary Public

My commission expires: 11/10/06

JTG/DRG/daj

Enclosures: Enclosure 1 - TS and Bases Amendment
Enclosure 2 - Significant Hazards Consideration Evaluation
Enclosure 3 - Pen and Ink Changes
Enclosure 4 - Final TS, Bases, and PTLR Changes

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Enclosure 1

Vogtle Electric Generating Plant Units 1 and 2
Technical Specification and Bases Amendment

Enclosure 1

Vogtle Electric Generating Plant
Request to Revise Technical Specifications to
Relocate the COPS Arming Temperature

TS and Bases Amendment

Proposed Changes

The proposed changes to the Technical Specifications (TS) are as follows:

- Section 1.1, Definitions, Pressure and Temperature Limits Report (PTLR) will be revised to add a reference to the Cold Overpressure Protection System (COPS) arming temperature.
- Limiting Condition for Operation (LCO) 3.4.6, Reactor Coolant System (RCS) Loops – Mode 4, Note 2 will be revised to add a reference to the COPS arming temperature specified in the PTLR. The second sentence of Note 2 is revised by deleting "no RCP running" and clarifying that the limitation is applicable when the residual heat removal (RHR) system suction isolation valves are open.
- LCO 3.4.10, Pressurizer Safety Valves, the Applicability will be revised to include the portion of Mode 4 when all RCS cold leg temperatures greater than the COPS arming temperature specified in the PTLR. The Applicability Note will be revised to include Mode 4 with all RCS cold leg temperatures greater than the COPS arming temperature specified in the PTLR. Required Action B.2 will be revised to Mode 4 with any RCS cold leg temperature less than or equal to the COPS arming temperature specified in the PTLR.
- LCO 3.4.12, Cold Overpressure Protection Systems, the Applicability will be revised to include only that portion of Mode 4 when any RCS cold leg temperature is less than or equal to the COPS arming temperature specified in the PTLR. Note 2 to the Applicability and Note 2 to the Actions table will be deleted. Required Action C.1 will be revised to require the RCS cold leg temperatures to be increased to greater than the COPS arming temperature specified in the PTLR. The Frequency of Surveillance Requirement (SR) 3.4.12.1 of "Within 4 hours after entering MODE 4 from MODE 3 and prior to the temperature of one or more RCS cold legs decreasing below 325° F will be deleted. The Note to SR 3.4.12.6 will be revised to specify the COPS arming temperature specified in the PTLR.
- LCO 3.5.2, Emergency Core Cooling System (ECCS) – Operating, Applicability Note 2 will be deleted.
- Appropriate Bases changes will be made consistent with the above changes to the TS.
- Section 5.6.6, Administrative Controls, Reactor Coolant System (RCS) Pressure and Temperature Limits Report (PTLR) will be revised to include the COPS arming temperature.

Basis for Proposed Changes

In general, the proposed changes to the TS involve the relocation of the COPS arming temperature to the PTLR. The changes proposed for the VEGP TS are based on the generic changes approved for NUREG-1431, "Standard Technical Specifications Westinghouse Plants." These changes were submitted to the NRC by the industry via Technical Specification Task Force (TSTF) traveler number TSTF-233, Revision 0, "Relocate LTOP Arming Temperature to PTLR," which was subsequently approved by the NRC on July 16, 1998, for incorporation into NUREG-1431. The specific value for the limiting RCS cold leg temperature, below which the reactor vessel may suffer damage from a cold overpressure event, is reactor vessel plant-specific and varies with vessel fluence. Requiring a plant-specific arming temperature in the TS, which may require a subsequent amendment, is not consistent with the PTLR philosophy. The PTLR currently contains the pressure and temperature (P/T) limits, including heatup and cooldown rates, and the nominal power operated relief valve (PORV) setpoints for cold overpressure

protection. The idea behind the PTLR is that these limits, which are also plant-specific and vary with vessel fluence, can be revised without prior NRC approval provided that they are calculated using an NRC-approved methodology. Therefore, provided that the COPS arming temperature is determined using an NRC-approved methodology, the principle is the same and the arming temperature can be controlled within the PTLR. The COPS arming temperature was determined utilizing the methodology contained in WCAP-14040-A, Revision 4, "Methodology Used to Develop Cold Overpressure Mitigating System Setpoints and RCS Heatup and Cooldown Limit Curves." In addition to relocation to the PTLR, the COPS arming temperature will be lowered to 220 °F from 350 °F, which, in turn, requires changes to certain VEGP-specific TS requirements. The basis for lowering the COPS arming temperature will be discussed later in this enclosure. A detailed discussion of the basis for the TS changes follows.

- Section 1.1, Definitions, Pressure and Temperature Limits Report (PTLR) – This definition currently contains a high level description of the contents of the PTLR. Because the COPS arming temperature is being relocated to the PTLR, the description of the contents of the PTLR that appears in this definition will be revised to include the COPS arming temperature. This is an administrative change.

- LCO 3.4.6, Reactor Coolant System (RCS) Loops – Mode 4 – This LCO is currently modified by a Note 2 which restricts startup of a reactor coolant pump (RCP) unless the secondary side water temperature of each steam generator is less than 50 °F above each of the RCS cold leg temperatures. With no RCP running, this value is reduced to 25 °F at an RCS temperature of 350 °F and varies linearly to 50 °F at an RCS temperature of 200 °F. This note is currently applicable at all times in Mode 4. If no RCPs are running and the secondary side water temperature is higher than the RCS cold leg temperature, starting an RCP will result in a heat input to the RCS. If the temperature of the secondary side water is greater than or equal to 50 °F higher than the RCS cold leg temperature, the resulting heat input transient could cause the water in the RCS to expand at a rate greater than the relief capacity of the COPS. Therefore, the purpose of the Note is to protect the RCS from a cold overpressurization event due to starting an RCP. The second part of the Note provides additional protection for the RHR system itself. If the RHR system is in service with the RHR suction isolation valves open, additional restrictions are imposed on starting an RCP to protect the RHR system from overpressurization. The amount by which the secondary side water temperature can exceed RCS cold leg temperature is reduced to 25 °F at an RCS temperature of 350 °F and allowed to vary linearly to 50 °F at an RCS temperature of 200 °F. These additional restrictions further limit the heat input to the RCS due to starting an RCP, thereby ensuring that the design pressure for the piping associated with the RHR is not exceeded. The phrase "with no RCP running" is deleted from the second part of the Note, since a heat injection event can only occur due to the start of the first RCP, when no other RCPs are running, and to make it consistent with the first part of the Note.

  Lowering the arming temperature to 220 °F relaxes the restrictions on starting RCPs with respect to the RCS. Therefore, Note 2 can be modified so that it is only applicable when any RCS cold leg temperature is less than or equal to the COPS arming temperature specified in the PTLR. However, when the RHR suction isolation valves are open, thereby exposing the RHR piping to RCS pressure, the RHR system must be protected when starting an RCP. The revision to the second part of Note 2 provides the necessary restrictions to ensure that the RHR system will not be overpressurized when open to the RCS.

Enclosure 1

Vogtle Electric Generating Plant
Request to Revise Technical Specifications to
Relocate the COPS Arming Temperature

TS and Bases Amendment

- LCO 3.4.10, Pressurizer Safety Valves – Currently, the Applicability for LCO 3.4.10 is Modes 1, 2, and 3. This is consistent with the current COPS arming temperature of 350 °F, which is also the entry temperature for Mode 4. However, lowering the COPS arming temperature to 220 °F necessitates a change in the Applicability of the LCO for the pressurizer safety valves so that overpressure protection is provided throughout the entire range of RCS operating pressures. Therefore, the Applicability of LCO 3.4.10 is revised to capture that portion of Mode 4 when all RCS cold leg temperatures are greater than the COPS arming temperature specified in the PTLR. This change will ensure that the pressurizer safety valves are Operable to provide overpressure protection until the COPS is required to be Operable.

  With one pressurizer safety valve inoperable, LCO 3.4.10, Condition A, Required Action A.1 requires the inoperable valve to be restored to Operable status within 15 minutes. If the Required Action and associated Completion Time of Condition A are not met, Condition B, Required Action B.2 requires the unit to be in Mode 4 within 12 hours. In keeping with the philosophy of placing the unit in a Mode or specified condition in which the TS does not apply, Required Action B.2 will be revised to specify that the unit be in Mode 4 with any RCS cold leg temperature less than or equal to the COPS arming temperature specified in the PTLR.

- LCO 3.4.12, Cold Overpressure Protection System (COPS) – The Applicability of LCO 3.4.12 will be revised from Mode 4 (in its entirety) to Mode 4 with any RCS cold leg temperature less than or equal to the COPS arming temperature specified in the PTLR. COPS is no longer required for cold overpressure protection when entering into Mode 4 due to lowering the COPS arming temperature from 350 °F to 220 °F. Overpressure protection is provided by the pressurizer code safety valves in Mode 4 when the RCS cold leg temperatures are above the COPS arming temperature.

  The Applicability of LCO 3.4.12 is modified by a Note 2 that states that the safety injection pumps are not required to be incapable of injecting into the RCS until four hours after entering Mode 4 from Mode 3 provided the temperature of one or more RCS cold legs has not decreased below 325 °F. The mass input analysis for cold overpressure protection does not allow the mass input from the safety injection pumps. Therefore, whenever the RCS is in the temperature regime where cold overpressure protection is required, the safety injection pumps must be rendered incapable of injecting into the RCS. The current TS arming temperature for COPS is 350 °F, which is the transition temperature between Mode 3 and Mode 4, and LCO 3.5.2, "ECCS- Operating," requires both trains of ECCS (each train includes a safety injection pump) to be Operable in Mode 3. Therefore, in order to provide for entry into Mode 4 from Mode 3, Note 2 to the Applicability of LCO 3.4.12 allowed a reasonable amount of time to establish compliance with LCO 3.4.12 by rendering the safety injection pumps incapable of injecting into the RCS. However, since the COPS arming temperature is being lowered to 220 °F, this provision is no longer required. The safety injection pumps are no longer required to be made incapable of injecting into the RCS until the RCS cold leg temperature reaches 220 °F. Therefore, entry into Mode 4 from Mode 3 can be accomplished while the safety injection pumps remain capable of injecting into the RCS without making a special provision for compliance with LCO 3.4.12.

TS and Bases Amendment

As part of Amendments 108 and 86, Note 2 to the Actions table was added to permit entry into Mode 4 from Mode 3 with a required PORV inoperable provided that certain specified restrictions were met. One of these restrictions was that RCS temperature be maintained above 275 °F. The Bases for LCO 3.4.12 state:

"The current COPS enable temperature is established very conservatively at 350 °F. However, the application of ASME Code Case N-514 would allow the enable temperature to be lowered to less than 275 °F. Therefore, when entering this LCO from MODE 3 with one required PORV inoperable, maintaining RCS temperature above 275 °F minimizes actual exposure to a cold overpressure event."

As discussed above, the COPS arming temperature was determined to be 220 °F, which includes an allowance for temperature measurement uncertainty. Therefore, COPS is not required to be in service when the RCS cold leg temperatures are above 220 °F and Mode 4 can be entered from Mode 3 with inoperable PORV(s). Therefore, Note 2 to the Actions table of LCO 3.4.12 is unnecessary and can be deleted.

Condition B of LCO 3.4.12 provides a Required Action for an accumulator that is not isolated. If the Required Action and associated Completion Time of Condition B are not met, Condition C provides default actions that would either put the unit in a Mode or specified condition in which the TS does not apply or remove the potential for overpressurization by directing that the affected accumulator be depressurized. In keeping with the change in Applicability, Condition C, Required Action C.1, will be revised to require that the RCS cold leg temperatures be increased to greater than the COPS arming temperature specified in the PTLR. This puts the unit in a specified condition in which the TS does not apply.

Condition D of LCO 3.4.12 addresses the condition of one required RCS relief path inoperable in Mode 4. Consistent with the change to revise the Applicability of LCO 3.4.12 from Mode 4 (in its entirety) to Mode 4 with any RCS cold leg temperature less than or equal to the COPS arming temperature specified in the PTLR, Condition D of LCO 3.4.12 is also revised to Mode 4 with any RCS cold leg temperature less than or equal to the COPS arming temperature specified in the PTLR.

Surveillance Requirement (SR) 3.4.12.1 is a requirement to verify that both safety injection pumps are incapable of injection into the RCS. The Frequency of SR 3.4.12.1 is within 4 hours after entering Mode 4 from Mode 3 and prior to the temperature of one or more RCS cold legs decreasing below 325 °F and 12 hours thereafter. The mass input analysis for cold overpressure protection does not allow the mass input from the safety injection pumps. Therefore, whenever the RCS is in the temperature regime where cold overpressure protection is required, the safety injection pumps must be rendered incapable of injecting into the RCS. The current TS arming temperature for COPS is 350 °F, which is the transition temperature between Mode 3 and Mode 4, and LCO 3.5.2, "ECCS-Operating," requires both trains of ECCS (each train includes a safety injection pump) to be Operable in Mode 3. Therefore, in order to provide for entry into Mode 4 from Mode 3, the Frequency of SR 3.4.12.1 allowed a reasonable amount of time to perform the Surveillance and establish compliance with LCO 3.4.12 by rendering the safety injection pumps incapable of injecting into the RCS. However, since the COPS arming temperature is being lowered to 220 °F, this Frequency is no longer

required. The safety injection pumps are no longer required to be made incapable of injecting into the RCS until the RCS cold leg temperature reaches 220 °F. Therefore, entry into Mode 4 from Mode 3 can be accomplished while the safety injection pumps remain capable of injecting into the RCS without making a special provision for performing the Surveillance and establishing compliance with LCO 3.4.12.

SR 3.4.12.6 is a requirement to perform a Channel Operational Test on each required PORV with a Frequency of every 31 days. The SR is currently modified by a Note that states that the Surveillance is not required to be performed until 12 hours after decreasing RCS cold leg temperature to less than or equal to 350 °F. This is based on the current COPS arming temperature of 350 °F. Lowering the arming temperature and relocating the arming temperature to the PTLR requires that this Note be revised to reference the COPS arming temperature specified in the PTLR.

- LCO 3.5.2, ECCS – Operating – The current Applicability for LCO 3.5.2 is modified by a Note 2 that provides for operation in Mode 3 with ECCS pumps declared inoperable pursuant to LCO 3.4.12. With the COPS arming temperature at 350 °F, and because LCO 3.4.12 requires the safety injection pumps to be incapable of injecting into the RCS, Note 2 to LCO 3.5.2 provided for entry into Mode 3 from Mode 4 while the safety injection pumps were in compliance with LCO 3.4.12. Note 2 to LCO 3.5.2 provided time to restore compliance with LCO 3.5.2 upon transition into Mode 3 from Mode 4. However, by lowering the COPS arming temperature to 220 °F, the safety injection pumps can be restored to Operable status for the purpose of LCO 3.5.2 prior to entry into Mode 3. Therefore, Note 2 to LCO 3.5.2 is no longer required.

- Specification 5.6.6 – Reactor Coolant System (RCS) Pressure and Temperature Limits Report (PTLR) – This Specification is revised by adding reference to the COPS arming temperature specified in the PTLR for LCO 3.4.12. This change is administrative in nature.

Enclosure 2

Vogtle Electric Generating Plant Units 1 and 2
Significant Hazards Consideration Evaluation

Enclosure 2

Vogtle Electric Generating Plant
Request to Revise Technical Specifications to
Relocate the COPS Arming Temperature

Significant Hazard Consideration Evaluation

Proposed Changes

Southern Nuclear Operating Company (SNC) proposes to revise the Vogtle Electric Generating Plant (VEGP) Unit 1 and Unit 2 Technical Specifications (TS). The proposed changes to the TS will relocate the Cold Overpressure Protection System (COPS) arming temperature to the Pressure and Temperature Limits Report (PTLR). The revisions to the TS that involve the relocation of the COPS arming temperature are based on NRC-approved changes to NUREG-1431, "Standard Technical Specifications Westinghouse Plants." These changes were submitted to the NRC via Technical Specification Task Force (TSTF) Traveler number TSTF-233, Revision 0, "Relocate Low Temperature Overpressure Protection (LTOP) Arming Temperature to PTLR." Traveler TSTF-233, Revision 0 was approved by the NRC on July 16, 1998. The following is a detailed description of the proposed changes.

- Section 1.1, Definitions, Pressure and Temperature Limits Report (PTLR) will be revised to add a reference to the COPS arming temperature.
- Limiting Condition for Operation (LCO) 3.4.6, Reactor Coolant System (RCS) Loops – Mode 4, Note 2 will be revised to add a reference to the COPS arming temperature specified in the PTLR. The second sentence of Note 2 is revised by deleting "no RCP running" and clarifying that the limitation is applicable when the residual heat removal (RHR) system suction isolation valves are open.
- LCO 3.4.10, Pressurizer Safety Valves, the Applicability will be revised to include the portion of Mode 4 when all RCS cold leg temperatures are greater than the COPS arming temperature specified in the PTLR. The Applicability Note will be revised to include Mode 4 with all RCS cold leg temperatures greater than the COPS arming temperature specified in the PTLR. Required Action B.2 will be revised to Mode 4 with any RCS cold leg temperature less than or equal to the COPS arming temperature specified in the PTLR.
- LCO 3.4.12, Cold Overpressure Protection Systems, the Applicability will be revised to include only that portion of Mode 4 when any RCS cold leg temperature is less than or equal to the COPS arming temperature specified in the PTLR. Note 2 to the Applicability and Note 2 to the Actions table will be deleted. Required Action C.1 will be revised to require the RCS cold leg temperatures to be increased to greater than the COPS arming temperature specified in the PTLR. The Frequency of Surveillance Requirement (SR) 3.4.12.1 of "Within 4 hours after entering MODE 4 from MODE 3 and prior to the temperature of one or more RCS cold legs decreasing below 325° F" will be deleted. The Note to SR 3.4.12.6 will be revised to specify the COPS arming temperature specified in the PTLR.
- LCO 3.5.2, Emergency Core Cooling System (ECCS) – Operating, Applicability Note 2 will be deleted.
- Appropriate Bases changes will be made consistent with the above changes to the TS.
- Section 5.6.6, Administrative Controls, Reactor Coolant System (RCS) Pressure and Temperature Limits Report (PTLR) will be revised to include the COPS arming temperature.

Enclosure 2

Vogtle Electric Generating Plant
Request to Revise Technical Specifications to
Relocate the COPS Arming Temperature

Significant Hazard Consideration Evaluation

Evaluation

1. Do the proposed changes involve a significant increase in the probability or consequences of an accident previously evaluated?

   No. The proposed changes to the Technical Specifications do not affect any plant equipment, test methods, or plant operation, and are not initiators of any analyzed accident sequence. COPS will continue to perform its function as designed to provide cold overpressure protection, and the pressurizer safety valves will provide overpressure protection during operation when COPS is not in service. Operation in accordance with the proposed TS will ensure that all analyzed accidents will continue to be mitigated by the Structures, Systems, and Components (SSCs) as previously analyzed. Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Do the proposed changes create the possibility of a new or different kind of accident from any previously evaluated?

   No. The proposed changes do not introduce any new equipment, create new failure modes for existing equipment, or create any new limiting single failures. COPS will continue to ensure that appropriate fracture toughness margins are maintained to protect against reactor vessel failure during low temperature operation. The proposed changes are consistent with TSTF-233, Revision 0, which was approved by the NRC. Plant operation will not be altered, and all safety functions will continue to perform as previously assumed in accident analyses. Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any previously evaluated.

3. Do the proposed changes involve a significant reduction in a margin of safety?

   No. The proposed changes will not adversely affect the operation of plant equipment or the function of any equipment assumed in the accident analysis. The COPS arming temperature has been established in accordance with an NRC-approved methodology. No changes are being made to the cold overpressure protection analysis and the function of COPS as assumed in the analysis. Therefore, the proposed changes do no involve a significant reduction in any margin to safety.

Conclusion

Based on the preceding evaluation, Southern Nuclear has determined that the proposed changes meet the requirements of 10 CFR 50.92(c) and do not involve a significant hazards consideration.

Environmental Evaluation

Southern Nuclear has evaluated the proposed changes and determined that the changes do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the individual or cumulative occupational radiation exposure. Accordingly, the proposed changes meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed changes is not required.

Enclosure 3

Vogtle Electric Generating Plant Units 1 and 2
Pen and Ink Changes

1.1 Definitions

PHYSICS TESTS (continued)	a. Described in Chapter 14 of the FSAR; b. Authorized under the provisions of 10 CFR 50.59; or c. Otherwise approved by the Nuclear Regulatory Commission.
PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR)	The PTLR is the unit specific document that provides the reactor vessel pressure and temperature limits, including heatup and cooldown rates and the nominal PORV setpoints for the ~~cold overpressure protection system~~ Cold Overpressure Protection System (COPS) arming temperature, for the current reactor vessel fluence period. These pressure and temperature limits shall be determined for each fluence period in accordance with Specification 5.6.6. Unit operation within these operating limits is addressed in individual specifications.
QUADRANT POWER TILT RATIO (QPTR)	QPTR shall be the ratio of the maximum upper excore detector calibrated output to the average of the upper excore detector calibrated outputs, or the ratio of the maximum lower excore detector calibrated output to the average of the lower excore detector calibrated outputs, whichever is greater.
RATED THERMAL POWER (RTP)	RTP shall be a total reactor core heat transfer rate to the reactor coolant of 3565 MWt.
REACTOR TRIP SYSTEM (RTS) RESPONSE TIME	The RTS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its RTS trip setpoint at the channel sensor until loss of stationary gripper coil voltage. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and the methodology for verification have been previously reviewed and approved by the NRC.

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.6 RCS Loops - MODE 4

LCO 3.4.6 Two loops consisting of any combination of RCS loops and residual heat removal (RHR) loops shall be OPERABLE, and one loop shall be in operation.

----------NOTES----------

1. All reactor coolant pumps (RCPs) and RHR pumps may be de-energized for ≤ 1 hour per 8 hour period provided:

   a. No operations are permitted that would cause reduction of the RCS boron concentration; and

   b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. An RCP shall not be started with any RCS cold leg temperature ≤ the Cold Overpressure Protections System (COPS) arming temperature specified in the PTLR unless the secondary side water temperature of each steam generator (SG) is < 50°F above each of the RCS cold leg temperatures. With ~~no RCP running~~ the RHR suction isolation valves open, this value is reduced to 25°F at an RCS temperature of 350°F and varies linearly to 50°F at an RCS temperature of 200°F.

APPLICABILITY: MODE 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required RCS loop inoperable. AND Two RHR loops inoperable.	A.1 Initiate action to restore a second loop to OPERABLE status.	Immediately

(continued)

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.10 Pressurizer Safety Valves

LCO 3.4.10 Three pressurizer safety valves shall be OPERABLE with lift settings ≥ 2410 psig and ≤ 2510 psig.

APPLICABILITY: MODES 1, 2, and 3.
MODE 4 with all RCS cold leg temperatures > the COPS arming temperature specified in the PTLR.

----------NOTE----------
The lift settings are not required to be within the LCO limits during MODE 3 and MODE 4 with all RCS cold leg temperatures > the COPS arming temperature specified in the PTLR for the purpose of setting the pressurizer safety valves under ambient (hot) conditions. This exception is allowed for 54 hours following entry into MODE 3 provided a preliminary cold setting was made prior to heatup.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One pressurizer safety valve inoperable.	A.1	Restore valve to OPERABLE status.	15 minutes
B. Required Action and associated Completion Time not met. OR Two or more pressurizer safety valves inoperable.	B.1 AND B.2	Be in MODE 3. Be in MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR.	6 hours 12 hours

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.12 Cold Overpressure Protection Systems (COPS)

LCO 3.4.12 A COPS shall be OPERABLE with all safety injection pumps incapable of injecting into the RCS and the accumulators isolated and either a or b below.

a. Two RCS relief valves, as follows:

1. Two power operated relief valves (PORVs) with lift settings within the limits specified in the PTLR, or

2. Two residual heat removal (RHR) suction relief valves with setpoints ≥ 440 psig and ≤ 460 psig, or

3. One PORV with a lift setting within the limits specified in the PTLR and one RHR suction relief valve with a setpoint within specified limits.

b. The RCS depressurized and an RCS vent of ≥ 2.14 square inches (based on an equivalent length of 10 feet of pipe).

APPLICABILITY: MODE 4 <u>with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR,</u>
MODE 5,
MODE 6 when the reactor vessel head is on.

----------NOTE----------

~~1.~~ Accumulator isolation is only required when accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS cold leg temperature allowed by the P/T limit curves provided in the PTLR.

~~2. The safety injection pumps are not required to be incapable of injecting into the RCS until 4 hours after entering MODE 4 from MODE 3 provided the temperature of one or more RCS cold legs has not decreased below 325°F.~~

ACTIONS

----------NOTE----------

~~1.~~ While this LCO is not met, entry into MODE 6 with the reactor vessel head on from MODE 6, and entry into MODE 5 from MODE 6 with the reactor vessel head on is not permitted.

~~2. With one required PORV inoperable for the purpose of cold overpressure protection, entry into MODE 4 from MODE 3 is permitted provided that RCS temperature is maintained above 275°F, and, within 36 hours, either: the PORV is restored to OPERABLE status; or, an RHR suction relief valve is placed in service so that the requirements of LCO 3.4.12 are met. Otherwise, the reactor vessel must be depressurized and vented in accordance with Required Action F.1.~~

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more safety injection pumps capable of injecting into the RCS.	A.1 Render all safety injection pumps incapable of injecting into the RCS.	4 hours
B. An accumulator not isolated when the accumulator pressure is greater than or equal to the maximum RCS pressure for existing cold leg temperature allowed in the PTLR.	B.1 Isolate affected accumulator.	1 hour
C. Required Action and associated Completion Time of Condition B not met.	C.1 Increase RCS cold leg temperature to > ~~350°F~~<u>the COPS arming temperature specified in the PTLR</u>.	12 hours
	<u>OR</u>	12 hours
	C.2 Depressurize affected accumulator to less than the maximum RCS pressure for existing cold leg temperature allowed in the PTLR.	
D. One required RCS relief valve inoperable in MODE 4<u>, with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR</u>.	D.1 Restore required RCS relief valve to OPERABLE status.	7 days

(continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.12.1	Verify both safety injection pumps are incapable of injecting into the RCS.	~~Within 4 hours after entering MODE 4 from MODE 3 and prior to the temperature of one or more RCS cold legs decreasing below 325°F~~ ~~AND~~ 12 hours ~~thereafter.~~
SR 3.4.12.2	Verify each accumulator is isolated.	12 hours
SR 3.4.12.3	Verify RHR suction valves are open for each required RHR suction relief valve.	72 hours
SR 3.4.12.4	----------NOTE---------- Only required to be performed when complying with LCO 3.4.12.b. ---------- Verify RCS vent size within specified limits.	12 hours for unlocked open vent valve(s) AND 31 days for locked open vent valve(s)

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.12.5	Verify PORV block valve is open for each required PORV.	72 hours
SR 3.4.12.6	----------NOTE---------- Not required to be performed until 12 hours after decreasing RCS cold leg temperature to ≤ ~~350°F~~the COPS arming temperature specified in the PTLR. ---------- Perform a COT on each required PORV, excluding actuation.	31 days
SR 3.4.12.7	Perform CHANNEL CALIBRATION for each required PORV actuation channel.	18 months

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.2 ECCS - Operating

LCO 3.5.2 Two ECCS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

----------NOTES----------

~~1.~~ In MODE 3, either residual heat removal pump to cold legs injection flow path may be isolated by closing the isolation valve to perform pressure isolation valve testing per SR 3.4.14.1.

~~2. Operation in MODE 3 with ECCS pumps declared inoperable pursuant to LCO 3.4.12, "Cold Overpressure Protection System (COPS)," is allowed for up to 4 hours or until the temperature of all RCS cold legs exceeds 375°F, whichever comes first.~~

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more trains inoperable. AND At least 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available.	A.1 Restore train(s) to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	6 hours 12 hours

5.6 Reporting Requirements

5.6.5 Core Operating Limits Report (COLR) (continued)

d. The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

5.6.6 Reactor Coolant System (RCS) PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR)

a. RCS pressure and temperature limits for heatup, cooldown, operation, criticality, and hydrostatic testing as well as heatup and cooldown rates shall be established and documented in the PTLR for the following:

LCO 3.4.3 "RCS Pressure and Temperature (P/T) Limits"

b. The power operated relief valve lift settings required to support the Cold Overpressure Protection Systems (COPS) and the COPS arming temperature shall be established and documented in the PTLR for the following:

LCO 3.4.12 "Cold Overpressure Protection Systems"

c. The RCS pressure and temperature limits for Unit 1 shall be those previously reviewed and approved by the NRC in Amendment No. 87 to Facility Operating License NPF-68. The RCS pressure and temperature limits for Unit 2 shall be those previously reviewed and approved by the NRC in Amendment No. 65 to Facility Operating License NPF-81. The acceptability of the P/T and COPS limits are documented in NRC letter "Vogtle Electric Generating Plant, Units 1 and 2 - Acceptance for Referencing of Pressure Temperature Limits Report," February 12, 1996. Specifically, the limits and methodology are described in the following documents:

1. Amendment No. 87 to Facility Operating License No. NPF-68, Vogtle Electric Generating Plant, Unit 1, June 8, 1995.

2. Amendment No. 65 to Facility Operating License No. NPF-81, Vogtle Electric Generating Plant, Unit 2, June 8, 1995.

(continued)

BASES

LCO (continued)

loops and RHR loops. Any one loop in operation provides enough flow to remove the decay heat from the core with forced circulation. An additional loop is required to be OPERABLE to provide redundancy for heat removal.

Note 1 permits all RCPs or RHR pumps to be de-energized for ≤ 1 hour per 8 hour period. The purpose of the Note is to permit tests that are designed to validate various accident analyses values. These tests are initially performed during startup testing. However, if changes are made to the RCS that would cause a change to the flow characteristics of the RCS, the input values must be revalidated by conducting the test again. The 1 hour time period is adequate to perform the necessary testing, and operating experience has shown that boron stratification is not a problem during this short period with no forced flow.

Utilization of Note 1 is permitted provided the following conditions are met along with any other conditions imposed by initial startup test procedures:

a. No operations are permitted that would dilute the RCS boron concentration, therefore maintaining the margin to criticality. Boron reduction is prohibited because a uniform concentration distribution throughout the RCS cannot be ensured when in natural circulation; and

b. Core outlet temperature is maintained at least 10°F below saturation temperature, so that no vapor bubble may form and possibly cause a natural circulation flow obstruction.

Note 2 requires that the secondary side water temperature of each SG be < 50°F above each of the RCS cold leg temperatures before the start of an RCP any time during MODE 4 operation with any RCS cold leg temperature ≤ the Cold Overpressure Protection System (COPS) arming temperature specified in the PTLR. This restraint is to prevent a low temperature overpressure event due to a thermal transient when an RCP is started. ~~In addition, the~~ The Note further restricts starting ~~of~~ an RCP ~~when no other RCP is operating, is further restricted~~ to a range of temperature differentials between the SGs and the RCS that is consistent with analysis assumptions used to demonstrate that the RHR design pressure is not exceeded when the RHR suction ~~relief~~ isolation valves are open. ~~used for RCS overpressure protection.~~

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.10 Pressurizer Safety Valves

BASES

BACKGROUND

The pressurizer safety valves provide, in conjunction with the Reactor Protection System, overpressure protection for the RCS. The pressurizer safety valves are of the pop type. The valves are spring loaded and self actuated by direct fluid pressure with backpressure compensation. The safety valves are designed to prevent the system pressure from exceeding the system Safety Limit (SL), 2735 psig, which is 110% of the design pressure.

Because the safety valves are self actuating, they are considered independent components. The relief capacity for each valve, 420,000 lb/hr at a pressurizer pressure of 2560 psig, is based on postulated overpressure transient conditions resulting from a complete loss of steam flow to the turbine with the reactor operating at 102 percent of engineered safeguards design power. The relief rate is stated at a pressure of 2560 psig which is equivalent to the former set pressure of 2485 psig plus 3% for set pressure tolerance and valve accumulation. This event results in the maximum surge rate into the pressurizer, which specifies the minimum relief capacity for the safety valves. The decrease in set pressure to 2460 psig and increase in tolerance does not significantly affect the relief capacity of the safety valves.

The discharge flow from the pressurizer safety valves is directed to the pressurizer relief tank. This discharge flow is indicated by an increase in temperature downstream of the pressurizer safety valves or increase in the pressurizer relief tank temperature or level.

Overpressure protection is required in MODES 1, 2, 3, 4, 5, and MODE 6 with the reactor vessel head on; however, in MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR, MODE 5, and MODE 6 with the reactor vessel head on, overpressure protection is provided by operating procedures and by meeting the requirements of LCO 3.4.12, "Cold Temperature Overpressure Protection System (COPS)."

The upper and lower pressure limits are based on the ± 2% tolerance requirement assumed in the safety analyses. The lift setting is for the ambient conditions associated with

(continued)

BASES

BACKGROUND

(continued)

MODES 1, 2, 3 and ~~3~~ MODE 4 with all RCS cold leg temperatures ≥ the COPS arming temperature specified in the PTLR. This requires either that the valves be set hot or that a correlation between hot and cold settings be established.

The pressurizer safety valves are part of the primary success path and mitigate the effects of postulated accidents. OPERABILITY of the safety valves ensures that the RCS pressure will be limited to 110% of design pressure.

The consequences of exceeding the American Society of Mechanical Engineers (ASME) pressure limit (Ref. 1) could include damage to RCS components, increased leakage, or a requirement to perform additional stress analyses prior to resumption of reactor operation.

APPLICABLE SAFETY ANALYSES

All accident and safety analyses in the FSAR (Ref. 2) that require safety valve actuation assume operation of three pressurizer safety valves to limit increases in RCS pressure. The overpressure protection analysis (Ref. 3) is also based on operation of three safety valves. Accidents that could result in overpressurization if not properly terminated include:

a. Uncontrolled rod withdrawal from full power;

b. Loss of reactor coolant flow;

c. Loss of external electrical load;

d. Loss of normal feedwater;

e. Loss of all AC power to station auxiliaries;

f. Locked rotor; and

g. Feedwater line break.

Detailed analyses of the above transients are contained in Reference 2. Safety valve actuation is required in events c, e, and f (above) to limit the pressure increase. Compliance with this LCO is consistent with the design bases and accident analyses assumptions.

(continued)

BASES (continued)

LCO

Pressurizer safety valves satisfy Criterion 3 of 10 CFR 50.36 (c)(2)(ii).

The three pressurizer safety valves are set to open at an RCS pressure of 2460 psig, and within the specified tolerance, to avoid exceeding the maximum design pressure SL, and to maintain accident analyses assumptions. The upper and lower pressure tolerance limits are based on the ± 2% tolerance requirements assumed in the safety analyses.

The limit protected by this Specification is the reactor coolant pressure boundary (RCPB) SL of 110% of design pressure.

APPLICABILITY

In MODES 1, 2, 3 and ~~3~~ MODE 4 with all RCS cold leg temperatures ≥ the COPS arming temperature specified in the PTLR, OPERABILITY of three valves is required because the combined capacity is required to keep reactor coolant pressure below 110% of its design value during certain accidents. MODE 3 is conservatively included, although the listed accidents may not require the safety valves for protection.

The LCO is not applicable in MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR, MODE 5, or MODE 6 (with the reactor vessel head on) because the cold overpressure protection system is in service. Overpressure protection is not required in MODE 6 with reactor vessel head removed.

The Note allows entry into MODE 3 and MODE 4 with all RCS cold leg temperatures ≥ the COPS arming temperature specified in the PTLR with the lift settings outside the LCO limits. This permits testing and examination of the safety valves at high pressure and temperature near their normal operating range, but only after the valves have had a preliminary cold setting. The cold setting gives assurance that the valves are OPERABLE near their design condition. Only one valve at a time will be removed from service for testing. The 54 hour exception is based on 18 hour outage time for each of the three valves. The 18 hour period is derived from operating experience that hot testing can be performed in this timeframe.

(continued)

BASES (continued)

ACTIONS

A.1

With one pressurizer safety valve inoperable, restoration must take place within 15 minutes. The Completion Time of 15 minutes reflects the importance of maintaining the RCS overpressure protection system. An inoperable safety valve coincident with an RCS overpressure event could challenge the integrity of the pressure boundary.

B.1 and B.2

If the Required Action of A.1 cannot be met within the required Completion Time or if two or more pressurizer safety valves are inoperable, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. In MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR, overpressure protection is provided by the cold overpressure protection system. The change from MODE 1, 2, or 3 to MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR reduces the RCS energy (core power and pressure), lowers the potential for large pressurizer insurges, and thereby removes the need for overpressure protection by three pressurizer safety valves.

SURVEILLANCE REQUIREMENTS

SR 3.4.10.1

SRs are specified in the Inservice Testing Program. Pressurizer safety valves are to be tested in accordance with the requirements of Section XI of the ASME Code (Ref. 4), which provides the activities and Frequencies necessary to satisfy the SRs. No additional requirements are specified. The lift settings shall be ≥ 2410 psig and ≤ 2510 psig. The lift setting pressures shall correspond to ambient conditions of the valves at normal operating temperature and pressure.

(continued)

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.12 Cold Overpressure Protection Systems (COPS)

BASES

BACKGROUND

The COPS controls RCS pressure at low temperatures so the integrity of the reactor coolant pressure boundary (RCPB) is not compromised by violating the pressure and temperature (P/T) limits of 10 CFR 50, Appendix G (Ref. 1). The reactor vessel is the limiting RCPB component for demonstrating such protection. The PTLR provides the maximum allowable actuation logic setpoints for the power operated relief valves (PORVs) and the maximum RCS pressure for the existing RCS cold leg temperature during cooldown, shutdown, and heatup to meet the Reference 1 requirements during the COPS MODES or other specified condition in the COPS Applicability.

The reactor vessel material is less tough at low temperatures than at normal operating temperature. As the vessel neutron exposure accumulates, the material toughness decreases and becomes less resistant to pressure stress at low temperatures (Ref. 2). RCS pressure, therefore, is maintained low at low temperatures and is increased only as temperature is increased.

The potential for vessel overpressurization is most acute when the RCS is water solid, occurring only while shutdown; a pressure fluctuation can occur more quickly than an operator can react to relieve the condition. Exceeding the RCS P/T limits by a significant amount could cause brittle cracking of the reactor vessel. LCO 3.4.3, "RCS Pressure and Temperature (P/T) Limits," requires administrative control of RCS pressure and temperature during heatup and cooldown to prevent exceeding the PTLR limits.

This LCO provides RCS overpressure protection by having a minimum coolant input capability and having adequate pressure relief capacity. Limiting coolant input capability requires both safety injection pumps to be incapable of injection into the RCS and the accumulators to be isolated. The pressure relief capacity requires either two redundant RCS relief valves or a depressurized RCS and an RCS vent of sufficient size. One RCS relief valve or the open RCS vent is the overpressure protection device that acts to terminate an increasing pressure event.

(continued)

BASES

BACKGROUND

PORV Requirements (continued)

When a PORV is opened in an increasing pressure transient, the release of coolant will cause the pressure increase to slow and reverse. As the PORV releases coolant, the RCS pressure decreases until a reset pressure is reached and the valve is signaled to close. The pressure continues to decrease below the reset pressure as the valve closes.

RHR Suction Relief Valve Requirements

During the COPS MODES or other specified condition in the COPS Applicability, the RHR System is operated for decay heat removal and low pressure letdown control. Therefore, the RHR suction isolation valves are open in the piping from the RCS hot legs to the inlets of the RHR pumps. While these valves are open and the RHR suction valves are open, the RHR suction relief valves are exposed to the RCS and are able to relieve pressure transients in the RCS.

The RHR suction isolation valves and the RHR suction valves must be open to make the RHR suction relief valves OPERABLE for RCS overpressure mitigation. The RHR suction relief valves are self-actuated water relief valves with pressure tolerances and accumulation limits established by Section III of the American Society of Mechanical Engineers (ASME) Code (Ref. 3) for Class 2 relief valves.

RCS Vent Requirements

Once the RCS is depressurized, a vent exposed to the containment atmosphere will maintain the RCS at containment ambient pressure in an RCS overpressure transient, if the relieving requirements of the transient do not exceed the capabilities of the vent. Thus, the vent path must be capable of relieving the flow resulting from the limiting COPS mass or heat input transient, and maintaining pressure below the P/T limits. The required vent capacity may be provided by one or more vent paths.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES

Safety analyses (Ref. 4) demonstrate that the reactor vessel is adequately protected against exceeding the Reference 1 P/T limits. In MODES 1, 2, 3 and ~~3~~MODE 4 with all RCS cold leg temperatures > the COPS arming temperature specified in the PTLR, the pressurizer safety valves will prevent RCS pressure from exceeding the Reference 1 limits. In MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR and below, overpressure prevention falls to two OPERABLE RCS relief valves or to a depressurized RCS and a sufficient sized RCS vent. Each of these means has a limited overpressure relief capability.

The actual temperature at which the pressure in the P/T limit curve falls below the pressurizer safety valve setpoint increases as the reactor vessel material toughness decreases due to neutron embrittlement. Each time the PTLR curves are revised, the COPS must be re-evaluated to ensure its functional requirements can still be met using the RCS relief valve method or the depressurized and vented RCS condition.

The PTLR contains the acceptance limits that define the COPS requirements. Any change to the RCS must be evaluated against the Reference 4 analyses to determine the impact of the change on the COPS acceptance limits.

Transients that are capable of overpressurizing the RCS are categorized as either mass or heat input transients, as discussed below. ~~examples of which follow:~~

Mass Input Type Transients

a. Inadvertent safety injection; or

b. Charging/letdown flow mismatch.

Heat Input Type Transients

~~a. Inadvertent actuation of pressurizer heaters;~~

~~b. Loss of RHR cooling; or~~

~~c~~a. Reactor coolant pump (RCP) startup with temperature asymmetry ~~within the RCS or~~ between the RCS and steam generators.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

~~Heat Input Type Transients~~ ~~(continued)~~

The following are required during the COPS MODES or other specified condition in the COPS Applicability to ensure that mass and heat input transients do not occur, which either of the COPS overpressure protection means cannot handle:

a. Rendering both safety injection pumps incapable of injection;

b. Deactivating the accumulator discharge isolation valves in their closed positions; and

c. Disallowing the start of an RCP if the secondary temperature is more than 50°F above ~~primary~~ the RCS cold leg temperature in any one loop. With ~~no reactor coolant pump running,~~ the RHR suction isolation valves open, this value is reduced to 25°F at an RCS temperature of 350°F and varies linearly to 50°F at an RCS temperature of 200°F for RHR design pressure considerations. LCO 3.4.6, "RCS Loops — MODE 4," and LCO 3.4.7, "RCS Loops — MODE 5, Loops Filled," contain notes on this limitation that provide this protection.

The Reference 4 analyses demonstrate that either one RCS relief valve or the depressurized RCS and RCS vent can maintain RCS pressure below limits when both centrifugal charging pumps are actuated. Thus, the LCO requires both safety injection pumps to be incapable of injecting into the RCS during the COPS MODES or other specified condition in the COPS Applicability.

Since neither one RCS relief valve nor the RCS vent can handle the pressure transient caused by accumulator injection when RCS temperature is low, the LCO also requires accumulator isolation when accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS ~~Cold~~ cold leg temperature allowed in the PTLR. The isolated accumulators must have their discharge valves closed and the valve power supply breakers fixed in their open positions.

PORV Performance

The fracture mechanics analyses show that the vessel is protected when the PORVs are set to open at or below the limits shown in the PTLR. The setpoints are derived by analyses that model the performance of the COPS, assuming

(continued)

BASES

APPLICABLE SAFETY ANALYSES

PORV Performance (continued)

the mass injection transient of two centrifugal charging pumps and the positive displacement pump injecting into the RCS, and the heat injection transient of starting an RCP with the RCS 50°F colder than the secondary coolant. These analyses consider pressure overshoot and undershoot beyond the PORV opening and closing, resulting from signal processing and valve stroke times. The PORV setpoints at or below the derived limit ensures the Reference 1 P/T limits will be met.

----------NOTE----------
Although the positive displacement pump (PDP) was replaced with the normal charging pump (NCP), the current mass injection transient analysis assumes two centrifugal charging pumps and the positive displacement pump. Westinghouse performed an evaluation of the effect of replacing the PDP with the NCP and obtained acceptable results without reanalysis of the mass injection transient. Reference Westinghouse letter, GP-168-38 from J. L. Tain to J. B. Beasley, Jr., dated August 13, 1998, COPS PORV Setpoint for New Charging Pump.

The PORV setpoints in the PTLR will be updated when the revised P/T limits conflict with the COPS analysis limits. The P/T limits are periodically modified as the reactor vessel material toughness decreases due to neutron embrittlement caused by neutron irradiation. Revised limits are determined using neutron fluence projections and the results of examinations of the reactor vessel material irradiation surveillance specimens. The Bases for LCO 3.4.3, "RCS Pressure and Temperature (P/T) Limits," discuss these examinations.

The PORVs are considered active components. Thus, the failure of one PORV is assumed to represent the worst case, single active failure.

RHR Suction Relief Valve Performance

The RHR suction relief valves do not have variable pressure and temperature lift setpoints like the PORVs. Analyses show that one RHR suction relief valve with a setpoint at or between 440 psig and 460 psig (Ref. 9) will pass flow greater than that required for the limiting COPS transient while maintaining RCS pressure less than the P/T limit curve.

(continued)

BASES

APPLICABLE SAFETY ANALYSES

RHR Suction Relief Valve Performance (continued)

As the RCS P/T limits are decreased to reflect the loss of toughness in the reactor vessel materials due to neutron embrittlement, the RHR suction relief valves must be analyzed to still accommodate the design basis transients for COPS.

The RHR suction relief valves are considered active components. Thus, the failure of one valve is assumed to represent the worst case single active failure.

RCS Vent Performance

With the RCS depressurized, analyses show a vent size of 2.14 square inches (based on an equivalent length of 10 feet of pipe, i.e., a vent capable of relieving ~~670~~685 gpm waterflow at ~~470~~722 psig) is capable of mitigating the allowed COPS overpressure transient. The capacity of a vent this size is greater than the flow of the limiting transient for the COPS configuration, with both safety injection pumps incapable of injecting into the RCS, maintaining RCS pressure less than the maximum pressure on the P/T limit curve.

The RCS vent size will be re-evaluated for compliance each time the P/T limit curves are revised based on the results of the vessel material surveillance.

The RCS vent is passive and is not subject to active failure.

The COPS satisfies Criterion 2 of 10 CFR 50.36 (c)(2)(ii).

LCO

This LCO requires that the COPS is OPERABLE. The COPS is OPERABLE when the minimum coolant input and pressure relief capabilities are OPERABLE. Violation of this LCO could lead to the loss of low temperature overpressure mitigation and violation of the Reference 1 limits as a result of an operational transient.

To limit the coolant input capability, the LCO requires both safety injection pumps to be incapable of injecting into the RCS and all accumulator discharge isolation valves closed and immobilized when accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS cold leg temperature allowed in the PTLR.

(continued)

BASES

LCO (continued)

The elements of the LCO that provide low temperature overpressure mitigation through pressure relief are:

a. Two RCS relief valves, as follows:

1. Two OPERABLE PORVs; or

A PORV is OPERABLE for the COPS when its block valve is open, its lift setpoint is set to the limit required by the PTLR and testing proves its ability to open at this setpoint, and motive power is available to the two valves and their control circuits. The PORVs (PV-455A and PV-456A) are powered from 125 V MCCs 1/2AD1M and 1/2BD1M, respectively. The PORVs are to be considered OPERABLE whenever these MCCs are available to supply power.

2. Two OPERABLE RHR suction relief valves; or

An RHR suction relief valve is OPERABLE for the COPS when its RHR suction isolation valve and its RHR suction valve are open, its setpoint is at or between 440 psig and 460 psig, and testing has proven its ability to open at this setpoint.

3. One OPERABLE PORV and one OPERABLE RHR suction relief valve; or

b. A depressurized RCS and an RCS vent.

An RCS vent is OPERABLE when open with an area of ≥ 2.14 square inches (based on an equivalent length of 10 feet of pipe, i.e., capable of relieving ~~670~~685 gpm at ~~470~~722 psig).

Each of these methods of overpressure prevention is capable of mitigating the limiting COPS transient.

APPLICABILITY

This LCO is applicable in MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR, in MODE 5, and in MODE 6 when the reactor vessel head is on. The pressurizer safety valves provide overpressure protection that meets the Reference 1 P/T limits in MODES 1, 2, 3, and MODE 4 with all RCS cold leg temperatures > the COPS arming temperature specified in the PTLR. When the reactor vessel head is off, overpressurization cannot occur.

LCO 3.4.3 provides the operational P/T limits for all MODES.
LCO 3.4.10, "Pressurizer Safety Valves," requires the

(continued)

BASES

APPLICABILITY (continued)

OPERABILITY of the pressurizer safety valves that provide overpressure protection during MODES 1, 2, 3 and ~~3~~MODE 4 with all RCS cold leg temperatures > the COPS arming temperature specified in the PTLR.

Low temperature overpressure prevention is most critical during shutdown when the RCS is water solid, and a mass or heat input transient can cause a very rapid increase in RCS pressure when little or no time allows operator action to mitigate the event.

The Applicability is modified by a Note stating that accumulator isolation is only required when the accumulator pressure is more than or at the maximum RCS pressure for the existing temperature, as allowed by the P/T limit curves. This Note permits the accumulator discharge isolation valve Surveillance to be performed only under these pressure and temperature conditions.

ACTIONS

~~Two~~ A Notes ~~modify~~ modifies the ACTIONS table. The Note ~~1~~ prohibits entry into MODE 6 with the vessel head on from MODE 6 and MODE 5 from MODE 6 with the vessel head on. Entry into MODE 4 from MODE 5 is already prohibited by LCO 3.0.4. ~~Note 2 permits entry into MODE 4 from MODE 3 with a PORV that is inoperable for the purpose of cold overpressure protection provided that RCS temperature is maintained above 275°F, and, within 36 hours, either: the PORV is restored to OPERABLE status; or, an RHR suction relief valve is placed in service so that the requirements of LCO 3.4.12 are met. Otherwise, the reactor vessel must be depressurized and vented in accordance with Required Action F.1. With only one PORV OPERABLE, the COPS remains capable of mitigating a design basis cold overpressurization event. However, the system cannot withstand a single failure of the remaining PORV. The current COPS enable temperature is established very conservatively at 350°F. However, the application of ASME Code Case N-514 would allow the enable temperature to be lowered to less than 275°F. Therefore, when entering this LCO from MODE 3 with one required PORV inoperable, maintaining RCS temperature above 275°F minimizes actual exposure to a cold overpressure event. Furthermore, requiring action within 36 hours minimizes the exposure to a single failure while allowing sufficient time to either restore the inoperable PORV or to place RHR in service. Note 2 is only applicable to the condition of entering MODE 4 from MODE 3 with one required PORV inoperable for the purpose of cold overpressure protection. If operating in MODE 4 and a failure of a required RCS relief valve occurs, Condition D applies.~~

(continued)

BASES

ACTIONS (continued)

A.1

With one or more safety injection pumps capable of injecting into the RCS, RCS overpressurization is possible.

Rendering the safety injection pumps incapable of injecting into the RCS within 4 hours to restore restricted coolant input capability to the RCS reflects the urgency of removing the RCS from this condition.

B.1, C.1, and C.2

An unisolated accumulator requires isolation within 1 hour. This is only required when the accumulator pressure is at or more than the maximum RCS pressure for the existing temperature allowed by the P/T limit curves.

If isolation is needed and cannot be accomplished in 1 hour, Required Action C.1 and Required Action C.2 provide two options, either of which must be performed in the next 12 hours. By increasing the RCS temperature to > ~~350°F~~the COPS arming temperature specified in the PTLR, an accumulator pressure of 678 psig cannot exceed the COPS limits if the accumulators are fully injected. Depressurizing the accumulators below the COPS limit from the PTLR also gives this protection.

The Completion Times are based on operating experience that these activities can be accomplished in these time periods and that the likelihood that an event requiring COPS during this time is small.

D.1

In MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR, with one required RCS relief valve inoperable, the RCS relief valve must be restored to OPERABLE status within a Completion Time of 7 days. Two RCS relief valves in any combination of the PORVS and the RHR suction relief valves are required to provide low temperature overpressure mitigation while withstanding a single failure of an active component.

The Completion Time considers the facts that only one of the RCS relief valves is required to mitigate an overpressure transient and that the likelihood of an active failure of the remaining valve path during this time period is very low.

(continued)

BASES

ACTIONS (continued)

E.1

The consequences of operational events that will overpressurize the RCS are more severe at lower temperature (Ref. 7). Thus, with one of the two RCS relief valves inoperable in MODE 5 or in MODE 6 with the head on, the Completion Time to restore two valves to OPERABLE status is 24 hours.

The Completion Time represents a reasonable time to investigate and repair several types of relief valve failures without exposure to a lengthy period with only one OPERABLE RCS relief valve to protect against overpressure events.

F.1

The RCS must be depressurized and a vent must be established within 12 hours when:

a. Both required RCS relief valves are inoperable; or

b. A Required Action and associated Completion Time of Condition A, C, D, or E is not met; or

c. The COPS is inoperable for any reason other than Condition A, B, C, D, or E.

The vent must be sized ≥ 2.14 square inches (based on an equivalent length of 10 feet of pipe) to ensure that the flow capacity is greater than that required for the worst case mass input transient reasonable during the applicable COPS MODES or other specified condition in the COPS Applicability. This action is needed to protect the RCPB from a low temperature overpressure event and a possible brittle failure of the reactor vessel.

The Completion Time considers the time required to place the ~~plant~~ unit in this Condition and the relatively low probability of an overpressure event during this time period due to increased operator awareness of administrative control requirements.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.12.1 and SR 3.4.12.2

To minimize the potential for a low temperature overpressure event by limiting the mass input capability, both safety injection pumps are verified incapable of injecting into the RCS, and the accumulator discharge isolation valves are verified closed and locked out.

The safety injection pumps are rendered incapable of injecting into the RCS through at least two independent means such that a single failure or single action will not result in an injection into the RCS.

The Frequency of ~~within 4 hours after initial entry into MODE 4 from MODE 3 and prior to RCS cold leg temperature decreasing below 325°F (for the safety injection pumps) and~~ 12 hours ~~thereafter~~ (for the safety injection pumps and accumulators) is sufficient, considering other indications and alarms available to the operator in the control room, to verify the required status of the equipment.

SR 3.4.12.3

Each required RHR suction relief valve shall be demonstrated OPERABLE by verifying its RHR suction isolation valves are open and by testing it in accordance with the Inservice Testing Program. This Surveillance is only required to be performed if the RHR suction relief valve is being used to meet this LCO. For Train A, the RHR suction relief valve is PSV-8708A and the suction isolation valves are HV-8701A and B. For Train B, the RHR suction relief valve is PSV-8708B and the suction isolation valves are HV-8702A and B.

The RHR suction valves are verified to be opened every 12 hours. The Frequency is considered adequate in view of other administrative controls such as valve status indications available to the operator in the control room that verify the RHR suction isolation valves remain open.

The ASME Code, Section XI (Ref. 8), test per Inservice Testing Program verifies OPERABILITY by proving proper relief valve mechanical motion and by measuring and, if required, adjusting the lift setpoint.

SR 3.4.12.4

The RCS vent of ≥ 2.14 square inches (based on an equivalent length of 10 feet of pipe) is proven OPERABLE by verifying its open condition either:

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.12.4 (continued)

a. Once every 12 hours for a valve that cannot be locked.

b. Once every 31 days for a valve that is locked, sealed, or secured in position. A removed pressurizer safety valve fits this category.

The passive vent arrangement must only be open to be OPERABLE. This Surveillance is required to be performed if the vent is being used to satisfy the pressure relief requirements of the LCO 3.4.12.b.

SR 3.4.12.5

The PORV block valve must be verified open every 72 hours to provide the flow path for each required PORV to perform its function when actuated. The valve must be remotely verified open in the main control room. This Surveillance is performed if the PORV satisfies the LCO.

The block valve is a remotely controlled, motor operated valve. The power to the valve operator is not required to be removed, and the manual operator is not required to be locked in the inactive position. Thus, the block valve can be closed in the event the PORV develops excessive leakage or does not close (sticks open) after relieving an overpressure situation.

The 72 hour Frequency is considered adequate in view of other administrative controls available to the operator in the control room, such as valve position indication, that verify that the PORV block valve remains open.

SR 3.4.12.6

Performance of a COT is required within 12 hours after decreasing RCS temperature to ≤ ~~350°F~~the COPS arming temperature specified in the PTLR and every 31 days on each required PORV to verify and, as necessary, adjust its lift setpoint. The COT will verify the setpoint is within the ~~PTLR~~ allowed maximum limits in the PTLR. PORV actuation could depressurize the RCS and is not required.

A Note has been added indicating that this SR is required to be performed 12 hours after decreasing RCS cold leg temperature to ≤ ~~350°F~~the COPS arming temperature specified in the PTLR. The 12 hours considers the unlikelihood of a low temperature overpressure event during this time.

BASES (continued)

APPLICABILITY

In MODES 1, 2, and 3, the ECCS OPERABILITY requirements for the limiting Design Basis Accident, a large break LOCA, are based on full power operation. Although reduced power would not require the same level of performance, the accident analysis does not provide for reduced cooling requirements in the lower MODES. The centrifugal charging pump performance is based on a small break LOCA, which establishes the pump performance curve and has less dependence on power. The SI pump performance requirements are based on a small break LOCA. MODE 2 and MODE 3 requirements are bounded by the MODE 1 analysis.

This LCO is only applicable in MODE 3 and above. Below MODE 3, the SI signal setpoint is manually bypassed by operator control, and system functional requirements are relaxed as described in LCO 3.5.3, "ECCS — Shutdown."

As indicated in the Note ~~1~~, either flow path may be isolated in MODE 3, under controlled conditions, to perform pressure isolation valve testing per SR 3.4.14.1. The flow path is readily restorable from the control room.

~~As indicated in Note 2, operation in MODE 3 with ECCS trains declared inoperable pursuant to LCO 3.4.12, "Cold Overpressure Protection System (COPs)," is necessary since the arming temperature is the MODE 3 boundary temperature of 350°F. LCO 3.4.12 requires that certain pumps be rendered inoperable at and below the COPs arming temperature. When this temperature is at or near the MODE 3 boundary temperature, time is needed to restore the inoperable pumps to OPERABLE status.~~

In MODES 5 and 6, plant conditions are such that the probability of an event requiring ECCS injection is extremely low. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops — MODE 5, Loops Filled," and LCO 3.4.8, "RCS Loops — MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation — High Water Level," and LCO 3.9.6, "Residual Heat Removal (RHR) and Coolant Circulation — Low Water Level."

(continued)

Southern Nuclear Company
Vogtle Unit 1

Pressure Temperature Limits Report
Revision ~~2~~3, February 2004

Approved:_____

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1.0 RCS Pressure Temperature Limits Report (PTLR)

This PTLR for Vogtle Unit 1 has been prepared in accordance with the requirements of Technical Specification (TS) 5.6.6. The TS addressed in this report are listed below:

LCO 3.4.3 RCS Pressure and Temperature (P/T) Limits

LCO 3.4.12 Cold Overpressure Protection Systems (COPS)

Revisions to the PTLR shall be provided to the NRC after issuance.

2.0 RCS Pressure and Temperature (P/T) Limits

The limits for TS 3.4.3 are presented in the subsections which follow and were developed using the NRC approved methodology in WCAP-14040, Revision 4[1] with exception of WCAP-16142-P, Revision 1[2] (Elimination of the Flange Requirement). The operability requirements associated with COPS are specified in LCO 3.4.12 and were determined to adequately protect the RCS against brittle fracture in the event of a cold overpressure transient in accordance with the methodology specified in TS 5.6.6.

2.1 RCS P/T Limits (LCO 3.4.3)

2.1.1 The minimum boltup temperature is 60°F

2.1.2 The RCS temperature rate-of-change limits are:

a. A maximum heatup rate of 100°F in any one hour period.
b. A maximum cooldown rate of 100°F in any one hour period.
c. A maximum temperature change of less than or equal to 10°F in any one hour period during inservice hydrostatic and leak testing operations above the heatup and cooldown limit curves.

2.1.3 The RCS P/T limits for heatup, cooldown, inservice hydrostatic and leak testing, and criticality are specified by Figures 2-1 and 2-2.

3.0 Cold Overpressure Protection Systems (LCO 3.4.12)

The setpoints for the pressurizer Power Operated Relief Valves (PORVs) and arming temperature are presented in the subsections which follow. These setpoints and arming temperature have been developed using the NRC-approved methodology specified in TS 5.6.6.

3.1 Pressurizer PORV Setpoints

The pressurizer PORV setpoints are specified in Figure 3-1 and Table 3-1. The limits for the COPS setpoints are contained in the 36 EFPY steady-state curves (Table 2-2), which are beltline conditions and are not compensated for pressure differences between the pressurizer transmitter and the reactor midplane/beltline or for instrument inaccuracies. The pressure difference between the pressurizer transmitter and the reactor vessel midplane/beltline with four reactor coolant pumps in operation is 74 psi.

Note: These setpoints include an allowance for the 50°F thermal transport effect for heat injection transients. A calculation has been performed to confirm that the setpoints will maintain the system pressure within the established limits when the pressure difference between the pressure transmitter and reactor midplane and maximum temperature/pressure instrument uncertainties are applied to the setpoints.

3.2 Arming Temperature

The arming temperature shall be ≤ 220° F.

4.0 Reactor Vessel Material Surveillance Program

The reactor vessel material irradiation surveillance specimens shall be removed and examined to determine changes in material properties. The removal schedule is provided in UFSAR Table 5.3.1-8. The results of these examinations shall be used to update Figures 2-1, 2-2, and 3-1.

The pressure vessel steel surveillance program (WCAP-11011[4]) is in compliance with Appendix H[3] to 10 CFR 50, "Reactor Vessel Material Surveillance Program Requirements." The material test requirements and the acceptance standard utilize the reference nil-ductility temperature RT_{NDT}, which is determined in accordance with ASTM E23 [5]. The empirical relationship between RT_{NDT} and the fracture toughness of the reactor vessel steel is developed in accordance with Code Case N-640[6] of Section XI of the ASME Boiler and Pressure Vessel Code, Appendix G, "Fracture Toughness Criteria for Protection Against Failure"[7]. The surveillance capsule removal schedule meets the requirements of ASTM E185-82[8]. The removal schedule is provided in UFSAR Table 5.3.1-8.

Southern Nuclear Company
Vogtle Unit 2

Pressure Temperature Limits Report
Revision ~~2~~3, February 2004

Approved:_____

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1.0 RCS Pressure Temperature Limits Report (PTLR)

This PTLR for Vogtle Unit 2 has been prepared in accordance with the requirements of Technical Specification (TS) 5.6.6. The TS addressed in this report are listed below:

LCO 3.4.3 RCS Pressure and Temperature (P/T) Limits

LCO 3.4.12 Cold Overpressure Protection Systems (COPS)

Revisions to the PTLR shall be provided to the NRC after issuance.

2.0 RCS Pressure and Temperature (P/T) Limits (LCO 3.4.3)

The limits for TS 3.4.3 are presented in the subsections which follow and were developed using the NRC approved methodology in WCAP-14040, Revision 4[1] with exception of WCAP-16142-P, Revision 1[2] (elimination of the flange requirement). The operability requirements associated with the COPS are specified in LCO 3.4.12 and were determined to adequately protect the RCS against brittle fracture in the event of a cold overpressure transient in accordance with the methodology specified in TS 5.6.6.

2.1 RCS P/T Limits (LCO 3.4.3)

2.1.1 The minimum boltup temperature is 60°F

2.1.2 The RCS temperature rate-of-change limits are:

a. A maximum heatup rate of 100°F in any one hour period.
b. A maximum cooldown rate of 100°F in any one hour period.
c. A maximum temperature change of less than or equal to 10°F in any one hour period during inservice hydrostatic and leak testing operations above the heatup and cooldown limit curves.

2.1.3 The RCS P/T limits for heatup, cooldown, inservice hydrostatic and leak testing, and criticality are specified by Figures 2-1 and 2-2.

3.0 Cold Overpressure Protection Systems (LCO 3.4.12)

The setpoints for the pressurizer Power Operated Relief Valves (PORVs) are presented in the subsections which follow. These setpoints and arming temperature have been developed using the NRC-approved methodology specified in TS 5.6.6.

3.1 Pressurizer PORV Setpoints

The pressurizer PORV setpoints are specified in Figure 3-1 and Table 3-1. The limits for the COPS setpoints are contained in the 36 EFPY steady-state curves (Table 2-2), which are beltline conditions and are not compensated for pressure differences between the pressurizer transmitter and the reactor midplane/beltline or for instrument inaccuracies. The pressure difference between the pressurizer transmitter and the reactor vessel midplane/beltline with four reactor coolant pumps in operation is 74 psi.

Note: These setpoints include an allowance for the 50°F thermal transport effect for heat injection transients. A calculation has been performed to confirm that the setpoints will maintain the system pressure within the established limits when the pressure difference between the pressure transmitter and reactor midplane and maximum temperature/pressure instrument uncertainties are applied to the setpoints.

3.2 Arming Temperature

The arming temperature shall be ≤ 220° F.

4.0 Reactor Vessel Material Surveillance Program

The reactor vessel material irradiation surveillance specimens shall be removed and examined to determine changes in material properties. The removal schedule is provided in UFSAR Table 5.3.1-9. The results of these examinations shall be used to update Figures 2-1, 2-2, and 3-1.

The pressure vessel steel surveillance program (WCAP-11381[4]) is in compliance with Appendix H[3] to 10 CFR 50, "Reactor Vessel Material Surveillance Program Requirements." The material test requirements and the acceptance standard utilize the reference nil-ductility temperature RT_{NDT}, which is determined in accordance with ASTM E23 [5]. The empirical relationship between RT_{NDT} and the fracture toughness of the reactor vessel steel is developed in accordance with Code Case N-640[6] of Section XI of the ASME Boiler and Pressure Vessel Code, Appendix G, "Fracture Toughness Criteria for Protection Against Failure"[7]. The surveillance capsule removal schedule meets the requirements of ASTM E185-82[8]. The removal schedule is provided in UFSAR Table 5.3.1-9.

Enclosure 4

Vogtle Electric Generating Plant Units 1 and 2
Final Technical Specification, Bases, and PTLR Changes

PHYSICS TESTS (continued)	a. Described in Chapter 14 of the FSAR; b. Authorized under the provisions of 10 CFR 50.59; or c. Otherwise approved by the Nuclear Regulatory Commission.
PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR)	The PTLR is the unit specific document that provides the reactor vessel pressure and temperature limits, including heatup and cooldown rates, Cold Overpressure Protection System (COPS) arming temperature and the nominal PORV setpoints for the COPS, for the current reactor vessel fluence period. These pressure and temperature limits shall be determined for each fluence period in accordance with Specification 5.6.6. Unit operation within these operating limits is addressed in individual specifications.
QUADRANT POWER TILT RATIO (QPTR)	QPTR shall be the ratio of the maximum upper excore detector calibrated output to the average of the upper excore detector calibrated outputs, or the ratio of the maximum lower excore detector calibrated output to the average of the lower excore detector calibrated outputs, whichever is greater.
RATED THERMAL POWER (RTP)	RTP shall be a total reactor core heat transfer rate to the reactor coolant of 3565 MWt.
REACTOR TRIP SYSTEM (RTS) RESPONSE TIME	The RTS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its RTS trip setpoint at the channel sensor until loss of stationary gripper coil voltage. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and the methodology for verification have been previously reviewed and approved by the NRC.

(continued)

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.6 RCS Loops - MODE 4

LCO 3.4.6 Two loops consisting of any combination of RCS loops and residual heat removal (RHR) loops shall be OPERABLE, and one loop shall be in operation.

----------NOTES----------

1. All reactor coolant pumps (RCPs) and RHR pumps may be de-energized for ≤ 1 hour per 8 hour period provided:

   a. No operations are permitted that would cause reduction of the RCS boron concentration; and

   b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. An RCP shall not be started with any RCS cold leg temperature ≤ the Cold Overpressure Protection System (COPS) arming temperature specified in the PTLR, unless the secondary side water temperature of each steam generator (SG) is < 50°F above each of the RCS cold leg temperatures. With the RHR suction isolation valves open, this value is reduced to 25°F at an RCS temperature of 350°F and varies linearly to 50°F at an RCS temperature of 200°F.

APPLICABILITY: MODE 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required RCS loop inoperable. AND Two RHR loops inoperable.	A.1 Initiate action to restore a second loop to OPERABLE status.	Immediately

(continued)

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.10 Pressurizer Safety Valves

LCO 3.4.10 Three pressurizer safety valves shall be OPERABLE with lift settings ≥ 2410 psig and ≤ 2510 psig.

APPLICABILITY: MODES 1, 2, and 3.
MODE 4 with all RCS cold leg temperatures > the COPS arming temperature specified in the PTLR.

----------NOTE----------
The lift settings are not required to be within the LCO limits during MODE 3 and MODE 4 with all RCS cold leg temperatures > the COPS arming temperature specified in the PTLR for the purpose of setting the pressurizer safety valves under ambient (hot) conditions. This exception is allowed for 54 hours following entry into MODE 3 provided a preliminary cold setting was made prior to heatup.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One pressurizer safety valve inoperable.	A.1	Restore valve to OPERABLE status.	15 minutes
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
	AND		
OR	B.2	Be in MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR.	12 hours
Two or more pressurizer safety valves inoperable.			

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.12 Cold Overpressure Protection Systems (COPS)

LCO 3.4.12 A COPS shall be OPERABLE with all safety injection pumps incapable of injecting into the RCS and the accumulators isolated and either a or b below.

a. Two RCS relief valves, as follows:

1. Two power operated relief valves (PORVs) with lift settings within the limits specified in the PTLR, or

2. Two residual heat removal (RHR) suction relief valves with setpoints ≥ 440 psig and ≤ 460 psig, or

3. One PORV with a lift setting within the limits specified in the PTLR and one RHR suction relief valve with a setpoint within specified limits.

b. The RCS depressurized and an RCS vent of ≥ 2.14 square inches (based on an equivalent length of 10 feet of pipe).

APPLICABILITY: MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR,
MODE 5,
MODE 6 when the reactor vessel head is on.

----------NOTE----------
Accumulator isolation is only required when accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS cold leg temperature allowed by the P/T limit curves provided in the PTLR.

ACTIONS

----------NOTE----------
While this LCO is not met, entry into MODE 6 with the reactor vessel head on from MODE 6, and entry into MODE 5 from MODE 6 with the reactor vessel head on is not permitted.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more safety injection pumps capable of injecting into the RCS.	A.1 Render all safety injection pumps incapable of injecting into the RCS.	4 hours
B. An accumulator not isolated when the accumulator pressure is greater than or equal to the maximum RCS pressure for existing cold leg temperature allowed in the PTLR.	B.1 Isolate affected accumulator.	1 hour
C. Required Action and associated Completion Time of Condition B not met.	C.1 Increase RCS cold leg temperature to > the COPS arming temperature specified in the PTLR.	12 hours
	OR	
	C.2 Depressurize affected accumulator to less than the maximum RCS pressure for existing cold leg temperature allowed in the PTLR.	12 hours
D. One required RCS relief valve inoperable in MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR.	D.1 Restore required RCS relief valve to OPERABLE status.	7 days

(continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.12.1	Verify both safety injection pumps are incapable of injecting into the RCS.	12 hours
SR 3.4.12.2	Verify each accumulator is isolated.	12 hours
SR 3.4.12.3	Verify RHR suction valves are open for each required RHR suction relief valve.	72 hours
SR 3.4.12.4	----------NOTE---------- Only required to be performed when complying with LCO 3.4.12.b. ---------- Verify RCS vent size within specified limits.	12 hours for unlocked open vent valve(s) <u>AND</u> 31 days for locked open vent valve(s)

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.12.5	Verify PORV block valve is open for each required PORV.	72 hours
SR 3.4.12.6	----------NOTE---------- Not required to be performed until 12 hours after decreasing RCS cold leg temperature to ≤ the COPS arming temperature specified in the PTLR. ---------- Perform a COT on each required PORV, excluding actuation.	31 days
SR 3.4.12.7	Perform CHANNEL CALIBRATION for each required PORV actuation channel.	18 months

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.2 ECCS - Operating

LCO 3.5.2 Two ECCS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

----------NOTE----------
In MODE 3, either residual heat removal pump to cold legs injection flow path may be isolated by closing the isolation valve to perform pressure isolation valve testing per SR 3.4.14.1.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more trains inoperable. AND At least 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available.	A.1 Restore train(s) to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	6 hours 12 hours

5.6 Reporting Requirements

5.6.5 Core Operating Limits Report (COLR) (continued)

d. The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

5.6.6 Reactor Coolant System (RCS) PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR)

a. RCS pressure and temperature limits for heatup, cooldown, operation, criticality, and hydrostatic testing as well as heatup and cooldown rates shall be established and documented in the PTLR for the following:

LCO 3.4.3 "RCS Pressure and Temperature (P/T) Limits"

b. The power operated relief valve lift settings required to support the Cold Overpressure Protection Systems (COPS) and the COPS arming temperature shall be established and documented in the PTLR for the following:

LCO 3.4.12 "Cold Overpressure Protection Systems"

c. The RCS pressure and temperature limits for Unit 1 shall be those previously reviewed and approved by the NRC in Amendment No. 87 to Facility Operating License NPF-68. The RCS pressure and temperature limits for Unit 2 shall be those previously reviewed and approved by the NRC in Amendment No. 65 to Facility Operating License NPF-81. The acceptability of the P/T and COPS limits are documented in NRC letter "Vogtle Electric Generating Plant, Units 1 and 2 - Acceptance for Referencing of Pressure Temperature Limits Report," February 12, 1996. Specifically, the limits and methodology are described in the following documents:

1. Amendment No. 87 to Facility Operating License No. NPF-68, Vogtle Electric Generating Plant, Unit 1, June 8, 1995.

2. Amendment No. 65 to Facility Operating License No. NPF-81, Vogtle Electric Generating Plant, Unit 2, June 8, 1995.

(continued)

BASES

LCO (continued)

loops and RHR loops. Any one loop in operation provides enough flow to remove the decay heat from the core with forced circulation. An additional loop is required to be OPERABLE to provide redundancy for heat removal.

Note 1 permits all RCPs or RHR pumps to be de-energized for ≤ 1 hour per 8 hour period. The purpose of the Note is to permit tests that are designed to validate various accident analyses values. These tests are initially performed during startup testing. However, if changes are made to the RCS that would cause a change to the flow characteristics of the RCS, the input values must be revalidated by conducting the test again. The 1 hour time period is adequate to perform the necessary testing, and operating experience has shown that boron stratification is not a problem during this short period with no forced flow.

Utilization of Note 1 is permitted provided the following conditions are met along with any other conditions imposed by initial startup test procedures:

a. No operations are permitted that would dilute the RCS boron concentration, therefore maintaining the margin to criticality. Boron reduction is prohibited because a uniform concentration distribution throughout the RCS cannot be ensured when in natural circulation; and

b. Core outlet temperature is maintained at least 10°F below saturation temperature, so that no vapor bubble may form and possibly cause a natural circulation flow obstruction.

Note 2 requires that the secondary side water temperature of each SG be < 50°F above each of the RCS cold leg temperatures before the start of an RCP any time during MODE 4 operation with any RCS cold leg temperature ≤ the Cold Overpressure Protection System (COPS) arming temperature specified in the PTLR. This restraint is to prevent a low temperature overpressure event due to a thermal transient when an RCP is started. The Note further restricts starting an RCP to a range of temperature differentials between the SGs and the RCS that is consistent with analysis assumptions used to demonstrate that the RHR design pressure is not exceeded when the RHR suction isolation valves are open.

(continued)

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.10 Pressurizer Safety Valves

BASES

BACKGROUND

The pressurizer safety valves provide, in conjunction with the Reactor Protection System, overpressure protection for the RCS. The pressurizer safety valves are of the pop type. The valves are spring loaded and self actuated by direct fluid pressure with backpressure compensation. The safety valves are designed to prevent the system pressure from exceeding the system Safety Limit (SL), 2735 psig, which is 110% of the design pressure.

Because the safety valves are self actuating, they are considered independent components. The relief capacity for each valve, 420,000 lb/hr at a pressurizer pressure of 2560 psig, is based on postulated overpressure transient conditions resulting from a complete loss of steam flow to the turbine with the reactor operating at 102 percent of engineered safeguards design power. The relief rate is stated at a pressure of 2560 psig which is equivalent to the former set pressure of 2485 psig plus 3% for set pressure tolerance and valve accumulation. This event results in the maximum surge rate into the pressurizer, which specifies the minimum relief capacity for the safety valves. The decrease in set pressure to 2460 psig and increase in tolerance does not significantly affect the relief capacity of the safety valves.

The discharge flow from the pressurizer safety valves is directed to the pressurizer relief tank. This discharge flow is indicated by an increase in temperature downstream of the pressurizer safety valves or increase in the pressurizer relief tank temperature or level.

Overpressure protection is required in MODES 1, 2, 3, 4, 5, and MODE 6 with the reactor vessel head on; however, in MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR, MODE 5, and MODE 6 with the reactor vessel head on, overpressure protection is provided by operating procedures and by meeting the requirements of LCO 3.4.12, "Cold Temperature Overpressure Protection System (COPS)."

The upper and lower pressure limits are based on the ± 2% tolerance requirement assumed in the safety analyses. The lift setting is for the ambient conditions associated with

(continued)

BASES

BACKGROUND (continued)

MODES 1, 2, 3, and MODE 4 with all RCS cold leg temperatures > the COPS arming temperature specified in the PTLR. This requires either that the valves be set hot or that a correlation between hot and cold settings be established.

The pressurizer safety valves are part of the primary success path and mitigate the effects of postulated accidents. OPERABILITY of the safety valves ensures that the RCS pressure will be limited to 110% of design pressure.

The consequences of exceeding the American Society of Mechanical Engineers (ASME) pressure limit (Ref. 1) could include damage to RCS components, increased leakage, or a requirement to perform additional stress analyses prior to resumption of reactor operation.

APPLICABLE SAFETY ANALYSES

All accident and safety analyses in the FSAR (Ref. 2) that require safety valve actuation assume operation of three pressurizer safety valves to limit increases in RCS pressure. The overpressure protection analysis (Ref. 3) is also based on operation of three safety valves. Accidents that could result in overpressurization if not properly terminated include:

a. Uncontrolled rod withdrawal from full power;

b. Loss of reactor coolant flow;

c. Loss of external electrical load;

d. Loss of normal feedwater;

e. Loss of all AC power to station auxiliaries;

f. Locked rotor; and

g. Feedwater line break.

Detailed analyses of the above transients are contained in Reference 2. Safety valve actuation is required in events c, e, and f (above) to limit the pressure increase. Compliance with this LCO is consistent with the design bases and accident analyses assumptions.

(continued)

BASES (continued)

LCO

Pressurizer safety valves satisfy Criterion 3 of 10 CFR 50.36 (c)(2)(ii).

The three pressurizer safety valves are set to open at an RCS pressure of 2460 psig, and within the specified tolerance, to avoid exceeding the maximum design pressure SL, and to maintain accident analyses assumptions. The upper and lower pressure tolerance limits are based on the ± 2% tolerance requirements assumed in the safety analyses.

The limit protected by this Specification is the reactor coolant pressure boundary (RCPB) SL of 110% of design pressure.

APPLICABILITY

In MODES 1, 2, 3, and MODE 4 with all RCS cold leg temperatures > the COPS arming temperature specified in the PTLR, OPERABILITY of three valves is required because the combined capacity is required to keep reactor coolant pressure below 110% of its design value during certain accidents. MODE 3 is conservatively included, although the listed accidents may not require the safety valves for protection.

The LCO is not applicable in MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR, MODE 5, or MODE 6 (with the reactor vessel head on) because the cold overpressure protection system is in service. Overpressure protection is not required in MODE 6 with reactor vessel head removed.

The Note allows entry into MODE 3 and MODE 4 with all RCS cold leg temperatures > the COPS arming temperature specified in the PTLR with the lift settings outside the LCO limits. This permits testing and examination of the safety valves at high pressure and temperature near their normal operating range, but only after the valves have had a preliminary cold setting. The cold setting gives assurance that the valves are OPERABLE near their design condition. Only one valve at a time will be removed from service for testing. The 54 hour exception is based on 18 hour outage time for each of the three valves. The 18 hour period is derived from operating experience that hot testing can be performed in this timeframe.

(continued)

BASES (continued)

ACTIONS

A.1

With one pressurizer safety valve inoperable, restoration must take place within 15 minutes. The Completion Time of 15 minutes reflects the importance of maintaining the RCS overpressure protection system. An inoperable safety valve coincident with an RCS overpressure event could challenge the integrity of the pressure boundary.

B.1 and B.2

If the Required Action of A.1 cannot be met within the required Completion Time or if two or more pressurizer safety valves are inoperable, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. In MODE 4, with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR, overpressure protection is provided by the cold overpressure protection system. The change from MODE 1, 2, or 3 to MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR, reduces the RCS energy (core power and pressure), lowers the potential for large pressurizer insurges, and thereby removes the need for overpressure protection by three pressurizer safety valves.

SURVEILLANCE REQUIREMENTS

SR 3.4.10.1

SRs are specified in the Inservice Testing Program. Pressurizer safety valves are to be tested in accordance with the requirements of Section XI of the ASME Code (Ref. 4), which provides the activities and Frequencies necessary to satisfy the SRs. No additional requirements are specified. The lift settings shall be ≥ 2410 psig and ≤ 2510 psig. The lift setting pressures shall correspond to ambient conditions of the valves at normal operating temperature and pressure.

(continued)

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.12 Cold Overpressure Protection Systems (COPS)

BASES

BACKGROUND

The COPS controls RCS pressure at low temperatures so the integrity of the reactor coolant pressure boundary (RCPB) is not compromised by violating the pressure and temperature (P/T) limits of 10 CFR 50, Appendix G (Ref. 1). The reactor vessel is the limiting RCPB component for demonstrating such protection. The PTLR provides the maximum allowable actuation logic setpoints for the power operated relief valves (PORVs) and the maximum RCS pressure for the existing RCS cold leg temperature during cooldown, shutdown, and heatup to meet the Reference 1 requirements during the COPS MODES or other specified condition in the COPS Applicability.

The reactor vessel material is less tough at low temperatures than at normal operating temperature. As the vessel neutron exposure accumulates, the material toughness decreases and becomes less resistant to pressure stress at low temperatures (Ref. 2). RCS pressure, therefore, is maintained low at low temperatures and is increased only as temperature is increased.

The potential for vessel overpressurization is most acute when the RCS is water solid, occurring only while shutdown; a pressure fluctuation can occur more quickly than an operator can react to relieve the condition. Exceeding the RCS P/T limits by a significant amount could cause brittle cracking of the reactor vessel. LCO 3.4.3, "RCS Pressure and Temperature (P/T) Limits," requires administrative control of RCS pressure and temperature during heatup and cooldown to prevent exceeding the PTLR limits.

This LCO provides RCS overpressure protection by having a minimum coolant input capability and having adequate pressure relief capacity. Limiting coolant input capability requires both safety injection pumps to be incapable of injection into the RCS and the accumulators to be isolated. The pressure relief capacity requires either two redundant RCS relief valves or a depressurized RCS and an RCS vent of sufficient size. One RCS relief valve or the open RCS vent is the overpressure protection device that acts to terminate an increasing pressure event.

(continued)

BASES

BACKGROUND

PORV Requirements (continued)

When a PORV is opened in an increasing pressure transient, the release of coolant will cause the pressure increase to slow and reverse. As the PORV releases coolant, the RCS pressure decreases until a reset pressure is reached and the valve is signaled to close. The pressure continues to decrease below the reset pressure as the valve closes.

RHR Suction Relief Valve Requirements

During the COPS MODES or other specified condition in the COPS Applicability, the RHR System is operated for decay heat removal and low pressure letdown control. Therefore, the RHR suction isolation valves are open in the piping from the RCS hot legs to the inlets of the RHR pumps. While these valves are open and the RHR suction valves are open, the RHR suction relief valves are exposed to the RCS and are able to relieve pressure transients in the RCS.

The RHR suction isolation valves and the RHR suction valves must be open to make the RHR suction relief valves OPERABLE for RCS overpressure mitigation. The RHR suction relief valves are self-actuated water relief valves with pressure tolerances and accumulation limits established by Section III of the American Society of Mechanical Engineers (ASME) Code (Ref. 3) for Class 2 relief valves.

RCS Vent Requirements

Once the RCS is depressurized, a vent exposed to the containment atmosphere will maintain the RCS at containment ambient pressure in an RCS overpressure transient, if the relieving requirements of the transient do not exceed the capabilities of the vent. Thus, the vent path must be capable of relieving the flow resulting from the limiting COPS mass or heat input transient, and maintaining pressure below the P/T limits. The required vent capacity may be provided by one or more vent paths.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES

Safety analyses (Ref. 4) demonstrate that the reactor vessel is adequately protected against exceeding the Reference 1 P/T limits. In MODES 1, 2, 3, and MODE 4 with all RCS cold leg temperatures > the COPS arming temperature specified in the PTLR, the pressurizer safety valves will prevent RCS pressure from exceeding the Reference 1 limits. In MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR and below, overpressure prevention falls to two OPERABLE RCS relief valves or to a depressurized RCS and a sufficient sized RCS vent. Each of these means has a limited overpressure relief capability.

The actual temperature at which the pressure in the P/T limit curve falls below the pressurizer safety valve setpoint increases as the reactor vessel material toughness decreases due to neutron embrittlement. Each time the PTLR curves are revised, the COPS must be re-evaluated to ensure its functional requirements can still be met using the RCS relief valve method or the depressurized and vented RCS condition.

The PTLR contains the acceptance limits that define the COPS requirements. Any change to the RCS must be evaluated against the Reference 4 analyses to determine the impact of the change on the COPS acceptance limits.

Transients that are capable of overpressurizing the RCS are categorized as either mass or heat input transients, as discussed below.

Mass Input Type Transients

a. Inadvertent safety injection; or

b. Charging/letdown flow mismatch.

Heat Input Type Transients

a. Reactor coolant pump (RCP) startup with temperature asymmetry between the RCS and steam generators.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The following are required during the COPS MODES or other specified condition in the COPS Applicability to ensure that mass and heat input transients do not occur, which either of the COPS overpressure protection means cannot handle:

a. Rendering both safety injection pumps incapable of injection;

b. Deactivating the accumulator discharge isolation valves in their closed positions; and

c. Disallowing the start of an RCP if the secondary temperature is more than 50°F above the RCS cold leg temperature in any one loop. With the RHR suction isolation valves open, this value is reduced to 25°F at an RCS temperature of 350°F and varies linearly to 50°F at an RCS temperature of 200°F for RHR design pressure considerations. LCO 3.4.6, "RCS Loops—MODE 4," and LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled," contain Notes on this limitation that provide this protection.

The Reference 4 analyses demonstrate that either one RCS relief valve or the depressurized RCS and RCS vent can maintain RCS pressure below limits when both centrifugal charging pumps are actuated. Thus, the LCO requires both safety injection pumps to be incapable of injecting into the RCS during the COPS MODES or other specified condition in the COPS Applicability.

Since neither one RCS relief valve nor the RCS vent can handle the pressure transient caused by accumulator injection when RCS temperature is low, the LCO also requires accumulator isolation when accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS cold leg temperature allowed in the PTLR. The isolated accumulators must have their discharge valves closed and the valve power supply breakers fixed in their open positions.

PORV Performance

The fracture mechanics analyses show that the vessel is protected when the PORVs are set to open at or below the limits shown in the PTLR. The setpoints are derived by analyses that model the performance of the COPS, assuming

(continued)

BASES

APPLICABLE SAFETY ANALYSES

PORV Performance (continued)

the mass injection transient of two centrifugal charging pumps and the positive displacement pump injecting into the RCS, and the heat injection transient of starting an RCP with the RCS 50°F colder than the secondary coolant. These analyses consider pressure overshoot and undershoot beyond the PORV opening and closing, resulting from signal processing and valve stroke times. The PORV setpoints at or below the derived limit ensure the Reference 1 P/T limits will be met.

----------NOTE----------
Although the positive displacement pump (PDP) was replaced with the normal charging pump (NCP), the current mass injection transient analysis assumes two centrifugal charging pumps and the positive displacement pump. Westinghouse performed an evaluation of the effect of replacing the PDP with the NCP and obtained acceptable results without reanalysis of the mass injection transient. Reference Westinghouse letter, GP-16838 from J. L. Tain to J. B. Beasley, Jr., dated August 13, 1998, COPS PORV Setpoint for New Charging Pump.

The PORV setpoints in the PTLR will be updated when the revised P/T limits conflict with the COPS analysis limits. The P/T limits are periodically modified as the reactor vessel material toughness decreases due to neutron embrittlement caused by neutron irradiation. Revised limits are determined using neutron fluence projections and the results of examinations of the reactor vessel material irradiation surveillance specimens. The Bases for LCO 3.4.3, "RCS Pressure and Temperature (P/T) Limits," discuss these examinations.

The PORVs are considered active components. Thus, the failure of one PORV is assumed to represent the worst case, single active failure.

RHR Suction Relief Valve Performance

The RHR suction relief valves do not have variable pressure and temperature lift setpoints like the PORVs. Analyses show that one RHR suction relief valve with a setpoint at or between 440 psig and 460 psig (Ref. 9) will pass flow greater than that required for the limiting COPS transient while maintaining RCS pressure less than the P/T limit curve.

(continued)

BASES

APPLICABLE SAFETY ANALYSES

RHR Suction Relief Valve Performance (continued)

As the RCS P/T limits are decreased to reflect the loss of toughness in the reactor vessel materials due to neutron embrittlement, the RHR suction relief valves must be analyzed to still accommodate the design basis transients for COPS.

The RHR suction relief valves are considered active components. Thus, the failure of one valve is assumed to represent the worst case single active failure.

RCS Vent Performance

With the RCS depressurized, analyses show a vent size of 2.14 square inches (based on an equivalent length of 10 feet of pipe, i.e., a vent capable of relieving 685 gpm waterflow at 722 psig) is capable of mitigating the allowed COPS overpressure transient. The capacity of a vent this size is greater than the flow of the limiting transient for the COPS configuration, with both safety injection pumps incapable of injecting into the RCS, maintaining RCS pressure less than the maximum pressure on the P/T limit curve.

The RCS vent size will be re-evaluated for compliance each time the P/T limit curves are revised based on the results of the vessel material surveillance.

The RCS vent is passive and is not subject to active failure.

The COPS satisfies Criterion 2 of 10 CFR 50.36 (c)(2)(ii).

LCO

This LCO requires that the COPS is OPERABLE. The COPS is OPERABLE when the minimum coolant input and pressure relief capabilities are OPERABLE. Violation of this LCO could lead to the loss of low temperature overpressure mitigation and violation of the Reference 1 limits as a result of an operational transient.

To limit the coolant input capability, the LCO requires both safety injection pumps to be incapable of injecting into the RCS and all accumulator discharge isolation valves closed and immobilized when accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS cold leg temperature allowed in the PTLR.

(continued)

BASES

LCO (continued)

The elements of the LCO that provide low temperature overpressure mitigation through pressure relief are:

a. Two RCS relief valves, as follows:

1. Two OPERABLE PORVs; or

A PORV is OPERABLE for the COPS when its block valve is open, its lift setpoint is set to the limit required by the PTLR and testing proves its ability to open at this setpoint, and motive power is available to the two valves and their control circuits. The PORVs (PV-455A and PV-456A) are powered from 125 V MCCs 1/2AD1M and 1/2BD1M, respectively. The PORVs are to be considered OPERABLE whenever these MCCs are available to supply power.

2. Two OPERABLE RHR suction relief valves; or

An RHR suction relief valve is OPERABLE for the COPS when its RHR suction isolation valve and its RHR suction valve are open, its setpoint is at or between 440 psig and 460 psig, and testing has proven its ability to open at this setpoint.

3. One OPERABLE PORV and one OPERABLE RHR suction relief valve; or

b. A depressurized RCS and an RCS vent.

An RCS vent is OPERABLE when open with an area of ≥ 2.14 square inches (based on an equivalent length of 10 feet of pipe, i.e., capable of relieving 685 gpm at 722 psig).

Each of these methods of overpressure prevention is capable of mitigating the limiting COPS transient.

APPLICABILITY

This LCO is applicable in MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR, in MODE 5, and in MODE 6 when the reactor vessel head is on. The pressurizer safety valves provide overpressure protection that meets the Reference 1 P/T limits in MODES 1, 2, 3, and MODE 4 with all RCS cold leg temperatures > the COPS arming temperature specified in the PTLR. When the reactor vessel head is off, overpressurization cannot occur

LCO 3.4.3 provides the operational P/T limits for all MODES. LCO 3.4.10, "Pressurizer Safety Valves," requires the

(continued)

BASES

APPLICABILITY (continued)

OPERABILITY of the pressurizer safety valves that provide overpressure protection during MODES 1, 2, 3, and MODE 4 with all RCS cold leg temperatures > the COPS arming temperature specified in the PTLR.

Low temperature overpressure prevention is most critical during shutdown when the RCS is water solid, and a mass or heat input transient can cause a very rapid increase in RCS pressure when little or no time allows operator action to mitigate the event.

The Applicability is modified by a Note stating that accumulator isolation is only required when the accumulator pressure is more than or at the maximum RCS pressure for the existing temperature, as allowed by the P/T limit curves. This Note permits the accumulator discharge isolation valve Surveillance to be performed only under these pressure and temperature conditions.

ACTIONS

A Note modifies the ACTIONS table. The Note prohibits entry into MODE 6 with the vessel head on from MODE 6 and MODE 5 from MODE 6 with the vessel head on. Entry into MODE 4 from MODE 5 is already prohibited by LCO 3.0.4.

(continued)

BASES

ACTIONS (continued)

A.1

With one or more safety injection pumps capable of injecting into the RCS, RCS overpressurization is possible.

Rendering the safety injection pumps incapable of injecting into the RCS within 4 hours to restore restricted coolant input capability to the RCS reflects the urgency of removing the RCS from this condition.

B.1, C.1, and C.2

An unisolated accumulator requires isolation within 1 hour. This is only required when the accumulator pressure is at or more than the maximum RCS pressure for the existing temperature allowed by the P/T limit curves.

If isolation is needed and cannot be accomplished in 1 hour, Required Action C.1 and Required Action C.2 provide two options, either of which must be performed in the next 12 hours. By increasing the RCS temperature to > the COPS arming temperature specified in the PTLR, an accumulator pressure of 678 psig cannot exceed the COPS limits if the accumulators are fully injected. Depressurizing the accumulators below the COPS limit from the PTLR also gives this protection.

The Completion Times are based on operating experience that these activities can be accomplished in these time periods and that the likelihood that an event requiring COPS during this time is small.

D.1

In MODE 4 with any RCS cold leg temperature ≤ the COPS arming temperature specified in the PTLR, with one required RCS relief valve inoperable, the RCS relief valve must be restored to OPERABLE status within a Completion Time of 7 days. Two RCS relief valves in any combination of the PORVS and the RHR suction relief valves are required to provide low temperature overpressure mitigation while withstanding a single failure of an active component.

The Completion Time considers the facts that only one of the RCS relief valves is required to mitigate an overpressure transient and that the likelihood of an active failure of the remaining valve path during this time period is very low.

(continued)

BASES

ACTIONS (continued)

E.1

The consequences of operational events that will overpressurize the RCS are more severe at lower temperature (Ref. 7). Thus, with one of the two RCS relief valves inoperable in MODE 5 or in MODE 6 with the head on, the Completion Time to restore two valves to OPERABLE status is 24 hours.

The Completion Time represents a reasonable time to investigate and repair several types of relief valve failures without exposure to a lengthy period with only one OPERABLE RCS relief valve to protect against overpressure events.

F.1

The RCS must be depressurized and a vent must be established within 12 hours when:

a. Both required RCS relief valves are inoperable; or

b. A Required Action and associated Completion Time of Condition A, C, D, or E is not met; or

c. The COPS is inoperable for any reason other than Condition A, B, C, D, or E.

The vent must be sized ≥ 2.14 square inches (based on an equivalent length of 10 feet of pipe) to ensure that the flow capacity is greater than that required for the worst case mass input transient reasonable during the applicable COPS MODES or other specified condition in the COPS Applicability. This action is needed to protect the RCPB from a low temperature overpressure event and a possible brittle failure of the reactor vessel.

The Completion Time considers the time required to place the unit in this Condition and the relatively low probability of an overpressure event during this time period due to increased operator awareness of administrative control requirements.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.12.1 and SR 3.4.12.2

To minimize the potential for a low temperature overpressure event by limiting the mass input capability, both safety injection pumps are verified incapable of injecting into the RCS, and the accumulator discharge isolation valves are verified closed and locked out.

The safety injection pumps are rendered incapable of injecting into the RCS through at least two independent means such that a single failure or single action will not result in an injection into the RCS.

The Frequency of 12 hours (for the safety injection pumps and accumulators) is sufficient, considering other indications and alarms available to the operator in the control room, to verify the required status of the equipment.

SR 3.4.12.3

Each required RHR suction relief valve shall be demonstrated OPERABLE by verifying its RHR suction isolation valves are open and by testing it in accordance with the Inservice Testing Program. This Surveillance is only required to be performed if the RHR suction relief valve is being used to meet this LCO. For Train A, the RHR suction relief valve is PSV-8708A and the suction isolation valves are HV-8701A and B. For Train B, the RHR suction relief valve is PSV-8708B and the suction isolation valves are HV-8702A and B.

The RHR suction valves are verified to be opened every 12 hours. The Frequency is considered adequate in view of other administrative controls such as valve status indications available to the operator in the control room that verify the RHR suction isolation valves remain open.

The ASME Code, Section XI (Ref. 8), test per Inservice Testing Program verifies OPERABILITY by proving proper relief valve mechanical motion and by measuring and, if required, adjusting the lift setpoint.

SR 3.4.12.4

The RCS vent of ≥ 2.14 square inches (based on an equivalent length of 10 feet of pipe) is proven OPERABLE by verifying its open condition either:

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.12.4 (continued)

a. Once every 12 hours for a valve that cannot be locked.

b. Once every 31 days for a valve that is locked, sealed, or secured in position. A removed pressurizer safety valve fits this category.

The passive vent arrangement must only be open to be OPERABLE. This Surveillance is required to be performed if the vent is being used to satisfy the pressure relief requirements of the LCO 3.4.12 b.

SR 3.4.12.5

The PORV block valve must be verified open every 72 hours to provide the flow path for each required PORV to perform its function when actuated. The valve must be remotely verified open in the main control room. This Surveillance is performed if the PORV satisfies the LCO.

The block valve is a remotely controlled, motor operated valve. The power to the valve operator is not required to be removed, and the manual operator is not required to be locked in the inactive position. Thus, the block valve can be closed in the event the PORV develops excessive leakage or does not close (sticks open) after relieving an overpressure situation.

The 72 hour Frequency is considered adequate in view of other administrative controls available to the operator in the control room, such as valve position indication, that verify that the PORV block valve remains open.

SR 3.4.12.6

Performance of a COT is required within 12 hours after decreasing RCS temperature to ≤ the COPS arming temperature specified in the PTLR and every 31 days on each required PORV to verify and, as necessary, adjust its lift setpoint. The COT will verify the setpoint is within the allowed maximum limits in the PTLR. PORV actuation could depressurize the RCS and is not required.

A Note has been added indicating that this SR is required to be performed 12 hours after decreasing RCS cold leg temperature to ≤ the COPS arming temperature specified in the PTLR. The 12 hours considers the unlikelihood of a low temperature overpressure event during this time.

(continued)

BASES (continued)

APPLICABILITY

In MODES 1, 2, and 3, the ECCS OPERABILITY requirements for the limiting Design Basis Accident, a large break LOCA, are based on full power operation. Although reduced power would not require the same level of performance, the accident analysis does not provide for reduced cooling requirements in the lower MODES. The centrifugal charging pump performance is based on a small break LOCA, which establishes the pump performance curve and has less dependence on power. The SI pump performance requirements are based on a small break LOCA. MODE 2 and MODE 3 requirements are bounded by the MODE 1 analysis.

This LCO is only applicable in MODE 3 and above. Below MODE 3, the SI signal setpoint is manually bypassed by operator control, and system functional requirements are relaxed as described in LCO 3.5.3, "ECCS — Shutdown."

As indicated in the Note, either flow path may be isolated in MODE 3, under controlled conditions, to perform pressure isolation valve testing per SR 3.4.14.1. The flow path is readily restorable from the control room.

In MODES 5 and 6, plant conditions are such that the probability of an event requiring ECCS injection is extremely low. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops — MODE 5, Loops Filled," and LCO 3.4.8, "RCS Loops — MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation — High Water Level," and LCO 3.9.6, "Residual Heat Removal (RHR) and Coolant Circulation — Low Water Level."

(continued)

Southern Nuclear Company

Vogtle Unit 1

Pressure Temperature Limits Report

Revision 3, February 2004

Approved:_____

Table Of Contents

1.0 RCS Pressure Temperature Limits Report (PTLR)

This PTLR for Vogtle Unit 1 has been prepared in accordance with the requirements of Technical Specification (TS) 5.6.6. The TS addressed in this report are listed below:

LCO 3.4.3 RCS Pressure and Temperature (P/T) Limits

LCO 3.4.12 Cold Overpressure Protection Systems (COPS)

Revisions to the PTLR shall be provided to the NRC after issuance.

2.0 RCS Pressure and Temperature (P/T) Limits

The limits for TS 3.4.3 are presented in the subsections which follow and were developed using the NRC approved methodology in WCAP-14040, Revision 4[1] with exception of WCAP-16142-P, Revision 1[2] (Elimination of the Flange Requirement). The operability requirements associated with COPS are specified in LCO 3.4.12 and were determined to adequately protect the RCS against brittle fracture in the event of a cold overpressure transient in accordance with the methodology specified in TS 5.6.6.

2.1 RCS P/T Limits (LCO 3.4.3)

2.1.1 The minimum boltup temperature is 60°F

2.1.2 The RCS temperature rate-of-change limits are:

a. A maximum heatup rate of 100°F in any one hour period.
b. A maximum cooldown rate of 100°F in any one hour period.
c. A maximum temperature change of less than or equal to 10°F in any one hour period during inservice hydrostatic and leak testing operations above the heatup and cooldown limit curves.

2.1.3 The RCS P/T limits for heatup, cooldown, inservice hydrostatic and leak testing, and criticality are specified by Figures 2-1 and 2-2.

3.0 Cold Overpressure Protection Systems (LCO 3.4.12)

The setpoints for the pressurizer Power Operated Relief Valves (PORVs) and arming temperature are presented in the subsections which follow. These setpoints and arming temperature have been developed using the NRC-approved methodology specified in TS 5.6.6.

3.1 Pressurizer PORV Setpoints

The pressurizer PORV setpoints are specified in Figure 3-1 and Table 3-1. The limits for the COPS setpoints are contained in the 36 EFPY steady-state curves (Table 2-2), which are beltline conditions and are not compensated for pressure differences between the pressurizer transmitter and the reactor midplane/beltline or for instrument inaccuracies. The pressure difference between the pressurizer transmitter and the reactor vessel midplane/beltline with four reactor coolant pumps in operation is 74 psi.

Note: These setpoints include an allowance for the 50°F thermal transport effect for heat injection transients. A calculation has been performed to confirm that the setpoints will maintain the system pressure within the established limits when the pressure difference between the pressure transmitter and reactor midplane and maximum temperature/pressure instrument uncertainties are applied to the setpoints.

3.2 Arming Temperature

The arming temperature shall be $\leq$ 220°F.

4.0 Reactor Vessel Material Surveillance Program

The reactor vessel material irradiation surveillance specimens shall be removed and examined to determine changes in material properties. The removal schedule is provided in UFSAR Table 5.3.1-8. The results of these examinations shall be used to update Figures 2-1, 2-2, and 3-1.

The pressure vessel steel surveillance program (WCAP-11011[4]) is in compliance with Appendix H[3] to 10 CFR 50, "Reactor Vessel Material Surveillance Program Requirements." The material test requirements and the acceptance standard utilize the reference nil-ductility temperature RT_{NDT}, which is determined in accordance with ASTM E23 [5]. The empirical relationship between RT_{NDT} and the fracture toughness of the reactor vessel steel is developed in accordance with Code Case N-640[6] of Section XI of the ASME Boiler and Pressure Vessel Code, Appendix G, "Fracture Toughness Criteria for Protection Against Failure"[7]. The surveillance capsule removal schedule meets the requirements of ASTM E185-82[8]. The removal schedule is provided in UFSAR Table 5.3.1-8.

Southern Nuclear Company

Vogtle Unit 2

Pressure Temperature Limits Report

Revision 3, February 2004

Approved:_____

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1.0 RCS Pressure Temperature Limits Report (PTLR)

This PTLR for Vogtle Unit 2 has been prepared in accordance with the requirements of Technical Specification (TS) 5.6.6. The TS addressed in this report are listed below:

LCO 3.4.3 RCS Pressure and Temperature (P/T) Limits

LCO 3.4.12 Cold Overpressure Protection Systems (COPS)

Revisions to the PTLR shall be provided to the NRC after issuance.

2.0 RCS Pressure and Temperature (P/T) Limits (LCO 3.4.3)

The limits for TS 3.4.3 are presented in the subsections which follow and were developed using the NRC approved methodology in WCAP-14040, Revision 4[1] with exception of WCAP-16142-P, Revision 1[2] (elimination of the flange requirement). The operability requirements associated with the COPS are specified in LCO 3.4.12 and were determined to adequately protect the RCS against brittle fracture in the event of a cold overpressure transient in accordance with the methodology specified in TS 5.6.6.

2.1 RCS P/T Limits (LCO 3.4.3)

2.1.1 The minimum boltup temperature is 60°F

2.1.2 The RCS temperature rate-of-change limits are:

a. A maximum heatup rate of 100°F in any one hour period.
b. A maximum cooldown rate of 100°F in any one hour period.
c. A maximum temperature change of less than or equal to 10°F in any one hour period during inservice hydrostatic and leak testing operations above the heatup and cooldown limit curves.

2.1.3 The RCS P/T limits for heatup, cooldown, inservice hydrostatic and leak testing, and criticality are specified by Figures 2-1 and 2-2.

3.0 Cold Overpressure Protection Systems (LCO 3.4.12)

The setpoints for the pressurizer Power Operated Relief Valves (PORVs) and arming temperature are presented in the subsections which follow. These setpoints and arming temperature have been developed using the NRC-approved methodology specified in TS 5.6.6.

3.1 Pressurizer PORV Setpoints

The pressurizer PORV setpoints are specified in Figure 3-1 and Table 3-1. The limits for the COPS setpoints are contained in the 36 EFPY steady-state curves (Table 2-2), which are beltline conditions and are not compensated for pressure differences between the pressurizer transmitter and the reactor midplane/beltline or for instrument inaccuracies. The pressure difference between the pressurizer transmitter and the reactor vessel midplane/beltline with four reactor coolant pumps in operation is 74 psi.

Note: These setpoints include an allowance for the 50°F thermal transport effect for heat injection transients. A calculation has been performed to confirm that the setpoints will maintain the system pressure within the established limits when the pressure difference between the pressure transmitter and reactor midplane and maximum temperature/pressure instrument uncertainties are applied to the setpoints.

3.2 Arming Temperature

The arming temperature shall be ≤ 220°F.

4.0 Reactor Vessel Material Surveillance Program

The reactor vessel material irradiation surveillance specimens shall be removed and examined to determine changes in material properties. The removal schedule is provided in UFSAR Table 5.3.1-9. The results of these examinations shall be used to update Figures 2-1, 2-2, and 3-1.

The pressure vessel steel surveillance program (WCAP-11381[4]) is in compliance with Appendix H[3] to 10 CFR 50, "Reactor Vessel Material Surveillance Program Requirements." The material test requirements and the acceptance standard utilize the reference nil-ductility temperature RT_{NDT}, which is determined in accordance with ASTM E23 [5]. The empirical relationship between RT_{NDT} and the fracture toughness of the reactor vessel steel is developed in accordance with Code Case N-640[6] of Section XI of the ASME Boiler and Pressure Vessel Code, Appendix G, "Fracture Toughness Criteria for Protection Against Failure"[7]. The surveillance capsule removal schedule meets the requirements of ASTM E185-82[8]. The removal schedule is provided in UFSAR Table 5.3.1-9.