ENCLOSURE 2

VOLUME 7

ST. LUCIE PLANT
UNIT 1 AND UNIT 2

IMPROVED TECHNICAL SPECIFICATIONS CONVERSION

ITS SECTION 3.2
POWER DISTRIBUTION LIMITS

Revision 0

LIST OF ATTACHMENTS

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ATTACHMENT 1

ITS 3.2.1, LINEAR HEAT RATE (LHR)

Current Technical Specifications (CTS) Markup and Discussion of Changes (DOCs)

3/4.2 POWER DISTRIBUTION LIMITS

LINEAR HEAT RATE (LHR)

LIMITING CONDITION FOR OPERATION

LCO 3.2.1

3.2.1 The linear heat rate LHR shall not exceed the limits specified in the COLR.

Applicability

APPLICABILITY: MODE 1.

ACTION:

ACTION A

With the linear heat rate [LHR, as determined by the Excore Detector Monitoring system, exceeds the limits as indicated] [LHR, as determined by the Incore Detector Monitoring system,] exceeding its limits, [s the] [specified in the COLR] as indicated by four or more coincident incore channels or by the AXIAL SHAPE INDEX [ASI] outside of the power dependent control limits of [specified in the] COLR Figure 3.2-2, within 15 minutes initiate corrective action to reduce the linear heat rate to within the limits and either: L01

Required Action A.1

a. Restore the linear heat rate [LHR] to within its limits within one hour, or L02

Required Action B.1

b. Be in HOT STANDBY [MODE 2] within the next 6 hours.

SURVEILLANCE REQUIREMENTS

4.2.1.1 The provisions of Specification 4.0.4 are not applicable. M01

SR Note

4.2.1.2 The linear heat rate shall be determined to be within its limits by continuously monitoring the core power distribution with either the excore detector monitoring system or with the incore detector monitoring system. [shall be used to determine LHR]

SR 3.2.1.1 Note

4.2.1.3 Excore Detector Monitoring System – [Only required to be met when] The excore detector monitoring system may [is being] be used for monitoring the linear heat rate by: [to determine LHR.]

a. Verifying in accordance with the Surveillance Frequency Control Program that the full length CEAs are withdrawn to and maintained at or beyond the Long Term Steady State Insertion Limit of Specification 3.1.3.6. See ITS 3.1.6

SR 3.2.1.1

b. Verifying in accordance with the Surveillance Frequency Control Program that the AXIAL SHAPE INDEX [ASI] alarm setpoints are adjusted to within the limits shown on [specified in the] COLR Figure 3.2-2.

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (continued)

c. Verifying that the AXIAL SHAPE INDEX is maintained within the allowable limits of COLR Figure 3.2-2, where 100 percent of maximum allowable power represents the maximum THERMAL POWER allowed by the following expression:

M x N

where:

1. M is the maximum allowable THERMAL POWER level for the existing Reactor Coolant Pump combination.

2. N is the maximum allowable fraction of RATED THERMAL POWER as determined by the F_r^T curve of COLR Figure 3.2-3.

LA01

SR 3.2.1.2 Note 1 and 2 SR 3.2.1.3 Note 1 and 2

is being | 1. Only required to be met when

4.2.1.4 Incore Detector Monitoring System# - The incore detector monitoring system may be used for monitoring the linear heat rate by verifying that the incore detector to determine LHR.

Verify incore detector Local Power Density alarms: | 2. Not required to be performed below 20% RTP. L03

SR 3.2.1.2 a. Are adjusted to satisfy the requirements of the core power distribution map which shall be updated in accordance with the Surveillance Frequency Control Program in MODE 1.

Verify incore detector local power density | s | are

SR 3.2.1.3 b. Have their alarm setpoint adjusted to less than or equal to the limits shown on COLR Figure 3.2-1.

specified in the | in accordance with the Surveillance Frequency Control Program

M02

If the incore system become inoperable, reduce power to M x N within 4 hours and monitor linear heat rate in accordance with Specification 4.2.1.3.

LA01

Pages 3/4 2-4 (Amendment 106), 3/4 2-5 (Amendment 63), and 3/4 2-6 through 3/4 2-8 (Amendment 109) have been deleted from the Technical Specifications. The next page is 3/4 2-9.

A01

A01

3/4.2 POWER DISTRIBUTION LIMITS

3/4 2.1 LINEAR HEAT RATE (LHR)

LIMITING CONDITION FOR OPERATION

LCO 3.2.1 — 3.2.1 The linear heat rate [LHR] shall not exceed the limits specified in the COLR.

Applicability — **APPLICABILITY:** MODE 1.

ACTION:

ACTION A — With the linear heat rate [LHR, as determined by the Excore Detector Monitoring system, exceeds the limits as indicated] [LHR, as determined by the Incore Detector Monitoring system,] exceeding its [s the] limits, [specified in the COLR] as indicated by four or more coincident incore channels or by the AXIAL SHAPE INDEX [ASI] outside of the power dependent control limits of [specified in the] COLR Figure 3.2-2, within 15 minutes initiate corrective action to reduce the linear heat rate to within the limits and either: L01

Required Action A.1 — a. Restore the linear heat rate [LHR] to within its limits within 1 hour, or L02

Required Action B.1 — b. Be in at least HOT STANDBY [MODE 2] within the next 6 hours.

SURVEILLANCE REQUIREMENTS

4.2.1.1 The provisions of Specification 4.0.4 are not applicable. M01

SR Note — 4.2.1.2 The linear heat rate shall be determined to be within its limits by continuously monitoring the core power distribution with either the excore detector monitoring system or with the incore detector monitoring system. [shall be used to determine LHR]

SR 3.2.1.1 Note — 4.2.1.3 Excore Detector Monitoring System – The excore detector monitoring system may be [is being] used for monitoring the linear heat rate by: [to determine LHR.]

a. Verifying in accordance with the Surveillance Frequency Control Program that the full-length CEAs are withdrawn to and maintained at or beyond the Long Term Steady State Insertion Limit of Specification 3.1.3.6. [See ITS 3.1.6]

SR 3.2.1.1 — b. Verifying in accordance with the Surveillance Frequency Control Program that the AXIAL SHAPE INDEX [ASI] alarm setpoints are adjusted to within the limits shown on [specified in the] COLR Figure 3.2-2.

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

~~c. Verifying that the AXIAL SHAPE INDEX is maintained within the allowable limits of COLR Figure 3.2-2, where 100% of maximum allowable power represents the maximum THERMAL POWER allowed by the following expression:~~ LA01

~~**M x N**~~

~~where:~~

~~1. M is the maximum allowable THERMAL POWER level for the existing Reactor Coolant Pump combination.~~

~~2. N is the maximum allowable fraction of RATED THERMAL POWER as determined by the~~ F_r^T ~~curve of COLR Figure 3.2-3.~~

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.2.1.2 Note 1 and 2
SR 3.2.1.3 Note 1 and 2

1. Only required to be met when

~~4.2.1.4 Incore Detector Monitoring System# -~~ The incore detector monitoring system ~~may be~~ is being used ~~for monitoring the linear rate by verifying that the incore detector~~ to determine LHR.

Verify incore detector Local Power Density alarms:

2. Not required to be performed below 20% RTP. L03

SR 3.2.1.2

~~a.~~ ~~Are adjusted to~~ satisfy the requirements of the core power distribution map which shall be updated in accordance with the Surveillance Frequency Control Program in MODE 1.

SR 3.2.1.3

Verify incore detector local power density

~~b.~~ ~~Have their~~ alarm setpoint s are ~~adjusted to~~ less than or equal to the limits ~~shown on~~ specified in the COLR ~~Figure 3.2-1~~ in accordance with the Surveillance Frequency Control Program.

M02

~~# If incore system becomes inoperable, reduce power to M x N within 4 hours and monitor linear heat rate in accordance with Specification 4.2.1.3.~~ LA01

Pages 3/4 2-4 (Amendment 42), 3/4 2-5 (Amendment 8), and 3/4 2-6 (Amendment 17) have been deleted from the Technical Specifications. The next page is 3/4 2-7. A01

POWER DISTRIBUTION LIMITS

A01

DELETED

A01

POWER DISTRIBUTION LIMITS A01

DELETED A01

DISCUSSION OF CHANGES
ITS 3.2.1, LINEAR HEAT RATE (LHR)

ADMINISTRATIVE CHANGES

A01 In the conversion of the St. Lucie Plant (PSL) Unit 1 and Unit 2, Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1432, Rev. 5.0, "Standard Technical Specifications-Combustion Engineering Plants" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

MORE RESTRICTIVE CHANGES

M01 CTS 4.2.1.1 states that the provisions of Specification 4.0.4 are not applicable, and thereby provides an allowance for entering the next higher MODE of Applicability when the Surveillance is not met. ITS 3.2.1 does not provide a Surveillance Note that states that the provisions of LCO 4.0.4 are not applicable. LCO 4.0.4 states that entry into a MODE or other specified condition in the Applicability of a Limiting Condition for Operation (LCO) shall only be made when the LCO's Surveillances have been met within their specified Frequency, except as provided by Surveillance Requirement 4.0.3. LCO 4.0.3 provides the provisions for a missed surveillance and does not apply to a surveillance known to not be met within its specified Frequency prior to entering the Mode of Applicability.

The purpose of CTS 4.2.2.1 is to provide an allowance for entering the MODE of applicability when any Surveillance is not met. This change is designated as more restrictive because the CTS 4.0.4 MODE change allowance is deleted and entry into MODE 1 shall only be made when the LCO's surveillances have been met within their specified Frequency. This changes CTS by allowing entry into the MODE of Applicability by only deferring the performance of the Surveillance Requirements instead of deferring compliance with the LCO.

ITS SR 3.2.1.2 and SR 3.2.1.3 each contain a note that states "Not required to be performed below 20% RTP. ITS SR 3.2.1.2 and SR 3.2.1.3 Surveillance Requirements Note will provide an allowance whereby, Surveillance performance is not required prior to entering MODE 1. This allows establishing the conditions at which the Surveillances can be performed. See DOC L03 discussion of change for ITS SR 3.2.1.2 Note and SR 3.2.1.3 Note.

M02 CTS 4.2.1.4.b does not explicitly state how often the incore detector low power density alarm setpoint is adjusted to less than or equal to the limits shown on COLR Figure 3.2.1. CTS 4.2.1.4.b is changed to include a Surveillance Frequency in accordance with the Surveillance Frequency Control Program (SFCP) consistent with the Frequency to update the core distribution map as specified in CTS 4.2.1.4.a. The Frequency of ITS 3.2.1.3 is "in accordance with the Surveillance Frequency Control Program."

PSL controls periodic Frequencies for Surveillances in accordance with the Surveillance Frequency Control Program (SFCP) per CTS 6.8.4.o (Unit 1) and CTS 6.8.4.q (Unit 2). Performance of SR 3.2.1.3 (CTS 4.2.1.4.b) verifies, in part, that the Incore Detector Monitoring System can accurately monitor LHR and is performed following the update of the core flux map, which is performed at a frequency specified in the SFCP. The change to the Frequency of CTS 4.2.1.4.a is discussed in FPL (PSL Unit 1 and Unit 2) “Application for Technical Specification Change Regarding Risk-Informed Justifications for the Relocation of Specific Surveillance Frequency Requirements to a Licensee Controlled Program” (ADAMS Accession No. ML14070A087). The NRC issued Amendment No. 223 to Renewed Facility Operating License No. DPR-67 and Amendment No. 173 to Renewed Facility Operating License No. NPF-16 for the St. Lucie Plant, Unit Nos. 1 and 2 (St. Lucie 1 and 2), respectively (ADAMS Accession No. ML15127A066). The initial frequency established in accordance with the SFCP will be 31 days consistent with the frequency established for ISTS SR 3.2.1.3 and considers the historical testing frequency of the reactor monitoring system.

This change is designated as more restrictive because a Surveillance Frequency has been added to ensure the incore detector local power density alarm setpoints are periodically verified to be within the limits of the COLR.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

LA01 *(Type 4 – Removal of LCO, SR, or other TS Requirement to the TRM, UFSAR, ODCM, QAP, CLRT Program, IST Program, ISI Program, or Surveillance Frequency Control Program)*

CTS 4.2.1.4 footnote # states that if the incore detector monitoring system becomes inoperable, reduce power to M x N within 4 hours and monitor linear heat rate in accordance with Specification 4.2.1.3. CTS 4.2.1.3.c provides the determination of M x N and directs which figures in the COLR to use for LHR verifications using the excore detection system. ITS 3.2.1 does not include this requirement. This changes the CTS by relocating the action to take when the incore detector monitoring system is inoperable to the Technical Requirements Manual (TRM).

The incore detector monitoring system monitors LHR. However, there are no requirements in CTS for this indication-only instrumentation system to be OPERABLE. Therefore, it is unnecessary to provide actions in the Technical Specifications that must be performed when this non-TS system is not functional. The removal of action requirements for indication-only instrumentation and alarms from the Technical Specifications is acceptable because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The requirement to determine LHR and actions to perform when LHR is not within limits remains in the ITS. Either the incore detector monitoring system or the excore detector monitoring system is used to monitor LHR.

Normally, LHR is verified using the incore detector local power density alarm. The setpoint is maintained less than or equal to the COLR Figure 3.2-1 limits. When the incore detector monitoring system is discovered to be non-functional, the ASI alarm associated with the excore detector monitoring system is used to determine LHR. The ASI alarm setpoint is maintained within the COLR Figure 3.2-2 limits. A power reduction may be required to adjust the ASI alarm setpoint to correspond to the COLR figure limits, however, a power reduction may not be necessary based on plant conditions. If a power reduction is necessary to adjust the ASI alarm setpoints to within COLR limits, the power reduction is accomplished using normal plant operating procedures.

This change is acceptable because inoperability of the incore detector monitoring system alone does not indicate that LHR has exceeded the limit and the removed information will be adequately controlled in the TRM. The TRM is incorporated by reference into the UFSAR and any changes to the TRM are made under 10 CFR 50.59, thereby ensuring changes are properly evaluated. This change is designated as a less restrictive removal of detail change because action requirements for non-TS indication-only instrumentation and alarms is being removed from the Technical Specifications.

LESS RESTRICTIVE CHANGES

L01 *(Category 3 – Relaxation of Completion Time)* CTS 3.2.1 Action states that within 15 minutes initiate corrective action to reduce the linear heat rate (LHR) to within limits. ITS 3.2.1 Required Action A.1 and associated Completion Time states that LHR be restored to within limits with a Completion Time of 1 hour. This changes the CTS by not requiring that within 15 minutes corrective action be taken to reduce the LHR to within limits, rather only requiring that the LHR be restored to within limits within 1 hour, consistent with the ITS 3.2.1 Completion Time. Requiring corrective action be taken within 15 minutes does not necessarily restore LHR within limits within 1 hour.

The purpose of CTS 3.2.1 is to maintain LHR within the limits specified in the COLR. When the LCO is not met, both CTS 3.2.1 and ITS 3.2.1 require that the LHR be restored to within limits within 1 hour. With the LHR exceeding its limit, fuel damage could occur following an accident. In this Condition, prompt action must be taken to restore the LHR to within the specified limits. One hour to restore the LHR to within its specified limits is reasonable and ensures that the core does not continue to operate in this Condition. The 1 hour Completion Time also allows the operator sufficient time for evaluating core conditions and for initiating proper corrective actions. This change is acceptable because the CTS 3.2.1 Completion Time and ITS 3.2.1 Completion Time are both 1 hour.

This change is designated as less restrictive because the CTS requirement to within 15 minutes initiate corrective action to reduce the linear heat rate (LHR) to within limits is deleted.

L02 *(Category 4 – Relaxation of Required Action)* CTS 3.2.1 Action b. states that with the linear heat rate (LHR) not within limits within 1 hour, to be in HOT STANDBY within the next 6 hours. ITS 3.2.1 Action B states that with the LHR not within limits within 1 hour, then be in MODE 2 with a Completion Time of 6 hours. This changes the CTS by only requiring entry into MODE 2 within 6 hours. Once in MODE 2, LCO 3.0.2 allows the LCO to be exited since the Applicability is MODE 1, and completing the Required Actions is not required when an LCO is met or is no longer applicable, unless otherwise stated in the individual Specifications.

The purpose of CTS 3.2.1 Action b. and ITS 3.2.1 Action B is to reduce THERMAL POWER. Exiting the Mode of Applicability provides reasonable assurance that the core is operating within its thermal limits and places the core in a conservative condition. This change is acceptable because the Required Actions are used to establish remedial measures that must be taken in response to the degraded conditions in order to minimize risk associated with continued operation while providing time to repair inoperable features. The Required Actions are consistent with safe operation under the specified Condition, considering the OPERABLE status of the redundant systems or features. This includes the capacity and capability of remaining systems or features, a reasonable time for repairs or replacement, and the low probability of a DBA occurring during the repair period.

This change is designated as less restrictive because less stringent Required Actions are being applied in the ITS than were applied in the CTS.

L03 *(Category 7 – Relaxation Of Surveillance Frequency)* CTS 4.2.1.1 states that the provisions of Specification 4.0.4 are not applicable, and thereby provides an allowance for entering the next higher MODE of Applicability when the Surveillance is not met. ITS 3.2.1 does not provide a Surveillance Note that states that the provisions of LCO 4.0.4 are not applicable. See DOC M01. ITS SR 3.2.1.2 and SR 3.2.1.3 each contain a note that states “Not required to be performed below 20% RTP.” ITS SR 3.2.1.2 and SR 3.2.1.3 Surveillance Requirements Note will provide an allowance whereby, Surveillance performance is not required prior to entering MODE 1. This allows establishing the conditions at which the Surveillances can be performed. CTS 4.0.1. states that Surveillance Requirements shall be applicable during the OPERATIONAL MODES or other conditions specified for individual LCOs unless otherwise stated in an individual Surveillance Requirement. Similarly, ITS SR 3.0.1 states that SRs shall be met during the MODES or other specified conditions in the Applicability for individual LCOs, unless otherwise stated in the SR. This changes the CTS by providing a Surveillance Note which states “Not required to be performed below 20% RTP.”

The purpose of CTS 4.2.1.1 is to provide a note that states that the provisions of Specification 4.0.4 are not applicable, and thereby provides an allowance for entering the next higher MODE of Applicability when the Surveillance is not met. ITS 3.2.1 does not provide a Surveillance Note that states that the provisions of LCO 4.0.4 are not applicable.

This change is acceptable because the note added to ITS SR 3.2.1.2 and SR 3.2.1.3 will provide an allowance whereby, Surveillance performance is not met prior to entering MODE 1. This allows establishing the conditions at which the Surveillances can be performed. This change is designated as less restrictive because Surveillances will be performed after entering MODE 1 rather than being performed prior to entry into MODE 1.

Improved Standard Technical Specifications (ISTS) Markup and Justification for Deviations (JFDs)

3.2 POWER DISTRIBUTION LIMITS ~~(Analog)~~

4

LCO 3.2.1 3.2.1 Linear Heat Rate (LHR) ~~(Analog)~~

LCO 3.2.1 LCO 3.2.1 LHR shall not exceed the limits specified in the COLR.

Applicability APPLICABILITY: MODE 1.

ACTIONS

	CONDITION	REQUIRED ACTION	COMPLETION TIME
ACTION A	A. LHR, as determined by the Incore Detector Monitoring System, exceeds the limits specified in the COLR, as indicated by four or more coincident incore channels. <u>OR</u> LHR, as determined by the Excore Detector Monitoring System, exceeds the limits as indicated by the ASI outside the power dependent control limits specified in the COLR.	A.1 Restore LHR to within limits.	1 hour
ACTION B	B. Required Action and associated Completion Time not met.	B.1 Be in MODE 2.	6 hours

SURVEILLANCE REQUIREMENTS

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

SR 4.2.1.2 Either the Excore Detector Monitoring System or the Incore Detector Monitoring System shall be used to determine LHR.

SURVEILLANCE		FREQUENCY
SR 4.2.1.3 SR 3.2.1.1	---------------NOTE--------------- Only required to be met when the Excore Detector Monitoring System is being used to determine LHR. ------------------------------------	
SR 4.2.1.3.b	Verify ASI alarm setpoints are within the limits specified in the COLR.	[31 days OR 2 In accordance with the Surveillance Frequency Control Program] 2
SR 4.2.1.4.a SR 3.2.1.2	---------------NOTES--------------- 1. Only required to be met when the Incore Detector Monitoring System is being used to determine LHR. 2. Not required to be performed below 20% RTP. ------------------------------------	
	Verify incore detector local power density alarms satisfy the requirements of the core power distribution map, which shall be updated at least once per 31 days of accumulated operation in MODE 1.	[31 days 2 OR 3 In accordance with the Surveillance Frequency Control Program]

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 4.2.1.4.b — SR 3.2.1.3	------------------------------NOTES------------------------------ 1. Only required to be met when the Incore Detector Monitoring System is being used to determine LHR. 2. Not required to be performed below 20% RTP. --- Verify incore detector local power density alarm setpoints are less than or equal to the limits specified in the COLR.	[31 days OR In accordance with the Surveillance Frequency Control Program] 2

3.2 POWER DISTRIBUTION LIMITS ~~(Analog)~~ 4

LCO 3.2.1 **3.2.1 Linear Heat Rate (LHR) ~~(Analog)~~**

LCO 3.2.1 LCO 3.2.1 LHR shall not exceed the limits specified in the COLR.

Applicability APPLICABILITY: MODE 1.

ACTIONS

	CONDITION	REQUIRED ACTION	COMPLETION TIME
ACTION A	A. LHR, as determined by the Incore Detector Monitoring System, exceeds the limits specified in the COLR, as indicated by four or more coincident incore channels. OR LHR, as determined by the Excore Detector Monitoring System, exceeds the limits as indicated by the ASI outside the power dependent control limits specified in the COLR.	A.1 Restore LHR to within limits.	1 hour
ACTION B	B. Required Action and associated Completion Time not met.	B.1 Be in MODE 2.	6 hours

SURVEILLANCE REQUIREMENTS

-----NOTE-----
SR 4.2.1.2 Either the Excore Detector Monitoring System or the Incore Detector Monitoring System shall be used to determine LHR.

	SURVEILLANCE		FREQUENCY
SR 4.2.1.3	SR 3.2.1.1	-----NOTE----- Only required to be met when the Excore Detector Monitoring System is being used to determine LHR. -----	
SR 4.2.1.3.b		Verify ASI alarm setpoints are within the limits specified in the COLR.	[31 days OR 2 In accordance with the Surveillance Frequency Control Program] 2
SR 4.2.1.4.a	SR 3.2.1.2	-----NOTES----- 1. Only required to be met when the Incore Detector Monitoring System is being used to determine LHR. 2. Not required to be performed below 20% RTP. ----- Verify incore detector local power density alarms satisfy the requirements of the core power distribution map, which shall be updated at least once per 31 days of accumulated operation in MODE 1.	[31 days 2 OR 3 In accordance with the Surveillance Frequency Control Program]

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 4.2.1.4.b SR 3.2.1.3	------------------------------NOTES---------------------------- 1. Only required to be met when the Incore Detector Monitoring System is being used to determine LHR. 2. Not required to be performed below 20% RTP. --- Verify incore detector local power density alarm setpoints are less than or equal to the limits specified in the COLR.	[31 days OR In accordance with the Surveillance Frequency Control Program] 2

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.1, LINEAR HEAT RATE (LHR)

1. Changes are made (additions, deletions, and/or changes) to the ISTS that reflect the plant specific nomenclature, number, reference, system description, analysis, licensing basis, or licensing basis description.

2. The ISTS contains bracketed information and/or values that are generic to all Combustion Engineering vintage plants. The brackets are removed, and the proper plant specific information/value is provided. This is acceptable since the information/value is changed to reflect the current licensing basis.

3. The ISTS SR 3.2.1.2 statement “which shall be updated at least once per 31 days of accumulated operation in MODE 1” is deleted. ITS SR 3.2.1.2, including update of the core power distribution map, is in accordance with the Surveillance Frequency Control Program (SFCP). The SFCP Frequency is at least once per 31 days.

4. The type of plant (Analog) is deleted since it is unnecessary. This information is provided in NUREG-1432, Rev. 5.0, to assist in identifying the appropriate Specification to be used as a model for the plant specific ITS conversion but serves no purpose in a plant specific implementation.

Improved Standard Technical Specifications (ISTS) Bases Markup and Justification for Deviations (JFDs)

B 3.2 POWER DISTRIBUTION LIMITS (Analog) 5

B 3.2.1 Linear Heat Rate (LHR) (Analog)

BASES

(Linear Heat Rate (LHR))

BACKGROUND

The purpose of this LCO is to limit the core power distribution to the initial values assumed in the accident analyses. Operation within the limits imposed by this LCO either limits or prevents potential fuel cladding failures that could breach the primary fission product barrier and release fission products to the reactor coolant in the event of a loss of coolant accident (LOCA), loss of flow accident, ejected control element assembly (CEA) accident, or other postulated accident requiring termination by a Reactor Protection System trip function. This LCO limits the amount of damage to the fuel cladding during an accident by ensuring that the plant is operating within acceptable bounding conditions at the onset of a transient. 1

Methods of controlling the power distribution include:

a. Using CEAs to alter the axial power distribution,

b. Decreasing CEA insertion by boration, thereby improving the radial power distribution, and

c. Correcting off optimum conditions (e.g., a CEA drop or misoperation of the unit) that cause margin degradations.

The core power distribution is controlled so that, in conjunction with other core operating parameters (e.g., CEA insertion and alignment limits), the power distribution does not result in violation of satisfies this LCO. The limiting safety system settings and this LCO are based on the accident analyses (Refs. 1 and 2), so that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences (AOOs), and the limits of acceptable consequences are not exceeded for other postulated accidents. 1

Limiting power distribution skewing over time also minimizes the xenon distribution skewing, which is a significant factor in controlling the axial power distribution.

Power distribution is a product of multiple parameters, various combinations of which may produce acceptable power distributions. Operation within the design limits of power distribution is accomplished by generating operating limits on linear heat rate (LHR) and departure from nucleate boiling (DNB).

BASES

BACKGROUND (continued)

AZIMUTHAL POWER TILT ( ) AXIAL SHAPE INDEX ( )

The limits on LHR, ~~Total Planar Radial Peaking Factor (F^T_{XY}),~~ Total Integrated Radial Peaking Factor (F^T_r), T_q, and ASI represent limits within which the LHR algorithms are valid. These limits are obtained directly from the core reload analysis. 4 1

Either of the two core power distribution monitoring systems, the Excore Detector Monitoring System or the Incore Detector Monitoring System, provides adequate monitoring of the core power distribution and is capable of verifying that the LHR is within its limits. The Excore Detector Monitoring System performs this function by continuously monitoring ASI with the OPERABLE quadrant symmetric excore neutron flux detectors and verifying that the ASI is maintained within the allowable limits specified in the COLR.

In conjunction with the use of the Excore Detector Monitoring System and in establishing ASI limits, the following ~~assumptions~~ conditions are ~~made~~ assumed: 1

a. The CEA insertion limits of LCO 3.1.5, "Shutdown CEA Insertion Limits," and LCO 3.1.6, "Regulating CEA Insertion Limits," are satisfied,

b. The T_q restrictions of LCO 3.2.~~4~~ 3 are satisfied, and 4

c. ~~F^T_{xy}~~ F^T_r is within the limits of LCO 3.2.2. 4

The Incore Detector Monitoring System continuously provides a more direct measure of the peaking factors, and the alarms ~~that have been~~ established for the individual incore detector segments~~,~~ ensuring that the peak LHRs are maintained within the limits specified in the COLR. The setpoints for these alarms include tolerances ~~, set in conservative directions, for:~~ described in Reference 3. 1 3

~~a. A measurement calculational uncertainty factor of 1.062,~~

~~b. An engineering uncertainty factor of 1.03,~~

~~c. An allowance of 1.002 for axial fuel densification and thermal expansion, and~~

~~d. A THERMAL POWER measurement uncertainty factor of 1.02.~~

 5

BASES

APPLICABLE SAFETY ANALYSES

The fuel cladding must not sustain damage as a result of normal operation (Condition 1) and AOOs (Condition 2) (Ref. 3, GDC 10). The power distribution and CEA insertion and alignment LCOs preclude core power distributions that violate the following fuel design criteria: 4 1

a. During a LOCA, peak cladding temperature must not exceed 2200°F (Ref. 4), 5 1

b. During a loss of flow accident, there must be at least 95% probability at the 95% confidence level (the 95/95 DNB criterion) that the hot fuel rod in the core does not experience a DNB condition (Ref. 3, GDC 10), 4 1

c. During an ejected CEA accident, the fission energy input to the fuel must not exceed 280 cal/gm (Ref. [ ]), and 3 2 2

d. The control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck fully withdrawn (Ref. 3, GDC 26). 4 1

The power density at any point in the core must be limited to maintain the fuel design criteria (Ref. 4). This is accomplished by maintaining the power distribution and reactor coolant conditions so that the peak LHR and DNB parameters are within operating limits supported by accident analyses (Ref. 1), with due regard for the correlations between measured quantities, the power distribution, and uncertainties in determining the power distribution. 5 1

Fuel cladding failure during a LOCA is limited by restricting the maximum linear heat generation rate so that the peak cladding temperature does not exceed 2200°F (Ref. 4). High peak cladding temperatures are assumed to cause severe cladding failure by oxidation due to a Zircaloy water reaction. 5 1

The LCOs governing LHR, ASI, and the Reactor Coolant System ensure that these criteria are met as long as the core is operated within the ASI, F^T_{XY}, and F^T_r, and T_q limits specified in the COLR, and within the T_q limits. The latter are process variables that characterize the three dimensional power distribution of the reactor core. Operation within the limits for these variables ensures that their actual values are within the ranges used in the accident analyses. 1 4

 1

BASES

APPLICABLE SAFETY ANALYSES (continued)

reactor

Fuel cladding damage does not normally occur while the unit is operating at conditions outside the limits of these LCOs during normal operation. Fuel cladding damage could result, however, if an accident or AOO occurs from initial conditions outside the limits of these LCOs. The This potential for fuel cladding damage exists because changes in the power distribution can cause increased power peaking and can correspondingly increase local LHR. 1 1

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

LCO

The power distribution LCO limits are based on correlations between power peaking and certain measured variables used as inputs to the LHR and DNB ratio operating limits. The power distribution LCO limits, except T_q, are provided in the COLR. The limitation on the LHR ensures that, in the event of a LOCA, the peak temperature of the fuel cladding does not exceed 2200°F.

APPLICABILITY

In MODE 1, power distribution must be maintained within the limits assumed in the accident analysis to ensure that fuel damage does not result following an AOO. In other MODES, this LCO does not apply because there is not sufficient THERMAL POWER to require a limit on the core power distribution. 1

ACTIONS

A.1

With the LHR exceeding its limit, excessive fuel damage could occur following an accident. In this Condition, prompt action must be taken to restore the LHR to within the specified limits. One hour to restore the LHR to within its specified limits is reasonable and ensures that the core does not continue to operate in this Condition. The 1 hour Completion Time also allows the operator sufficient time for evaluating core conditions and for initiating proper corrective actions.

B.1

If the LHR cannot be returned to within its specified limits, THERMAL POWER must be reduced. The change to MODE 2 provides reasonable assurance that the core is operating within its thermal limits and places the core in a conservative condition. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 2 from full power MODE 1 conditions in an orderly manner and without challenging plant systems.

5

BASES

SURVEILLANCE REQUIREMENTS

A Note was added to the SRs to require LHR to be determined by either the Excore Detector Monitoring System or the Incore Detector Monitoring System.

SR 3.2.1.1

Performance of this SR verifies that the Excore Detector Monitoring System can accurately monitor the LHR. Therefore, this SR is only applicable when the Excore Detector Monitoring System is being used to determine the LHR. [The 31 day Frequency is appropriate for this SR because it is consistent with the requirements of SR 3.3.1.3 for calibration of the excore detectors using the incore detectors. 2

OR

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

-----------------------------------REVIEWER'S NOTE-----------------------------------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement. 2
---]

The SR is modified by a Note that states that the SR is only required to be met when the Excore Detection Monitoring System is being used to determine LHR. The reason for the Note is that the excore detectors input neutron flux information into the ASI calculation.

SR 3.2.1.2 and SR 3.2.1.3

Continuous monitoring of the LHR is provided by the Incore Detector Monitoring System and the Excore Detector Monitoring System. Either of these two core power distribution monitoring systems provides adequate monitoring of the core power distribution and is capable of verifying that the LHR does not exceed its specified limits.

Performance of these SRs verifies that the Incore Detector Monitoring System can accurately monitor LHR. Therefore, they are only applicable when the Incore Detector Monitoring System is being used to determine the LHR.

1

BASES

SURVEILLANCE REQUIREMENTS (continued)

[A 31 day Frequency is consistent with the historical testing frequency of the reactor monitoring system. 2

OR

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

-----REVIEWER'S NOTE-----
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement. 2
--]

The SRs are modified by two Notes. Note 1 allows the SRs to be met only when the Incore Detector Monitoring System is being used to determine LHR. Note 2 states that the SRs are not required to be performed when THERMAL POWER is < 20% RTP. The accuracy of the neutron flux information from the incore detectors is not reliable at THERMAL POWER < 20% RTP. 6

low power levels . Note 2 allows entry into and operation in MODE 1 prior to performing the SRs in order to establish a power level that provides more accurate neutron flux information . Consistent with the requirements of SR 3.0.1 and SR 3.0.2, as specified in Example 1.4-5 of Section 1.4, "Frequency," the Surveillances must be performed within the Frequency requirements of the Surveillance Frequency Control Program prior to exceeding 20% RTP. 6

REFERENCES

1. U FSAR, Chapter [15]. 2
2. FSAR, Chapter [6]. NUREG 0800, Section 4.2, Appendix B
3. Technical Requirements Manual
3. 4 10 CFR 50, Appendix A.
4. 5 10 CFR 50.46.

B 3.2 POWER DISTRIBUTION LIMITS (Analog) 5

B 3.2.1 Linear Heat Rate (LHR) (Analog)

BASES

(Linear Heat Rate (LHR)) 1

BACKGROUND

The purpose of this LCO is to limit the core power distribution to the initial values assumed in the accident analyses. Operation within the limits imposed by this LCO either limits or prevents potential fuel cladding failures that could breach the primary fission product barrier and release fission products to the reactor coolant in the event of a loss of coolant accident (LOCA), loss of flow accident, ejected control element assembly (CEA) accident, or other postulated accident requiring termination by a Reactor Protection System trip function. This LCO limits the amount of damage to the fuel cladding during an accident by ensuring that the plant is operating within acceptable bounding conditions at the onset of a transient.

Methods of controlling the power distribution include:

a. Using CEAs to alter the axial power distribution,

b. Decreasing CEA insertion by boration, thereby improving the radial power distribution, and

c. Correcting off optimum conditions (e.g., a CEA drop or misoperation of the unit) that cause margin degradations.

The core power distribution is controlled so that, in conjunction with other core operating parameters (e.g., CEA insertion and alignment limits), the power distribution ~~satisfies~~ does not result in violation of this LCO. The limiting safety system settings and this LCO are based on the accident analyses (Ref~~s~~. 1 ~~and 2~~), so that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences (AOOs), and the limits of acceptable consequences are not exceeded for other postulated accidents. 1

Limiting power distribution skewing over time also minimizes the xenon distribution skewing, which is a significant factor in controlling the axial power distribution.

Power distribution is a product of multiple parameters, various combinations of which may produce acceptable power distributions. Operation within the design limits of power distribution is accomplished by generating operating limits on linear heat rate (LHR) and departure from nucleate boiling (DNB).

BASES

BACKGROUND (continued)

The limits on LHR, ~~Total Planar Radial Peaking Factor (F^T_{XY}),~~ Total Integrated Radial Peaking Factor (F^T_r), AZIMUTHAL POWER TILT (T_q), and AXIAL SHAPE INDEX (ASI) represent limits within which the LHR algorithms are valid. These limits are obtained directly from the core reload analysis. 4 1

Either of the two core power distribution monitoring systems, the Excore Detector Monitoring System or the Incore Detector Monitoring System, provides adequate monitoring of the core power distribution and is capable of verifying that the LHR is within its limits. The Excore Detector Monitoring System performs this function by continuously monitoring ASI with the OPERABLE quadrant symmetric excore neutron flux detectors and verifying that the ASI is maintained within the allowable limits specified in the COLR.

In conjunction with the use of the Excore Detector Monitoring System and in establishing ASI limits, the following ~~assumptions~~ conditions are ~~made~~ assumed: 1

a. The CEA insertion limits of LCO 3.1.5, "Shutdown CEA Insertion Limits," and LCO 3.1.6, "Regulating CEA Insertion Limits," are satisfied,

b. The T_q restrictions of LCO 3.2.~~4~~ 3 are satisfied, and 4

c. ~~F^T_{xy}~~ F^T_r is within the limits of LCO 3.2.2. 4

The Incore Detector Monitoring System, continuously provides the more direct measure of the peaking factors and alarms ~~that have been~~ established for the individual incore detector segments~~,~~ ensuring that the peak LHRs are maintained within the limits specified in the COLR. The setpoints for these alarms include tolerances~~, set in conservative directions, for:~~ described in Reference 3. 1 3

~~a. A measurement calculational uncertainty factor of 1.062,~~

~~b. An engineering uncertainty factor of 1.03,~~

~~c. An allowance of 1.002 for axial fuel densification and thermal expansion, and~~

~~d. A THERMAL POWER measurement uncertainty factor of 1.02.~~

BASES

APPLICABLE SAFETY ANALYSES

The fuel cladding must not sustain damage as a result of normal operation (Condition 1) and AOOs (Condition 2) (Ref. 3 4, GDC 10). The power distribution and CEA insertion and alignment LCOs preclude core power distributions that violate the following fuel design criteria: 1

a. During a LOCA, peak cladding temperature must not exceed 2200°F (Ref. 4 5), 1

b. During a loss of flow accident, there must be at least 95% probability at the 95% confidence level (the 95/95 DNB criterion) that the hot fuel rod in the core does not experience a DNB condition (Ref. 3 4, GDC 10), 1

c. During an ejected CEA accident, the fission energy input to the fuel must not exceed 280 3 cal/gm (Ref. [2]), and 2

d. The control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck fully withdrawn (Ref. 3 4, GDC 26). 1

The power density at any point in the core must be limited to maintain the fuel design criteria (Ref. 4 5). This is accomplished by maintaining the power distribution and reactor coolant conditions so that the peak LHR and DNB parameters are within operating limits supported by accident analyses (Ref. 1), with due regard for the correlations between measured quantities, the power distribution, and uncertainties in determining the power distribution. 1

Fuel cladding failure during a LOCA is limited by restricting the maximum linear heat generation rate so that the peak cladding temperature does not exceed 2200°F (Ref. 4 5). High peak cladding temperatures are assumed to cause severe cladding failure by oxidation due to a Zircaloy water reaction. 1

The LCOs governing LHR, ASI, and the Reactor Coolant System ensure that these criteria are met as long as the core is operated within the ASI, and F_{XY}^T, F_r^T, and T_q limits , and within the T_q limits specified in the COLR. The latter are process variables that characterize the three dimensional power distribution of the reactor core. Operation within the limits for these variables ensures that their actual values are within the ranges used in the accident analyses. 1 4

BASES

APPLICABLE SAFETY ANALYSES (continued)

Fuel cladding damage does not normally occur while the ~~unit~~ reactor is operating at conditions outside the limits of these LCOs during normal operation. Fuel cladding damage could result, however, if an accident or AOO occurs from initial conditions outside the limits of these LCOs. ~~The~~ This potential for fuel cladding damage exists because changes in the power distribution can cause increased power peaking and can correspondingly increase local LHR. 1 1

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

LCO

The power distribution LCO limits are based on correlations between power peaking and certain measured variables used as inputs to the LHR and DNB ratio operating limits. The power distribution LCO limits, except T_q, are provided in the COLR. The limitation on the LHR ensures that, in the event of a LOCA, the peak temperature of the fuel cladding does not exceed 2200°F.

APPLICABILITY

In MODE 1, power distribution must be maintained within the limits assumed in the accident analysis to ensure that fuel damage does not result following an AOO. In other MODES, this LCO does not apply because ~~there~~ is not sufficient THERMAL POWER to require a limit on the core power distribution. 1

ACTIONS

A.1

With the LHR exceeding its limit, excessive fuel damage could occur following an accident. In this Condition, prompt action must be taken to restore the LHR to within the specified limits. One hour to restore the LHR to within its specified limits is reasonable and ensures that the core does not continue to operate in this Condition. The 1 hour Completion Time also allows the operator sufficient time for evaluating core conditions and for initiating proper corrective actions.

B.1

If the LHR cannot be returned to within its specified limits, THERMAL POWER must be reduced. The change to MODE 2 provides reasonable assurance that the core is operating within its thermal limits and places the core in a conservative condition. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 2 from full power MODE 1 conditions in an orderly manner and without challenging plant systems.

 5

BASES

SURVEILLANCE REQUIREMENTS

A Note was added to the SRs to require LHR to be determined by either the Excore Detector Monitoring System or the Incore Detector Monitoring System.

SR 3.2.1.1

Performance of this SR verifies that the Excore Detector Monitoring System can accurately monitor the LHR. Therefore, this SR is only applicable when the Excore Detector Monitoring System is being used to determine the LHR. [The 31 day Frequency is appropriate for this SR because it is consistent with the requirements of SR 3.3.1.3 for calibration of the excore detectors using the incore detectors. 2

OR

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

-----------------------------------REVIEWER'S NOTE-----------------------------------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement. 2
---]

The SR is modified by a Note that states that the SR is only required to be met when the Excore Detection Monitoring System is being used to determine LHR. The reason for the Note is that the excore detectors input neutron flux information into the ASI calculation.

SR 3.2.1.2 and SR 3.2.1.3

Continuous monitoring of the LHR is provided by the Incore Detector Monitoring System and the Excore Detector Monitoring System. Either of these two core power distribution monitoring systems provides adequate monitoring of the core power distribution and is capable of verifying that the LHR does not exceed its specified limits.

Performance of these SRs verifies that the Incore Detector Monitoring System can accurately monitor LHR. Therefore, they are only applicable when the Incore Detector Monitoring System is being used to determine the LHR.

BASES

SURVEILLANCE REQUIREMENTS (continued)

[A 31 day Frequency is consistent with the historical testing frequency of the reactor monitoring system. 2

OR

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

-----------------------------------REVIEWER'S NOTE-----------------------------------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement. 2
--]

The SRs are modified by two Notes. Note 1 allows the SRs to be met only when the Incore Detector Monitoring System is being used to determine LHR. Note 2 states that the SRs are not required to be performed when THERMAL POWER is < 20% RTP. The accuracy of the neutron flux information from the incore detectors is not reliable at THERMAL POWER < 20% RTP. 6

low power levels . Note 2 allows entry into and operation in MODE 1 prior to performing the SRs in order to establish a power level that provides more accurate neutron flux information . Consistent with the requirements of SR 3.0.1 and SR 3.0.2, as specified in Example 1.4-5 of Section 1.4, "Frequency," the Surveillances must be performed within the Frequency requirements of the Surveillance Frequency Control Program prior to exceeding 20% RTP. 6

REFERENCES
1. U FSAR, Chapter [15].
2. FSAR, Chapter [6]. NUREG 0800, Section 4.2, Appendix B 2
3. Technical Requirements Manual
3. 4 10 CFR 50, Appendix A.
4. 5 10 CFR 50.46.

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.1, BASES, LINEAR HEAT RATE (LHR)

1. Changes are made (additions, deletions, and/or changes) to the ISTS that reflect the plant specific nomenclature, number, reference, system description, analysis, licensing basis, or licensing basis description.

2. The ISTS contains bracketed information and/or values that are generic to all Combustion Engineering vintage plants. The brackets are removed, and the proper plant specific information/value is provided. This is acceptable since the information/value is changed to reflect the current licensing basis.

3. The ISTS contains tolerances to be applied to the incore detector alarm setpoints. PSL Unit 1 UFSAR, Section 13.8, Licensee-Controlled Technical Specification Requirements, and PSL Unit 2 UFSAR, Section 13.7, Licensee-Controlled Technical Specification Requirements, each contain these tolerances to be applied to the incore detector alarm setpoints. Additionally, these tolerances will be provided in the Technical Requirements Manual. Therefore, the tolerances to be applied to the incore detector alarm setpoints are deleted.

4. The ISTS includes ISTS 3.2.1, Linear Heat Rate (LHR), ISTS 3.2.2, Total Planar Radial Peaking Factor (F_{xy}^T), ISTS 3.2.3, Total Integrated Radial Peaking Factor (F_r^T), ISTS 3.2.4, Azimuthal Power Tilt (T_q), and ISTS 3.2.5, Axial Shape Index (ASI). CTS do not include a Specification for ISTS 3.2.2, Total Planar Radial Peaking Factor (F_{xy}^T). The CTS and ISTS are renumbered. CTS 3.2.3, Total Integrated Radial Peaking Factor (F_r^T), CTS 3.2.4, Azimuthal Power Tilt (T_q), and CTS 3.2.5, Axial Shape Index (ASI), are renumbered as ITS 3.2.2, ITS 3.2.3, and ITS 3.2.4, respectively.

5. The type of plant (Analog) is deleted since it is unnecessary. This information is provided in NUREG-1432, Rev. 5.0, to assist in identifying the appropriate Specification to be used as a model for the plant specific ITS conversion but serves no purpose in a plant specific implementation.

6. Changes made to clarify the SR Frequency and Note 2 consistent with the generic Surveillance requirements specified in ISTS Section 3.0, “LCO and SR Applicability,” as specified in ISTS Section 1.4, “Frequency.”

Specific No Significant Hazards Considerations (NSHCs)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS
ITS 3.2.1, LINEAR HEAT RATE (LHR)

There are no specific No Significant Hazards Considerations for this Specification.

ATTACHMENT 2

ITS 3.2.2, TOTAL INTEGRATED RADIAL PEAKING FACTOR - F_r^T

Current Technical Specifications (CTS) Markup and Discussion of Changes (DOCs)

POWER DISTRIBUTION LIMITS

TOTAL INTEGRATED RADIAL PEAKING FACTOR - F_r^T

LIMITING CONDITION FOR OPERATION

LCO 3.2.2 — 3.2.~~3~~ 2 The calculated value of F_r^T shall be within the limits specified in the COLR.

Applicability — APPLICABILITY: MODE 1~~*~~. A03

ACTION:

ACTION A Note — Required Actions shall be completed if this Condition is entered.

ACTION A — ~~With~~ F_r^T not within limit~~s~~, within 6 hours ~~either~~:

Required Action B.1 — ~~a.~~ Be in ~~at least HOT STANDBY, or~~ MODE 2

Required Action A.1, Required Action A.2 — ~~b.~~ Reduce THERMAL POWER to bring the combination of THERMAL POWER and F_r^T to within ~~the~~ limits ~~of~~ specified in the COLR ~~Figure 3.2-3~~ and withdraw the ~~full length~~ control element assemblies (CEAs) to or beyond the Long Term Steady State Insertion Limits of ~~Specification 3.1.3.6~~ LCO 3.1.6, "Regulating Control Element Assembly (CEA) Insertion Limits," as specified in the COLR. ~~The THERMAL POWER limit determined from COLR Figure 3.2-3 shall then be used to~~ LA01

Required Action A.3 — establish a revised upper THERMAL POWER ~~level~~ limit ~~on~~ as specified in the COLR ~~Figure 3.2-4 (truncate Figure 3.2-4 at the allowable fraction of RATED THERMAL POWER determined by COLR Figure 3.2-3) and subsequent operation shall be maintained within the reduced acceptable operation region of COLR Figure 3.2-4.~~ LA01

L02 L01

SURVEILLANCE REQUIREMENTS

~~4.2.3.1~~ ~~The provisions of Specification 4.0.4 are not applicable.~~ M01

SR 3.2.2.1 Note — ~~4.2.3.2~~ ~~F_r^T shall be calculated by the expression $F_r^T = F_r(1 + T_q)$ when F_r is calculated with a non-full core power distribution analysis code and shall be calculated as $F_r^T = F_r$ when calculations are performed with a full core power distribution analysis code.~~ LA02

SR 3.2.2.1 — Verify the value of F_r^T ~~shall be determined to be within its limit at the following intervals~~.

SR 3.2.2.1 Frequency — a. Prior to operation ~~above 70 percent of RATED THERMAL POWER~~ > 70% RTP after each fuel loading.

SR 3.2.2.1 Frequency — b. In accordance with the Surveillance Frequency Control Program ~~in MODE 1, and~~

~~c. Within four hours if the AZIMUTHAL POWER TILT (T_q) is > 0.03.~~ A02

SR 3.2.2.1 and SR 3.2.2.3 shall be completed each time SR 3.2.2.1 is required. F_r^T shall be determined using the incore detectors to obtain a power distribution map with all CEAs at or above the long term steady state insertion limit as specified in the COLR.

~~* See Special Test Exception 3.10.2~~ A03

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.2.2.2 | Verify the value of | SR 3.2.2.2 and SR 3.2.2.3 | completed | SR 3.2.2.1

SR 3.2.2.1 Note

~~4.2.3.3~~ F_r shall be ~~determined~~ each time ~~a calculation of~~ F_r^T is required ~~by~~ using the incore detectors to obtain a power distribution map with all ~~full length~~ CEAs at or above the Long Term Steady State Insertion Limit ~~for the existing Reactor Coolant Pump combination.~~

F_r^T shall be determined

as specified in the COLR

SR 3.2.2.3 | Verify the value of | SR 3.2.2.2 and SR 3.2.2.3 | completed | SR 3.2.2.1 | required

SR 3.2.2.1 Note

~~4.2.3.4~~ T_q shall be ~~determined~~ each time ~~a calculation of~~ F_r^T is ~~made using a non-full core power distribution analysis code. The value of T_q used to determine F_r^T in this case shall be the measured value of T_q~~.

LA02

SR 3.2.2.2 Frequency
SR 3.2.2.3 Frequency

In accordance with the Frequency requirements of SR 3.2.2.1.

POWER DISTRIBUTION LIMITS

TOTAL INTEGRATED RADIAL PEAKING FACTOR - F_r^T

LIMITING CONDITION FOR OPERATION

LCO 3.2.2 3.2.3 2 The calculated value of F_r^T shall be within the limits specified in COLR.

Applicability APPLICABILITY: MODE 1*. A03

ACTION:

ACTION A Note ← Required Actions shall be completed if this Condition is entered.

ACTION A With F_r^T not within limits, within 6 hours either:

LCO 3.1.6, "Regulating Control Element Assembly (CEA) Insertion Limits," as specified in the COLR L02 L01

Required Action B.1 a. Be in MODE 2 at least HOT STANDBY, or

Required Action A.1 / Required Action A.2 b. Reduce THERMAL POWER to bring the combination of THERMAL POWER and F_r^T to within the limits specified in the of COLR Figure 3.2-3 and withdraw the control element assemblies (full length CEAs) to or beyond the Long Term Steady State Insertion Limits of Specification 3.1.3.6. The THERMAL POWER limit determined from COLR Figure 3.2-3 shall then be used to LA01

Required Action A.3 as specified in the establish a revised upper THERMAL POWER level limit on COLR Figure 3.2-4 (truncate COLR Figure 3.2-4 at the allowable fraction of RATED THERMAL POWER determined by COLR Figure 3.2-3) and subsequent operation shall be maintained within the reduced acceptable operation region of COLR Figure 3.2-4. LA01

SURVEILLANCE REQUIREMENTS

4.2.3.1 The provisions of Specification 4.0.4 are not applicable. M01

SR 3.2.2.1 Note 4.2.3.2 F_r^T shall be calculated by the expression $F_r^T = F_r(1 + T_q)$ when F_r is calculated with a non-full core power distribution analysis code and shall be calculated as $F_r^T = F_r$ when calculations are performed with a full core power distribution analysis code. LA02

SR 3.2.2.1 Verify the value of F_r^T shall be determined to be within its limit at the following intervals:

SR 3.2.2.1 Frequency a. Prior to operation > 70% RTP above 70% of RATED THERMAL POWER after each fuel loading,

SR 3.2.2.1 Frequency b. In accordance with the Surveillance Frequency Control Program in MODE 1, and

c. Within four hours if the AZIMUTHAL POWER TILT (T_q) is > 0.03. A02

SR 3.2.2.1 and SR 3.2.2.3 shall be completed each time SR 3.2.2.1 is required. F^T_r shall be determined using the incore detectors to obtain a power distribution map with all CEAs at or above the long term steady state insertion limit as specified in the COLR.

* See Special Test Exception 3.10.2 A03

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.2.2.2
SR 3.2.2.1 Note
Verify the value of | SR 3.2.2.2 and SR 3.2.2.3 | completed | SR 3.2.2.1
F_r^T shall be determined

4.2.3.3 F_r shall be determined each time a calculation of F_r^T is required by using the incore detectors to obtain a power distribution map with all full length CEAs at or above the Long Term Steady State Insertion Limit for the existing reactor coolant pump combination.

as specified in the COLR

SR 3.2.2.3
SR 3.2.2.1 Note
Verify the value of | SR 3.2.2.2 and SR 3.2.2.3 | completed | SR 3.2.2.1 | required

4.2.3.4 T_q shall be determined each time a calculation of F_r^T is made using a non-full core power distribution analysis code. The value of T_q used to determine F_r^T in this case shall be the measured value of T_q.

LA02

SR 3.2.2.2 Frequency
SR 3.2.2.3 Frequency
In accordance with the Frequency requirements of SR 3.2.2.1.

~~Pages 3/4 2-12 (Amendment 42) has been deleted from the Technical Specifications. The next page is 3/4 2-13.~~ A01

DISCUSSION OF CHANGES
ITS 3.2.2, TOTAL INTEGRATED RADIAL PEAKING FACTOR - F_r^T

ADMINISTRATIVE CHANGES

A01 In the conversion of the St. Lucie Plant (PSL) Unit 1 and Unit 2, Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1432, Rev. 5.0, "Standard Technical Specifications-Combustion Engineering Plants" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A02 CTS 4.2.3.2.c states that CTS 4.2.3.2 be performed within 4 hours if the Azimuthal Power Tilt (Tq) is > 0.03. CTS 3.2.4 Action a. states that with the Tq > 0.03 the F_r^T be verified within limits within 4 hours if the Tq is not restored. CTS 4.2.3.2.c is redundant to CTS 3.2.4 Action a. and is deleted.

This change is designated as an administrative change and is acceptable because the change does not result in technical changes to the CTS.

A03 CTS 3.2.3 Applicability is MODE 1 with a footnote (footnote *) for MODE 1 stating "See Special Test Exception 3.10.2." ITS 3.2.2 does not contain the footnote or a reference to the Special Test Exceptions. This changes the CTS by not including footnote * in the ITS.

The purpose of the footnote references is to alert the user that a Special Test Exception exists that may modify the Applicability of the Specification. It is an ITS convention to not include these types of footnotes or cross-references. This change is designated as administrative as it incorporates an ITS convention with no technical change to the CTS.

MORE RESTRICTIVE CHANGES

M01 CTS 4.2.3.1 states that the provisions of Specification 4.0.4 are not applicable, and thereby provides an allowance for entering the next higher MODE of Applicability when the Surveillance is not met. ITS 3.2.2 does not provide a Surveillance Note that states that the provisions of LCO 4.0.4 are not applicable. LCO 4.0.4 states that entry into a MODE or other specified condition in the Applicability of a Limiting Condition for Operation (LCO) shall only be made when the LCO's Surveillances have been met within their specified Frequency, except as provided by Surveillance Requirement 4.0.3. LCO 4.0.3 provides the provisions for a missed surveillance and does not apply to a surveillance known to not be met within its specified Frequency prior to entering the Mode of Applicability.

The purpose of CTS 4.2.3.1 is to provide an allowance for entering the MODE of applicability when any Surveillance is not met.

This change is designated as more restrictive because the CTS 4.0.4 MODE change allowance is deleted and entry into MODE 1 shall only be made when the LCO's surveillances have been met within their specified Frequency.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

LA01 *(Type 3 – Removing Procedural Details for Meeting TS Requirements)* CTS 3.2.3 Action b. states, in part, establish a revised upper THERMAL POWER level limit, and provides the COLR details used for this determination. ITS 3.2.2 Required Action A.3 states "Establish a revised upper THERMAL POWER limit as specified in the COLR." This changes the CTS by relocating the details for making the revised upper THERMAL POWER limit determination to the COLR.

The removal of these details for performing actions from the Technical Specifications is acceptable because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains the requirement to establish a revised upper THERMAL POWER limit as specified in the COLR. Also, this change is acceptable because these types of procedural details will be adequately controlled in the COLR. Changes to the COLR are made under 10 CFR 50.59 which ensures changes are properly evaluated. This change is designated as a less restrictive removal of detail change because procedural details for meeting Technical Specification requirements are being removed from the Technical Specifications.

LA02 *(Type 3 – Removing Procedural Details for Meeting TS Requirements)* CTS 4.2.3.2 and CTS 4.2.3.4 state details for calculating F_r^T with a non-full core power distribution analysis code and with a full core power distribution analysis code. ITS SR 3.2.2.1 and ITS SR 3.2.2.3 do not provide details for calculating F_r^T. This changes the CTS by relocating the details for calculating F_r^T to the ITS Bases. The ITS still retains the requirement to verify the value of F_r and to verify the value of Tq.

The removal of these details for performing actions from the Technical Specifications is acceptable because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. Also, this change is acceptable because these types of procedural details will be adequately controlled in the ITS Bases. The Bases are controlled by the Technical Specification Bases Control Program in Chapter 5. This program provides for the evaluation of changes to ensure the Bases are properly controlled.

This change is designated as a less restrictive removal of detail change because procedural details for meeting Technical Specification requirements are being removed from the Technical Specifications.

LESS RESTRICTIVE CHANGES

L01 *(Category 4 – Relaxation of Required Action)* CTS 3.2.2 Action a. states that with F_r^T not within limits, within 6 hours be in at least HOT STANDBY within the next 6 hours as an alternative to CTS Action b. ITS 3.2.2 Action B states that with the Required Actions and associated Completion Times (of Condition A) not met, then be in MODE 2 with a Completion Time of 6 hours. This changes the CTS by only requiring that MODE 2 be entered. Once in MODE 2, LCO 3.0.2 allows the LCO to be exited since the Applicability is MODE 1, and completing the Required Actions is not required when an LCO is met or is no longer applicable, unless otherwise stated in the individual Specifications.

The purpose of CTS 3.2.2 Action a. and ITS 3.2.2 Action B is to provide compensatory actions or reduce THERMAL POWER.

The purpose of CTS 3.2.2 Action a. and ITS 3.2.2 Action B is to reduce THERMAL POWER. Exiting the Mode of Applicability provides reasonable assurance that the core is operating within its thermal limits and places the core in a conservative condition. This change is acceptable because the Required Actions are used to establish remedial measures that must be taken in response to the degraded conditions in order to minimize risk associated with continued operation while providing time to repair inoperable features. The Required Actions are consistent with safe operation under the specified Condition, considering the OPERABLE status of the redundant systems or features. This includes the capacity and capability of remaining systems or features, a reasonable time for repairs or replacement, and the low probability of a DBA occurring during the repair period.

This change is designated as less restrictive because less stringent Required Actions are being applied in the ITS than were applied in the CTS.

L02 *(Category 3 – Relaxation of Completion Time)* CTS 3.2.2 Action a. states that with F_r^T not within limits, within 6 hours be in at least HOT STANDBY as an alternative to CTS Action b. ITS 3.2.2 Action B states that with the Required Actions and associated Completion Times (of Condition A) not met, then be in MODE 2 with a Completion Time of 6 hours. The ITS 3.2.2 Completion Time for Required Action A.1, A.2, and A.3 is 6 hours. Therefore, up to 12 hours may be allowed to be in MODE 2. This changes the CTS by allowing 6 hours to restore F_r^T to within limits before requiring that MODE 2 be entered within 6 hours. See DOC L01 for a discussion of change from MODE 3 (CTS) to MODE 2 (ITS).

The purpose of CTS 3.2.2 Action a. and ITS 3.2.2 Action B is to exit the Mode of Applicability should the LCO not be restored or the Required Actions not be completed within the associated Completion Times. A Note modifying ITS 3.2.2 Condition A requires Required Actions A.1, A.2, and A.3 to be completed if the

Condition is entered. This ensures that corrective action is taken prior to unrestricted operation. The limitations on F_r^T provided in the COLR ensure that the assumptions used in the analysis for establishing the ASI, LCO, and LSSS remain valid during operation at the various allowable CEA group insertion limits. If F_r^T exceeds its basic limitation, operation may continue under the additional restrictions imposed by the Required Actions (reducing THERMAL POWER, withdrawing CEAs to or beyond the long term steady state insertion limits of LCO 3.1.6, and establishing a revised upper THERMAL POWER limit) because these additional restrictions provide adequate provisions to ensure the assumptions used in establishing the LHR, LCO, and LSSS remain valid. This change is acceptable because the Required Actions are used to establish remedial measures that must be taken in response to the degraded conditions in order to minimize risk associated with continued operation while providing time to repair inoperable features. The Required Actions are consistent with safe operation under the specified Condition, considering the OPERABLE status of the redundant systems or features. This includes the capacity and capability of remaining systems or features, a reasonable time for repairs or replacement, and the low probability of a DBA occurring during the repair period.

This change is designated as less restrictive because the ITS allows up to 6 hours longer to exit the Mode of Applicability should the LCO not be restored or the Required Actions not be completion within the associated Completion Times.

Improved Standard Technical Specifications (ISTS) Markup and Justification for Deviations (JFDs)

3.2 POWER DISTRIBUTION LIMITS ~~(Analog)~~ 5

3.2.~~3~~ 2 Total Integrated Radial Peaking Factor (F_r^T) ~~(Analog)~~ 4

3.2.3 LCO 3.2.~~3~~ 2 The calculated value of F_r^T shall be within the limits specified in the COLR.

Applicability APPLICABILITY: MODE 1.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
ACTION ACTION b. A. ------------NOTE------------ Required Actions shall be completed if this Condition is entered. --------------------------------- F_r^T not within limit.	A.1 Reduce THERMAL POWER to bring the combination of THERMAL POWER and F_r^T to within limits specified in the COLR.	6 hours
	AND	
	A.2 Withdraw the control element assemblies (CEAs) to or beyond the long term steady state insertion limits of LCO 3.1.6, "Regulating Control Element Assembly (CEA) Insertion Limits," as specified in the COLR.	6 hours
	AND	
	A.3 Establish a revised upper THERMAL POWER limit as specified in the COLR.	6 hours
ACTION a. B. Required Actions and associated Completion Times not met.	B.1 Be in MODE 2.	6 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY	
SR 4.2.3.2 SR 4.2.3.2.a SR 4.2.3.2.b	SR 3.2.~~3~~.1 2 2 2 2 ------------------------------NOTE------------------------------ SR 3.2.~~3~~.2 and SR 3.2.~~3~~.3 shall be completed each time SR 3.2.~~3~~.1 is required. F_r^T shall be determined by using the incore detectors to obtain a power distribution map with all ~~full length~~ CEAs at or above the long term steady state insertion limit as specified in the COLR. -- Verify the value of F_r^T.	Prior to operation > 70% RTP after each fuel loading AND ~~[Each 31 days of accumulated operation in MODE 1~~ ~~OR~~ In accordance with the Surveillance Frequency Control Program ~~]~~	4 3 2
SR 4.2.3.3	SR 3.2.~~3~~.2 2 Verify the value of F_r.	In accordance with the Frequency requirements of SR 3.2.~~3~~.1 2	4
SR 4.2.3.4	SR 3.2.~~3~~.3 2 Verify the value of T_q.	In accordance with the Frequency requirements of SR 3.2.~~3~~.1 2	4

3.2 POWER DISTRIBUTION LIMITS ~~(Analog)~~ 5

3.2.~~3~~ 2 Total Integrated Radial Peaking Factor (F_r^T) ~~(Analog)~~ 4

3.2.3 LCO 3.2.~~3~~ 2 The calculated value of F_r^T shall be within the limits specified in the COLR.

Applicability APPLICABILITY: MODE 1.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
ACTION, ACTION b. A. ------------NOTE------------ Required Actions shall be completed if this Condition is entered. --------------------------------- F_r^T not within limit.	A.1 Reduce THERMAL POWER to bring the combination of THERMAL POWER and F_r^T to within limits specified in the COLR.	6 hours
	<u>AND</u>	
	A.2 Withdraw the control element assemblies (CEAs) to or beyond the long term steady state insertion limits of LCO 3.1.6, "Regulating Control Element Assembly (CEA) Insertion Limits," as specified in the COLR.	6 hours
	<u>AND</u>	
	A.3 Establish a revised upper THERMAL POWER limit as specified in the COLR.	6 hours
ACTION a. B. Required Actions and associated Completion Times not met.	B.1 Be in MODE 2.	6 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE		FREQUENCY
SR 4.2.3.2 SR 4.2.3.2.a SR 4.2.3.2.b	SR 3.2.3.1 (2)	2 2 2 ------------------------------NOTE------------------------------ SR 3.2.3.2 and SR 3.2.3.3 shall be completed each time SR 3.2.3.1 is required. F_r^T shall be determined by using the incore detectors to obtain a power distribution map with all full length CEAs at or above the long term steady state insertion limit as specified in the COLR. --- Verify the value of F_r^T.	Prior to operation > 70% RTP after each fuel loading AND [Each 31 days of accumulated operation in MODE 1 OR In accordance with the Surveillance Frequency Control Program]
SR 4.2.3.3	SR 3.2.3.2 (2)	Verify the value of F_r.	In accordance with the Frequency requirements of SR 3.2.3.1 (2)
SR 4.2.3.4	SR 3.2.3.3 (2)	Verify the value of T_q.	In accordance with the Frequency requirements of SR 3.2.3.1 (2)

4 3 2 4 4

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.2, TOTAL INTEGRATED RADIAL PEAKING FACTOR (F_r^T)

1. Changes are made (additions, deletions, and/or changes) to the ISTS that reflect the plant specific nomenclature, number, reference, system description, analysis, licensing basis, or licensing basis description.

2. The ISTS contains bracketed information and/or values that are generic to all Combustion Engineering vintage plants. The brackets are removed, and the proper plant specific information/value is provided. This is acceptable since the information/value is changed to reflect the current licensing basis.

3. ISTS SR 3.2.2.1 Note, deletes the term “full length” as related to control element assemblies (CEAs). Part length CEAs are not used at PSL Unit 1 and PSL Unit 2.

4. The ISTS includes ISTS 3.2.1, Linear Heat Rate (LHR), ISTS 3.2.2, Total Planar Radial Peaking Factor (F_{xy}^T), ISTS 3.2.3, Total Integrated Radial Peaking Factor (F_r^T), ISTS 3.2.4, Azimuthal Power Tilt (T_q), and ISTS 3.2.5, Axial Shape Index (ASI). CTS do not include a Specification for ISTS 3.2.2, Total Planar Radial Peaking Factor (F_{xy}^T). The CTS and ISTS are renumbered. CTS 3.2.3, Total Integrated Radial Peaking Factor (F_r^T), CTS 3.2.4, Azimuthal Power Tilt (T_q), and CTS 3.2.5, Axial Shape Index (ASI), are renumbered as ITS 3.2.2, ITS 3.2.3, and ITS 3.2.4, respectively.

5. The type of plant (Analog) is deleted since it is unnecessary. This information is provided in NUREG-1432, Rev. 5.0, to assist in identifying the appropriate Specification to be used as a model for the plant specific ITS conversion but serves no purpose in a plant specific implementation.

Improved Standard Technical Specifications (ISTS) Bases Markup and Justification for Deviations (JFDs)

B 3.2 POWER DISTRIBUTION LIMITS (Analog) 5

B 3.2.3 2 Total Integrated Radial Peaking Factor (F^T_{XY} F^T_r) (Analog) 4

BASES

BACKGROUND

The purpose of this LCO (Total Integrated Radial Peaking Factor (F^T_r)) is to limit the core power distribution to the initial values assumed in the accident analyses. Operation within the limits imposed by this LCO either limits or prevents potential fuel cladding failures that could breach the primary fission product barrier and release fission products to the reactor coolant in the event of a loss of coolant accident (LOCA), loss of flow accident, ejected control element assembly (CEA) accident, or other postulated accident requiring termination by a Reactor Protection System trip function. This LCO limits the amount of damage to the fuel cladding during an accident by ensuring that the plant is operating within acceptable bounding conditions at the onset of a transient.

Methods of controlling the power distribution include:

a. The use of CEAs to alter the axial power distribution,

b. Decreasing CEA insertion by boration, thereby improving the radial power distribution, and

c. Correcting off optimum conditions (e.g., a CEA drop or misoperation of the unit) that cause margin degradations.

The core power distribution is controlled so that, in conjunction with other core operating parameters (e.g., CEA insertion and alignment limits), the power distribution does not result in violation of this LCO. The limiting safety system settings (LSSS) and this LCO are based on the accident analyses (Refs. 1 and 2), so that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences (AOOs), and the limits of acceptable consequences are not exceeded for other postulated accidents.

Limiting power distribution skewing over time also minimizes the xenon distribution skewing, which is a significant factor in controlling the axial power distribution.

Power distribution is a product of multiple parameters, various combinations of which may produce acceptable power distributions. Operation within the design limits of power distribution is accomplished by generating operating limits on the linear heat rate (LHR) and departure from nucleate boiling (DNB).

BASES

BACKGROUND (continued)

The limits on LINEAR HEAT RATE (LHR), ~~Total Planar Radial Peaking Factor (F^T_{XY}),~~ F_r^T, AZIMUTHAL POWER TILT (T_q), and AXIAL SHAPE INDEX (ASI) represent limits within which the LHR algorithms are valid. These limits are obtained directly from the core reload analysis. 4 1

Either of the two core power distribution monitoring systems, the Excore Detector Monitoring System or the Incore Detector Monitoring System, provide adequate monitoring of the core power distribution and ~~are~~ is capable of verifying that the LHR does not exceed its limits. The Excore Detector Monitoring System performs this function by continuously monitoring ~~the~~ ASI with the OPERABLE quadrant symmetric excore neutron flux detectors and verifying that the ASI is maintained within the allowable limits specified in the COLR. 1

In conjunction with the use of the Excore Detector Monitoring System and in establishing the ASI limits, the following conditions are assumed:

a. The CEA insertion limits of LCO 3.1.5, "Shutdown CEA Insertion Limits," and LCO 3.1.6, "Regulating CEA Insertion Limits," are satisfied,

b. The T_q restrictions of LCO 3.2.~~4~~ 3 are satisfied, and

c. ~~F^T_{xy}~~ F_r^T does not exceed the limits of LCO 3.2.2. 4

The Incore Detector Monitoring System continuously provides a more direct measure of the peaking factors, and the alarms established for the individual incore detector segments ensure that the peak LHRs are maintained within the limits specified in the COLR. The setpoints for these alarms include tolerances~~, set in conservative directions, for:~~ described in Reference 3. 3

~~a. A measurement calculational uncertainty factor of 1.062,~~

~~b. An engineering uncertainty factor of 1.03,~~

~~c. An allowance of 1.002 for axial fuel densification and thermal expansion, and~~

~~d. A THERMAL POWER measurement uncertainty factor of 1.02~~.

BASES

APPLICABLE SAFETY ANALYSES

The fuel cladding must not sustain damage as a result of normal operation (Condition 1) and AOOs (Condition 2) (Ref. ~~3~~ 4, GDC 10). The power distribution and CEA insertion and alignment LCOs preclude core power distributions that violate the following fuel design criteria: 1

a. During a LOCA, peak cladding temperature must not exceed 2200°F (Ref. ~~4~~ 5), 1

b. During a loss of flow accident, there must be at least 95% probability at the 95% confidence level (the 95/95 DNB criterion) that the hot fuel rod in the core does not experience a DNB condition (Ref. ~~3~~ 4, GDC 10), 1

c. During an ejected CEA accident, the fission energy input to the fuel must not exceed 2~~8~~ 3 0 cal/gm (Ref. ~~[ ]~~ 2), and 2

d. The control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck fully withdrawn (Ref. ~~3~~ 4, GDC 26). 1

The power density at any point in the core must be limited to maintain the fuel design criteria (Ref. ~~4~~ 5). This is accomplished by maintaining the power distribution and reactor coolant conditions so that the peak LHR and DNB parameters are within operating limits supported by the accident analyses (Ref. 1), with due regard for the correlations between measured quantities, the power distribution, and uncertainties in the determination of power distribution. 1

Fuel cladding failure during a LOCA is limited by restricting the maximum linear heat generation rate so that the peak cladding temperature does not exceed 2200°F (Ref. ~~4~~ 5). High peak cladding temperatures are assumed to cause severe cladding failure by oxidation due to a Zircaloy water reaction. 1

The LCOs governing LHR, ASI, and the Reactor Coolant System ensure that these criteria are met as long as the core is operated within the ASI~~,~~ ~~F^T_{XY},~~ and F_r^T limits specified in the COLR, and within the T_q limits. The latter are process variables that characterize the three dimensional power distribution of the reactor core. Operation within the limits for these variables ensures that their actual values are within the range used in the accident analysis. 4

BASES

APPLICABLE SAFETY ANALYSES (continued)

Fuel cladding damage does not normally occur while [the reactor is operating] at conditions outside the limits of these LCOs during normal operation. Fuel cladding damage could result, however, if an accident or AOO occurs from initial conditions outside the limits of these LCOs. This potential for fuel cladding damage exists because changes in the power distribution cause increased power peaking and correspondingly increased local LHR. 1

F_r^T satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The LCO limits for [certain] power distribution are based on correlations between power peaking and measured variables used as inputs to LHR and DNB ratio operating limits. The LCO limits for power distribution, except T_q, are provided in the COLR. The limitation on the LHR ensures that, in the event of a LOCA, the peak temperature of the fuel cladding does not exceed 2200°F. 1

APPLICABILITY

In MODE 1, power distribution must be maintained within the limits assumed in the accident analysis to ensure that fuel damage does not result following an AOO. In other MODES, this LCO does not apply because ~~there~~ [THERMAL POWER] is not sufficient ~~THERMAL POWER~~ to require a limit on the core power distribution. 1

ACTIONS

<u>A.1, A.2, and A.3</u>

A Note modifying Condition A requires Required Actions A.1, A.2, and A.3 to be completed if the Condition is entered. This ensures that corrective action is taken prior to unrestricted operation.

The limitations on F_r^T provided in the COLR ensure that the assumptions used in the analysis for establishing the ASI, LCO, and LSSS remain valid during operation at the various allowable CEA group insertion limits. If F_r^T exceeds its basic limitation, operation may continue under the additional restrictions imposed by the Required Actions (reducing THERMAL POWER, withdrawing CEAs to or beyond the long term steady state insertion limits of LCO 3.1.6, and establishing a revised upper THERMAL POWER limit) because these additional restrictions provide adequate provisions to ensure that the assumptions used in establishing the LHR, LCO, and LSSS remain valid. Six hours to return F_r^T to within its limits by adjusting the ASI limits based on maximum power allowed for [F_r^T] ~~F^T_{XY}~~ is reasonable and ensures that all CEAs meet the long term steady state insertion limits of LCO 3.1.6. 4

BASES

ACTIONS (continued)

B.1

If F_r^T cannot be returned to within its limit, THERMAL POWER must be reduced. A change to MODE 2 provides reasonable assurance that the core is operating within its thermal limits and places the core in a conservative condition. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 2 from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2. ~~3~~.1 2 5

The periodic Surveillance to determine the calculated F_r^T ensures that F_r^T remains within the range assumed in the analysis throughout the fuel cycle. Determining the measured F_r^T once after each fuel loading prior to exceeding 70% RTP ensures that the core is properly loaded.

~~[Performance of the Surveillance every 31 days of accumulated operation in MODE 1 provides reasonable assurance that unacceptable changes in the F_r^T are promptly detected.~~ 2

~~OR~~

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

~~-----------------------------------REVIEWER'S NOTE-----------------------------------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~ 2
~~---]~~

The power distribution map can only be obtained after THERMAL POWER exceeds 20% RTP because the incore detectors are not reliable below 20% RTP.

The SR is modified by a Note that requires SR 3.2.3.2 and SR 3.2.3.3 be completed each time SR 3.2.3.1 is completed. This procedure is required because the values computed by these SRs are required to perform this SR.

F_r^T is calculated by the expression $F_r^T = Fr\,(1 + Tq)$ when Fr is calculated with a non-full core power distribution analysis code and is calculated by the expression $F_r^T = Fr$ when calculations are performed with a full core power distribution analysis code. 6

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.2.3.2 and SR 3.2.3.3 2 2 5

Measuring the values of F_r^X and T_q each time a value of F_r^T is calculated ensures that the calculated value of F_r^T accurately reflects the condition of the core.

The Frequency for these Surveillances is in accordance with the requirements of SR 3.2.3.1 because these SRs provide information to complete SR 3.2.2.1. 2 5

REFERENCES

1. U FSAR, Chapter [15]. 2
2. FSAR, Chapter [6]. NUREG 0800, Section 4.2, Appendix B
3. Technical Requirements Manual
3. 4 10 CFR 50, Appendix A.
4. 5 10 CFR 50.46.

B 3.2 POWER DISTRIBUTION LIMITS ~~(Analog)~~ 5

B 3.2.~~3~~2 Total Integrated Radial Peaking Factor (~~F^T_{XY}~~F^T_r) ~~(Analog)~~ 4

BASES

BACKGROUND

The purpose of this LCO (Total Integrated Radial Peaking Factor (F^T_r)) is to limit the core power distribution to the initial values assumed in the accident analyses. Operation within the limits imposed by this LCO either limits or prevents potential fuel cladding failures that could breach the primary fission product barrier and release fission products to the reactor coolant in the event of a loss of coolant accident (LOCA), loss of flow accident, ejected control element assembly (CEA) accident, or other postulated accident requiring termination by a Reactor Protection System trip function. This LCO limits the amount of damage to the fuel cladding during an accident by ensuring that the plant is operating within acceptable bounding conditions at the onset of a transient.

Methods of controlling the power distribution include:

a. The use of CEAs to alter the axial power distribution,

b. Decreasing CEA insertion by boration, thereby improving the radial power distribution, and

c. Correcting off optimum conditions (e.g., a CEA drop or misoperation of the unit) that cause margin degradations.

The core power distribution is controlled so that, in conjunction with other core operating parameters (e.g., CEA insertion and alignment limits), the power distribution does not result in violation of this LCO. The limiting safety system settings (LSSS) and this LCO are based on the accident analyses (Ref~~s~~. 1 ~~and 2~~), so that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences (AOOs), and the limits of acceptable consequences are not exceeded for other postulated accidents.

Limiting power distribution skewing over time also minimizes the xenon distribution skewing, which is a significant factor in controlling the axial power distribution.

Power distribution is a product of multiple parameters, various combinations of which may produce acceptable power distributions. Operation within the design limits of power distribution is accomplished by generating operating limits on the linear heat rate (LHR) and departure from nucleate boiling (DNB).

BASES

BACKGROUND (continued)

The limits on LINEAR HEAT RATE (LHR), Total Planar Radial Peaking Factor (F_{XY}^T), F_r^T, AZIMUTHAL POWER TILT (T_q), and AXIAL SHAPE INDEX (ASI) represent limits within which the LHR algorithms are valid. These limits are obtained directly from the core reload analysis. 4 1

Either of the two core power distribution monitoring systems, the Excore Detector Monitoring System or the Incore Detector Monitoring System, provide adequate monitoring of the core power distribution and are is capable of verifying that the LHR does not exceed its limits. The Excore Detector Monitoring System performs this function by continuously monitoring the ASI with the OPERABLE quadrant symmetric excore neutron flux detectors and verifying that the ASI is maintained within the allowable limits specified in the COLR. 1

In conjunction with the use of the Excore Detector Monitoring System and in establishing the ASI limits, the following conditions are assumed:

a. The CEA insertion limits of LCO 3.1.5, "Shutdown CEA Insertion Limits," and LCO 3.1.6, "Regulating CEA Insertion Limits," are satisfied,

b. The T_q restrictions of LCO 3.2.4 3 are satisfied, and

c. F_{xy}^T F_r^T does not exceed the limits of LCO 3.2.2. 4

The Incore Detector Monitoring System continuously provides a more direct measure of the peaking factors, and the alarms established for the individual incore detector segments ensure that the peak LHRs are maintained within the limits specified in the COLR. The setpoints for these alarms include tolerances, set in conservative directions, for: described in Reference 3. 3

a. A measurement-calculational uncertainty factor of 1.062,

b. An engineering uncertainty factor of 1.03,

c. An allowance of 1.002 for axial fuel densification and thermal expansion, and

d. A THERMAL POWER measurement uncertainty factor of 1.02.

BASES

APPLICABLE SAFETY ANALYSES

The fuel cladding must not sustain damage as a result of normal operation (Condition 1) and AOOs (Condition 2) (Ref. ~~3~~, GDC 10). The power distribution and CEA insertion and alignment LCOs preclude core power distributions that violate the following fuel design criteria: 4 1

a. During a LOCA, peak cladding temperature must not exceed 2200°F (Ref. 4), 5 1

b. During a loss of flow accident, there must be at least 95% probability at the 95% confidence level (the 95/95 DNB criterion) that the hot fuel rod in the core does not experience a DNB condition (Ref. ~~3~~, GDC 10), 4 1

c. During an ejected CEA accident, the fission energy input to the fuel must not exceed 2~~8~~0 cal/gm (Ref. [ ]), and 3 2 2

d. The control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck fully withdrawn (Ref. ~~3~~, GDC 26). 4 1

The power density at any point in the core must be limited to maintain the fuel design criteria (Ref. 4). This is accomplished by maintaining the power distribution and reactor coolant conditions so that the peak LHR and DNB parameters are within operating limits supported by the accident analyses (Ref. 1), with due regard for the correlations between measured quantities, the power distribution, and uncertainties in the determination of power distribution. 5 1

Fuel cladding failure during a LOCA is limited by restricting the maximum linear heat generation rate so that the peak cladding temperature does not exceed 2200°F (Ref. 4). High peak cladding temperatures are assumed to cause severe cladding failure by oxidation due to a Zircaloy water reaction. 5 1

The LCOs governing LHR, ASI, and the Reactor Coolant System ensure that these criteria are met as long as the core is operated within the ASI~~,~~ ~~F_{XY}^T,~~ and F_r^T limits specified in the COLR, and within the T_q limits. The latter are process variables that characterize the three dimensional power distribution of the reactor core. Operation within the limits for these variables ensures that their actual values are within the range used in the accident analysis. 4

BASES

APPLICABLE SAFETY ANALYSES (continued)

the reactor is operating 1

Fuel cladding damage does not normally occur while at conditions outside the limits of these LCOs during normal operation. Fuel cladding damage could result, however, if an accident or AOO occurs from initial conditions outside the limits of these LCOs. This potential for fuel cladding damage exists because changes in the power distribution cause increased power peaking and correspondingly increased local LHR.

F_r^T satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

certain

The LCO limits for power distribution are based on correlations between power peaking and measured variables used as inputs to LHR and DNB ratio operating limits. The LCO limits for power distribution, except T_q, are provided in the COLR. The limitation on the LHR ensures that, in the event of a LOCA, the peak temperature of the fuel cladding does not exceed 2200°F. 1

APPLICABILITY

In MODE 1, power distribution must be maintained within the limits assumed in the accident analysis to ensure that fuel damage does not result following an AOO. In other MODES, this LCO does not apply because there is not sufficient THERMAL POWER to require a limit on the core power distribution. 1

ACTIONS

A.1, A.2, and A.3

A Note modifying Condition A requires Required Actions A.1, A.2, and A.3 to be completed if the Condition is entered. This ensures that corrective action is taken prior to unrestricted operation.

The limitations on F_r^T provided in the COLR ensure that the assumptions used in the analysis for establishing the ASI, LCO, and LSSS remain valid during operation at the various allowable CEA group insertion limits. If F_r^T exceeds its basic limitation, operation may continue under the additional restrictions imposed by the Required Actions (reducing THERMAL POWER, withdrawing CEAs to or beyond the long term steady state insertion limits of LCO 3.1.6, and establishing a revised upper THERMAL POWER limit) because these additional restrictions provide adequate provisions to ensure that the assumptions used in establishing the LHR, LCO, and LSSS remain valid. Six hours to return F_r^T to within its limits by adjusting the ASI limits based on maximum power allowed for F_r^T F_{XY}^T is reasonable and ensures that all CEAs meet the long term steady state insertion limits of LCO 3.1.6. 4

BASES

ACTIONS (continued)

B.1

If F_r^T cannot be returned to within its limit, THERMAL POWER must be reduced. A change to MODE 2 provides reasonable assurance that the core is operating within its thermal limits and places the core in a conservative condition. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 2 from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2. ~~3~~.1 (2) 5

The periodic Surveillance to determine the calculated F_r^T ensures that F_r^T remains within the range assumed in the analysis throughout the fuel cycle. Determining the measured F_r^T once after each fuel loading prior to exceeding 70% RTP ensures that the core is properly loaded.

~~[Performance of the Surveillance every 31 days of accumulated operation in MODE 1 provides reasonable assurance that unacceptable changes in the F^T_r are promptly detected.~~ 2

~~OR~~

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

~~------------------------------REVIEWER'S NOTE------------------------------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~ 2
~~--]~~

The power distribution map can only be obtained after THERMAL POWER exceeds 20% RTP because the incore detectors are not reliable below 20% RTP.

The SR is modified by a Note that requires SR 3.2.3.2 and SR 3.2.3.3 be completed each time SR 3.2.3.1 is completed. This procedure is required because the values computed by these SRs are required to perform this SR.

F_r^T is calculated by the expression $F_r^T = Fr\,(1 + Tq)$ when Fr is calculated with a non-full core power distribution analysis code and is calculated by the expression $F_r^T = Fr$ when calculations are performed with a full core power distribution analysis code. 6

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.2.~~3~~2.2 and SR 3.2.~~3~~2.3

Measuring the values of F_r^T and T_q each time a value of F_r^T is calculated ensures that the calculated value of F_r^T accurately reflects the condition of the core.

The Frequency for these Surveillances is in accordance with the requirements of SR 3.2.~~3~~2.1 because these SRs provide information to complete SR 3.2.2.1.

REFERENCES

1. U FSAR, Chapter ~~[~~15~~]~~.
2. ~~FSAR, Chapter [6]~~ NUREG 0800, Section 4.2, Appendix B.
3. Technical Requirements Manual
~~3~~4. 10 CFR 50, Appendix A.
~~4~~5. 10 CFR 50.46.

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.2, BASES, TOTAL INTEGRATED RADIAL PEAKING FACTOR (F_r^T)

1. Changes are made (additions, deletions, and/or changes) to the ISTS that reflect the plant specific nomenclature, number, reference, system description, analysis, licensing basis, or licensing basis description.

2. The ISTS contains bracketed information and/or values that are generic to all Combustion Engineering vintage plants. The brackets are removed, and the proper plant specific information/value is provided. This is acceptable since the information/value is changed to reflect the current licensing basis.

3. The ISTS contains tolerances to be applied to the incore detector alarm setpoints. PSL Unit 1 UFSAR, Section 13.8, Licensee-Controlled Technical Specification Requirements, and PSL Unit 2 UFSAR, Section 13.7, Licensee-Controlled Technical Specification Requirements, each contain these tolerances to be applied to the incore detector alarm setpoints. Additionally, these tolerances will be provided in the Technical Requirements Manual. Therefore, the tolerances to be applied to the incore detector alarm setpoints are deleted.

4. The ISTS includes ISTS 3.2.1, Linear Heat Rate (LHR), ISTS 3.2.2, Total Planar Radial Peaking Factor (F_{xy}^T), ISTS 3.2.3, Total Integrated Radial Peaking Factor (F_r^T), ISTS 3.2.4, Azimuthal Power Tilt (T_q), and ISTS 3.2.5, Axial Shape Index (ASI). CTS do not include a Specification for ISTS 3.2.2, Total Planar Radial Peaking Factor (F_{xy}^T). The CTS and ISTS are renumbered. CTS 3.2.3, Total Integrated Radial Peaking Factor (F_r^T), CTS 3.2.4, Azimuthal Power Tilt (T_q), and CTS 3.2.5, Axial Shape Index (ASI), are renumbered as ITS 3.2.2, ITS 3.2.3, and ITS 3.2.4, respectively.

5. The type of plant (Analog) is deleted since it is unnecessary. This information is provided in NUREG-1432, Rev. 5.0, to assist in identifying the appropriate Specification to be used as a model for the plant specific ITS conversion but serves no purpose in a plant specific implementation.

6. CTS 4.2.3.2 and CTS 4.2.3.4 state details for calculating F_r^T with a non-full core power distribution analysis code and with a full core power distribution analysis code. ITS SR 3.2.2.1 and ITS SR 3.2.2.3 do not provide details for calculating F_r^T. This changes the CTS by relocating the details for calculating F_r^T to the ITS Bases. This change is acceptable since procedural details for meeting Technical Specification requirements are being removed from the Technical Specifications and relocating these details to the ITS Bases.

Specific No Significant Hazards Considerations (NSHCs)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS
ITS 3.2.2, TOTAL INTEGRATED RADIAL PEAKING FACTOR - F_r^T

There are no specific No Significant Hazards Considerations for this Specification.

ATTACHMENT 3

ITS 3.2.3, AZIMUTHAL POWER TILT (T_q)

Current Technical Specifications (CTS) Markup and Discussion of Changes (DOCs)

POWER DISTRIBUTION LIMITS

AZIMUTHAL POWER TILT – T_q

LIMITING CONDITION FOR OPERATION

LCO 3.2.3 3.2.4 [3] The AZIMUTHAL POWER TILT (T_q) shall not exceed [be ≤] 0.03.

Applicability **APPLICABILITY:** MODE 1*. [with THERMAL POWER > 50% RTP.] A02 L01

ACTION:

ACTION A
Required Action A.1 a. With the [and] indicated AZIMUTHAL POWER TILT [Tq] determined to be > .030 but ≤ 0.10, either correct the power tilt [Restore Tq to ≤ 0.03] within two hours or determine within the next 2 hours and at least once per subsequent [thereafter] 8 hours, that the TOTAL INTEGRATED RADIAL PEAKING FACTOR (F_r^T) [Verify] is within the limits of Specification 3.2.3. [LCO 3.2.2, "Total Integrated Radial Peaking Factor (F^T_r)."] M02

Required Action A.2

ACTION B
Required Action B.1 b. With the indicated [Restore Tq] AZIMUTHAL POWER TILT determined to be > [≤] 0.10, [within] operation may proceed for up to 2 hours provided that the TOTAL INTEGRATED RADIAL PEAKING FACTOR (F_r^T) [Verify] is within the limits of Specification [LCO] 3.2.3. [2 within 1 hour] Subsequent operation for the purpose of measurement and to identify the cause of the tilt is allowable provided the THERMAL POWER level is restricted to ≤ 20% of the maximum allowable THERMAL POWER level for the existing Reactor Coolant Pump combination.

Required Action B.2

ACTION C
Required Action C.1 [Required Action and associated Completion Time not met. Reduce THERMAL POWER to ≤ 50% RTP within 4 hours.] L02 L01

SURVEILLANCE REQUIREMENT

4.2.4.1 The provisions of Specification 4.0.4 are not applicable. M01

SR 3.2.3.1 4.2.4.2 The AZIMUTHAL POWER TILT shall be determined to be [Verify Tq is] within the limit[s] by:

a. Calculating the tilt in accordance with the Surveillance Frequency Control Program when the Subchannel Deviation Alarm is OPERABLE,

* See Special Test Exception 3.10.2. A02

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.2.3.1 Frequency

~~b. Calculating the tilt at least~~ once per 12 hours when the Subchannel Deviation Alarm is inoperable~~,~~ and

SR 3.2.3.1 Frequency

~~c. Using the incore detectors to determine the AZIMUTHAL POWER TILT at least~~ once per 12 hours when one excore channel is inoperable and ~~THERMAL POWER is~~ > 75% ~~of RATED THERMAL POWER.~~

RTP

POWER DISTRIBUTION LIMITS

3/4.2.4 AZIMUTHAL POWER TILT – T_q

LIMITING CONDITION FOR OPERATION

LCO 3.2.3 3.2.4 [3] The AZIMUTHAL POWER TILT (T_q) shall [be ≤] not exceed 0.03.

Applicability **APPLICABILITY:** MODE 1*. [with THERMAL POWER > 50% RTP.] A02 L01

ACTION:

ACTION A
Required Action A.1
Required Action A.2

a. With the indicated [Tq] AZIMUTHAL POWER TILT determined to be > .030 [and] but ≤ 0.10, either correct the power tilt within 2 hours or determine [Restore Tq to ≤ 0.03] within the next 2 hours and at least once per subsequent 8 hours, [thereafter] that the TOTAL INTEGRATED RADIAL PEAKING FACTOR (F_r^T) is within the limits of Specification 3.2.3. [Verify] [LCO 3.2.2, "Total Integrated Radial Peaking Factor (F^T_r)."] M02

ACTION B
Required Action B.1
Required Action B.2

b. With the indicated AZIMUTHAL POWER TILT determined to be > 0.10, [within] operation may proceed for up to 2 hours provided that the TOTAL INTEGRATED RADIAL PEAKING FACTOR (F_r^T) [Verify] is within the limits of [2 within 1 hour] [LCO] Specification 3.2.3. Subsequent operation for the purpose of measurement and to identify the cause of the tilt is allowable provided the THERMAL POWER level is restricted to ≤ 20% of the maximum allowable THERMAL POWER level for the existing Reactor Coolant Pump combination. L02

ACTION C
Required Action C.1

[Required Action and associated Completion Time not met. Reduce THERMAL POWER to ≤ 50% RTP within 4 hours.] L01

SURVEILLANCE REQUIREMENTS

4.2.4.1 The provisions of Specification 4.0.4 are not applicable. M01

SR 3.2.3.1 4.2.4.2 by: [Verify Tq is] The AZIMUTHAL POWER TILT shall be determined to be within the limit[s]

a. Calculating the tilt in accordance with the Surveillance Frequency Control Program.

b. Using the incore detectors to determine the AZIMUTHAL POWER TILT at least once per 12 hours when one excore channel is inoperable and THERMAL POWER is > 75% of RATED THERMAL POWER [RTP].

A02

* See Special Test Exception 3.10.2.

DISCUSSION OF CHANGES
ITS 3.2.3, AZIMUTHAL POWER TILT (T_q)

ADMINISTRATIVE CHANGES

A01 In the conversion of the St. Lucie Plant (PSL) Unit 1 and Unit 2, Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1432, Rev. 5.0, "Standard Technical Specifications - Combustion Engineering Plants" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A02 CTS 3.2.4 Applicability is MODE 1 with a footnote (footnote *) for MODE 1 stating "See Special Test Exception 3.10.2." ITS 3.2.3 does not contain the footnote or a reference to the Special Test Exceptions. This changes the CTS by not including footnote * in the ITS.

The purpose of the footnote references is to alert the user that a Special Test Exception exists that may modify the Applicability of the Specification. It is an ITS convention to not include these types of footnotes or cross-references. This change is designated as administrative as it incorporates an ITS convention with no technical change to the CTS.

MORE RESTRICTIVE CHANGES

M01 CTS 4.2.4.1 states that the provisions of Specification 4.0.4 are not applicable, and thereby provides an allowance for entering the next higher MODE of Applicability when the Surveillance is not met. ITS 3.2.3 does not provide a Surveillance Note that states that the provisions of LCO 4.0.4 are not applicable. LCO 4.0.4 states that entry into a MODE or other specified condition in the Applicability of a Limiting Condition for Operation (LCO) shall only be made when the LCO's Surveillances have been met within their specified Frequency, except as provided by Surveillance Requirement 4.0.3. LCO 4.0.3 provides the provisions for a missed surveillance and does not apply to a surveillance known to not be met within its specified Frequency prior to entering the Mode of Applicability.

The purpose of CTS 4.2.4.1 is to provide an allowance for entering the MODE of applicability when any Surveillance is not met. The ITS MODE change is changed from MODE 1 to MODE 1 with THERMAL POWER > 50% RTP. See DOC L01 for a discussion of change regarding the MODE change from MODE 1, to MODE 1 with THERMAL POWER > 50% RTP. This change allows the performance of ITS 3.2.3.1 after entry into MODE 1 and up to 50% RTP. The ITS MODE change to MODE 1 with THERMAL POWER > 50% is less restrictive; however, the deletion of CTS 4.0.4 is solely a more restrictive change.

This change is designated as more restrictive because the CTS 4.0.4 MODE change allowance is deleted and entry into MODE 1 shall only be made when the LCO's surveillances have been met within their specified Frequency.

M02 CTS 3.2.4.a states that T_q be corrected within 2 hours or F_r^T be verified within limits within the next 2 hours and at least once per subsequent 8 hours. ITS 3.2.3 Condition A states that T_q be restored to ≤ 0.03 within 2 hours or F_r^T be verified within the limits of LCO 3.2.2 within 2 hours and once per 8 hours thereafter. CTS requires the first verification that F_r^T is within limits be completed within 4 hours. ITS requires the first verification that F_r^T is within limits be completed within 2 hours.

The purpose of CTS/ITS is to provide reasonable assurance that the core is operating within its thermal limits during power operation beyond 2 hours by verifying that F_r^T is within limits if T_q is not corrected. The change requires that for operation to continue beyond 2 hours with T_q > 0.03 and ≤ 0.10, F_r^T must be verified within limits within 2 hours. Two hours is sufficient time to allow the operator to reposition CEAs, and significant radial xenon redistribution cannot occur within this time. This change is consistent with the ISTS Required Action A.2 Completion Time.

This change is designated as more restrictive as it requires that with T_q > 0.03 and ≤ 0.10, the first verification that F_r^T is within limits be completed within 2 hours.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

None

LESS RESTRICTIVE CHANGES

L01 *(Category 2 – Relaxation of Applicability)* CTS 3.2.4 states that the Applicability is MODE 1. ITS 3.2.3 states that the Applicability is MODE 1 with THERMAL POWER > 50% RTP. This changes the CTS by relaxing the Applicability to MODE 1 with THERMAL POWER > 50% RTP.

The purpose of CTS 3.2.4 Applicability is to state the MODE in which Tq must be maintained within the limits assumed in accident analysis to ensure that fuel damage does not result following an AOO. ITS 3.2.3 relaxes the Applicability to MODE 1 with THERMAL POWER > 50% RTP. CTS 4.2.4.1 states that the provisions of Specification 4.0.4 are not applicable, and thereby provides an allowance for entering the next higher MODE of Applicability with surveillances not met. ITS 3.2.3 Applicability of MODE 1 with THERMAL POWER > 50% RTP allows entry into MODE 1 with surveillances not met. See DOC M01 for the discussion of change for the MODE change.

This change limits the applicability of T_q to power operations with THERMAL POWER > 50% RTP. This change clarifies the applicability of the T_q, Azimuthal Power Tilt, consistent with the industry Standard Technical Specification (STS), approved by the NRC for generic use as NUREG-1432, Rev. 5.0, "Standard Technical Specifications - Combustion Engineering Plants" (ISTS). This change is acceptable because the LCO requirements applied in ITS MODE 1 continue to ensure process variables, structures, systems, and components are maintained in the conditions assumed in the safety analyses and licensing basis, and the proposed TS has been generically approved for industry usage.

In MODE 1 with THERMAL POWER > 50% RTP, T_q must be maintained within the limits assumed in accident analysis to ensure that fuel damage does not result following an anticipated operational occurrence (AOO). In other MODES, this LCO does not apply because THERMAL POWER is not sufficient to require a limit on T_q, and xenon transients generated within the lower power level range are not severe. In addition, significant margin to thermal limits exists at lower power levels and therefore thermal limits are not significantly challenged.

The power distribution and CEA insertion and alignment LCOs preclude core power distributions that violate the fuel design criteria. The core power distribution is controlled so that, in conjunction with other core operating parameters (e.g., CEA insertion and alignment limits), the power distribution does not result in violation of the power distribution LCOs, including ITS 3.2.3, T_q. This is accomplished by maintaining the power distribution and reactor coolant conditions so that the peak LHR and DNB parameters are within operating limits supported by the accident analysis.

PSL controls the AXIAL SHAPE INDEX (ASI) during startup, steady-state, and transients such as a dropped CEA. ASI COLR bands are applicable above 40% RTP while fuel conditioning ASI bands are applicable above 50% RTP. Axial shape control establishes and maintains axial shape within the fuel conditioning control bands prior to exceeding 50% RTP. The intent of the fuel preconditioning guidelines is to minimize fuel pellet / clad interaction and maximize fuel rod integrity. When THERMAL POWER is ≥ 50 RTP, boration or dilution is the primary means to compensate for changes in power level and transient xenon. Using boration/dilution to compensate for power changes subjects the fuel rods to uniform and smooth power transients. Regulating Group CEAs are used to respond deviations of ASI from its target equilibrium shape index.

This change is designated as less restrictive because the LCO requirements will not be applied under plant conditions in which they would be applied under the CTS.

L02 *(Category 4 – Relaxation of Required Action)* CTS 3.2.4 Action b. states, in part, “with in the indicated Azimuthal Power Tilt determined to be > 0.10 operation may proceed for up to 2 hours”. CTS 3.2.4 CTS 3.2.4.b states, in part, the subsequent operation be “≤ 20% of the maximum allowable THERMAL POWER level for the existing Reactor Coolant Pump combination.” PSL only operates in the four reactor coolant pump combination; therefore, subsequent operation is allowable provided the THERMAL POWER is reduced to ≤ 20% RTP – the equivalent THERMAL POWER for the CTS. ITS Required Action B.2 states "Restore T_q to ≤ 0.10 within 2 hours. If T_q is not restored to ≤ 0.10 within 2 hours, Required Action C.1 requires reducing THERMAL POWER to the ≤ 50% RTP within 4 hours. See DOC L01 for a discussion of change regarding the ITS MODE change from MODE 1, to MODE 1 with THERMAL POWER > 50% RTP.

The purpose of CTS 3.2.4 Action b. is to reduce THERMAL POWER to ≤ 20% if T_q is not restored to ≤ 0.10 within 2 hours. ITS requires that with T_q not restored to ≤ 0.10 within 2 hours, reduce THERMAL POWER to the ≤ 50% RTP within 4 hours.

This change is designated as less restrictive because less stringent Required Actions are being applied in the ITS than were applied in the CTS.

Improved Standard Technical Specifications (ISTS) Markup and Justification for Deviations (JFDs)

3.2 POWER DISTRIBUTION LIMITS (Analog)

3.2.4 3.2.4 3 AZIMUTHAL POWER TILT (T_q) (Analog) 3 7

LCO 3.2.4 LCO 3.2.4 3 T_q shall be ≤ [0.03]. 3 2

Applicability APPLICABILITY: MODE 1 with THERMAL POWER > 50% RTP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
ACTION a. A. Indicated T_q > [0.03] and ≤ 0.10.	A.1 Restore T_q to ≤ [0.03]. OR A.2 Verify F^T_{xy} and F^T_r are is within the limits of LCO 3.2.2, "Total Planar Radial Peaking Factor (F^T_{xy})," and LCO 3.2.3, "Total Integrated Radial Peaking Factor (F^T_r);" .	2 hours 2 2 hours AND 3 Once per 8 hours thereafter
B. C. Required Action and associated Completion Time of Condition A not met.	B.1 C.1 Reduce THERMAL POWER to ≤ 50% RTP.	4 hours 4 5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
ACTION b. C. B Indicated T_q > 0.10.	------------NOTE------------ All subsequent Required Actions must be completed if power reduction commences prior to restoring $T_q \leq 0.10$. ------------------------------	4 6
	C.1 B Verify F_{xy}^T and F_r^T are is within the limits of LCO 3.2.2 and LCO 3.2.3, respectively.	1 hour 4 3
	AND	
	C.2 Reduce THERMAL POWER to ≤ 50% RTP.	2 hours 5
	AND	
	C.3 B.2 Restore T_q to ≤ [0.03] 0.10.	2 hours Correct the cause of the out of limit condition prior to increasing THERMAL POWER. Subsequent power operation above 50% RTP may proceed provided that the measured T_q is verified ≤ [0.03] at least once per hour for 12 hours, or until verified at 95% RTP 4 2 6

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 4.2.4.2.a SR 3.2.4.1 [3]	Verify T_q is within limits.	12 hours when the subchannel deviation alarm is inoperable AND 12 hours when one excore detector is inoperable and > 75% RTP AND [12 hours OR In accordance with the Surveillance Frequency Control Program]

3 2 2

3.2 POWER DISTRIBUTION LIMITS (Analog)

3.2.4 **3.2.4 3 AZIMUTHAL POWER TILT (T_q) (Analog)** 3 7

LCO 3.2.4 LCO 3.2.4 3 T_q shall be ≤ [0.03]. 3 2

Applicability APPLICABILITY: MODE 1 with THERMAL POWER > 50% RTP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
ACTION a. A. Indicated T_q > [0.03] and ≤ 0.10.	A.1 Restore T_q to ≤ [0.03]. OR A.2 Verify F_{xy}^T and F_r^T are is within the limits of LCO 3.2.2, "Total Planar Radial Peaking Factor (F_{xy}^T)," and LCO 3.2.3, "Total Integrated Radial Peaking Factor (F_r^T);" .	2 hours 2 2 hours AND 3 Once per 8 hours thereafter
B. C. Required Action and associated Completion Time of Condition A not met.	B.1 C.1 Reduce THERMAL POWER to ≤ 50% RTP.	4 hours 4 5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
ACTION b. C. [B] Indicated $T_q > 0.10$.	-------------------NOTE------------------- All subsequent Required Actions must be completed if power reduction commences prior to restoring $T_q \leq 0.10$. ---	4 6
	C.1 [B] Verify F_{xy}^T and F_r^T are [is] within the limits of LCO 3.2.2 and LCO 3.2.3, respectively.	1 hour 4 3
	AND	
	C.2 Reduce THERMAL POWER to ≤ 50% RTP.	2 hours 5
	AND	
	C.3 [B.2] Restore T_q to ≤ [0.03] [0.10].	[2 hours] Correct the cause of the out of limit condition prior to increasing THERMAL POWER. Subsequent power operation above 50% RTP may proceed provided that the measured T_q is verified ≤ [0.03] at least once per hour for 12 hours, or until verified at 95% RTP 4 2 6

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 4.2.4.2.a	SR 3.2.4.1 3 — Verify T_q is within limits.	12 hours when one excore detector is inoperable and > 75% RTP (3) (2) AND [12 hours OR (2) In accordance with the Surveillance Frequency Control Program]

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.3, AZIMUTHAL POWER TILT (T_q)

1. Changes are made (additions, deletions, and/or changes) to the ISTS that reflect the plant specific nomenclature, number, reference, system description, analysis, licensing basis, or licensing basis description.

2. The ISTS contains bracketed information and/or values that are generic to all Combustion Engineering vintage plants. The brackets are removed, and the proper plant specific information/value is provided. This is acceptable since the information/value is changed to reflect the current licensing basis.

3. The ISTS includes ISTS 3.2.1, Linear Heat Rate (LHR), ISTS 3.2.2, Total Planar Radial Peaking Factor (F_{xy}^T), ISTS 3.2.3, Total Integrated Radial Peaking Factor (F_r^T), ISTS 3.2.4, Azimuthal Power Tilt (T_q), and ISTS 3.2.5, Axial Shape Index (ASI). CTS do not include a Specification for ISTS 3.2.2, Total Planar Radial Peaking Factor (F_{xy}^T). The CTS and ISTS are renumbered. CTS 3.2.3, Total Integrated Radial Peaking Factor (F_r^T), CTS 3.2.4, Azimuthal Power Tilt (T_q), and CTS 3.2.5, Axial Shape Index (ASI), are renumbered as ITS 3.2.2, ITS 3.2.3, and ITS 3.2.4, respectively.

4. ISTS Condition B is renumbered as ITS Condition C, and ISTS Condition C is renumbered as ITS Condition B. ITS Condition C deletes the verbiage “of Condition A” so ITS Condition C and Required Action C.1 apply to both ITS Condition A and ITS Condition B.

5. CTS 3.2.4.b allows operation for up to 2 hours with $T_q > 0.10$ provided F_r^T is verified within limits. ISTS Required Action C.3 (renumbered as ITS Required Action B.2) is changed to restore T_q to ≤ 0.10 with a Completion Time of 2 hours. ISTS Required Action C.2 is deleted since this action is moved to ITS Condition C and ITS Required Action C.1. This change is like Calvert Cliffs – Unit 1, Calvert Cliffs – Unit 2 Improved Technical Specifications (ADAMS Accession No. ML052720276). JFD-4 changes ISTS Condition B to Condition C.

   If the Required Actions and associated Completion Times of ITS Condition A or Condition B are not met, Condition C must be entered. ITS Required Action C.1 requires a reduction in THERMAL POWER to ≤ 50% RTP within 4 hours. If the T_q cannot be restored to within its specified limit, THERMAL POWER must be reduced. The reduction in THERMAL POWER to ≤ 50% RTP provides reasonable assurance that the core is operating within its thermal limits and places the core in a conservative condition.

6. ISTS Condition C Required Actions are modified by a Note that requires all subsequent actions to be performed once power reduction commences after entering the Condition if Tq is not restored to < 0.10. This Note is deleted.

   ISTS Required Action C.3 is modified with a Note to indicate that the cause of the out of limit condition must be corrected prior to increasing THERMAL POWER, and that subsequent power operation may proceed provided that the measured Tq is verified within its limit at least once per hour for 12 hours, or until verified at 95% RTP. This Note is deleted.

If ITS Required Action B.1 or Required Action B.2 is not met within its associated Completion Time, ITS Required Action C.1 requires a reduction in THERMAL POWER to ≤ 50% RTP within 4 hours. If F_r^T is verified within limits within 1 hour, and T_q is restored to ≤ 0.10 with 2 hours, Condition A is entered, and the Required Actions are taken. If the Condition A Required Actions are not met, ITS Required Action C.1 requires a reduction in THERMAL POWER to ≤ 50% RTP within 4 hours. The reduction in THERMAL POWER to ≤ 50% RTP provides reasonable assurance that the core is operating within its thermal limits and places the core in a conservative condition.

7. The type of plant (Analog) is deleted since it is unnecessary. This information is provided in NUREG-1432, Rev. 5.0, to assist in identifying the appropriate Specification to be used as a model for the plant specific ITS conversion but serves no purpose in a plant specific implementation.

Improved Standard Technical Specifications (ISTS) Bases Markup and Justification for Deviations (JFDs)

5 4

B 3.2 POWER DISTRIBUTION LIMITS ~~(Analog)~~

B 3.2.~~4~~ [3] AZIMUTHAL POWER TILT (T_q) ~~(Analog)~~

5 4

BASES

BACKGROUND

The purpose of this LCO (AZIMUTHAL POWER TILT (T_q)) is to limit the core power distribution to the initial values assumed in the accident analyses. Operation within the limits imposed by this LCO limits or prevents potential fuel cladding failures that could breach the primary fission product barrier and release fission products to the reactor coolant in the event of a loss of coolant accident (LOCA), loss of flow accident, ejected control element assembly (CEA) accident, or other postulated accident requiring termination by a Reactor Protection System trip function. This LCO limits the amount of damage to the fuel cladding during an accident by ensuring that the plant is operating within acceptable bounding conditions at the onset of a transient.

Methods of controlling the power distribution include:

a. Using CEAs to alter the axial power distribution,

b. Decreasing CEA insertion by boration, thereby improving the radial power distribution, and

c. Correcting off optimum conditions (e.g., a CEA drop or misoperation of the unit) that cause margin degradations.

The core power distribution is controlled so that, in conjunction with other core operating parameters (e.g., CEA insertion and alignment limits), the power distribution does not result in violation of this LCO. The limiting safety system settings and this LCO are based on the accident analyses (Ref~~s~~. 1 ~~and 2~~), so that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences (AOOs), and the limits of acceptable consequences are not exceeded for other postulated accidents. 2

Limiting power distribution skewing over time also minimizes the xenon distribution skewing, which is a significant factor in controlling the axial power distribution.

Power distribution is a product of multiple parameters, various combinations of which may produce acceptable power distributions. Operation within the design limits of power distribution is accomplished by generating operating limits for linear heat rate (LHR) and departure from nucleate boiling (DNB).

BASES

BACKGROUND (continued)

LINEAR HEAT RATE ( ) AXIAL SHAPE INDEX ( ) 4 1

The limits on LHR, Total Planar Radial Peaking Factor (F^T_{XY}), Total Integrated Radial Peaking Factor (F^T_r), T_q, and ASI represent limits within which the LHR algorithms are valid. These limits are obtained directly from the core reload analysis.

Either of the two core power distribution monitoring systems, the Excore Detector Monitoring System or the Incore Detector Monitoring System, provides adequate monitoring of the core power distribution and is capable of verifying that the LCO limits are not exceeded. The Excore Detector Monitoring System performs this function by continuously monitoring ASI with OPERABLE quadrant symmetric excore neutron detectors and by verifying ASI is maintained within the limits specified in the COLR.

In conjunction with the use of the Excore Detector Monitoring System and in establishing the ASI limits, the following assumptions are made:

a. The CEA insertion limits of LCO 3.1.5, "Shutdown CEA Insertion Limits," and LCO 3.1.6, "Regulating CEA Insertion Limits," are satisfied,

b. The T_q restrictions of LCO 3.2.4 3 are satisfied, and 4

c. F^T_r F^T_{xy} does not exceed the limits of LCO 3.2.2. 4

The Incore Detector Monitoring System continuously provides a more direct measure of the peaking factors, and the alarms that have been established for the individual incore detector segments ensure that the peak LHRs are maintained within the limits specified in the COLR. The setpoints for these alarms include tolerances, set in conservative directions, for: described in Reference 3. 1 3

a. A measurement calculational uncertainty factor of 1.062,

b. An engineering uncertainty factor of 1.03,

c. An allowance of 1.002 for axial fuel densification and thermal expansion, and

d. A THERMAL POWER measurement uncertainty factor of 1.02.

BASES

APPLICABLE SAFETY ANALYSES

The fuel cladding must not sustain damage as a result of normal operation (Condition 1) or AOOs (Condition 2) (Ref. 3, GDC 10). The power distribution and CEA insertion and alignment LCOs preclude core power distributions that violate the following fuel design criteria: 4 1

a. During a LOCA, peak cladding temperature must not exceed 2200°F (Ref. 4), 5 1

b. During a loss of flow accident, there must be at least 95% probability at the 95% confidence level (the 95/95 DNB criterion) that the hot fuel rod in the core does not experience a DNB condition (Ref. 3, GDC 10), 4 1

c. During an ejected CEA accident, the fission energy input to the fuel must not exceed 280 cal/gm (Ref. [ ]), and 3 2

d. The control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck fully withdrawn (Ref. 3, GDC 26). 4 1

The power density at any point in the core must be limited to maintain the fuel design criteria (Ref. 4). This process is accomplished by maintaining the power distribution and reactor coolant conditions so that the peak LHR and DNB parameters are within operating limits supported by the accident analysis (Ref. 1) with due regard for the correlations between measured quantities, the power distribution, and uncertainties in determining the power distribution. 5 1

Fuel cladding failure during a LOCA is limited by restricting the maximum linear heat generation rate (LHGR) so that the peak cladding temperature does not exceed 2200°F (Ref. 4). High peak cladding temperatures are assumed to cause severe cladding failure by oxidation due to a Zircaloy water reaction. 1 1 5

The LCOs governing LHR, ASI, and the Reactor Coolant System ensure that these criteria are met as long as the core is operated within the ASI, F^T_{XY}, and F^T_r limits specified in the COLR, and within the T_q limits. The latter are process variables that characterize the three dimensional power distribution of the reactor core. Operation within the limits for these variables ensures that their actual values are within the range used in the accident analyses. 4

BASES

APPLICABLE SAFETY ANALYSES (continued)

Fuel cladding damage does not normally occur while the reactor is operating at conditions outside these LCOs during otherwise normal operation. Fuel cladding damage could result, however, if an accident or AOO occurs from initial conditions outside the limits of these LCOs. [This potential for fuel cladding damage exists because] Changes in the power distribution cause increased power peaking and correspondingly increased local LHRs. 1 1

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

LCO

The power distribution [certain] LCO limits are based on correlations between power peaking and the measured variables used as inputs to the LHR and DNB operating limits. The power distribution LCO limits, except T_q, are provided in the COLR. The limits on LHR ensure that in the event of a LOCA, the peak temperature of the fuel cladding does not exceed 2200°F. 1

APPLICABILITY

In MODE 1 with THERMAL POWER > 50% RTP, T_q must be maintained within the limits assumed in accident analysis to ensure that fuel damage does not result following an AOO. In other MODES, this LCO does not apply because THERMAL POWER is not sufficient to require a limit on T_q.

ACTIONS

A.1 and A.2

If the measured T_q is > [0.03] and < [≤] 0.10, the calculation of T_q may be nonconservative. T_q must be restored within 2 hours or [within 2 hours] F_{XY}^T and F_r^T must be determined to be within the limits of LCO 3.2.2 and LCO 3.2.3, and determined to be within these limits every 8 hours thereafter, as long as T_q is out of limits. Two hours is sufficient time to allow the operator to reposition CEAs, and significant radial xenon redistribution cannot occur within this time. The 8 hour Completion Time ensures changes in F_{XY}^T and F_r^T can be identified before the limits of LCO 3.2.2 and LCO 3.2.3, respectively, are exceeded. 4 4

B [C].1

If Required Actions and associated Completion Times of Condition A [or B] are not met, THERMAL POWER must be reduced to ≤ 50% RTP. This requirement provides [conservative protection from increased peaking due to potential xenon redistribution and] reasonable assurance that the core is operating within its thermal limits and places the core in a conservative condition. Four hours is a reasonable time to reach 50% RTP in an orderly manner and without challenging plant systems. 6 1

ACTIONS (continued)

B B.2
~~C~~.1~~, C.2,~~ and ~~C.3~~ 6

its
With T_q > 0.10, ~~F_{XY}^T and~~ F_r^T must be within ~~their~~ specified limits to ensure that acceptable flux peaking factors are maintained. Based on operating experience, 1 hour is sufficient time for the operator to evaluate these factors. If ~~F_{XY}^T and~~ F_r^T ~~are~~ is within limits, operation may proceed for a total of 2 hours after the Condition is entered while attempts are made to restore T_q to within its limit. 4

If T_q ≤ 0.10 cannot be achieved, power must be reduced to ≤ 50% RTP within ~~2~~ 4 hours~~. If the tilt is generated due to a CEA misalignment, operating at ≤ 50% RTP allows for the recovery of the CEA. Except as a result of CEA misalignment, T_q > 0.10 is not expected; if it occurs, continued operation of the reactor may be necessary to discover the cause of the tilt. If this procedure is followed, operation is restricted to only those conditions required to identify the cause of the tilt. It is necessary to account explicitly for power asymmetries because the radial power peaking factors used in core power distribution calculations are based on an untilted power distribution.~~ 7

because
~~If T_q is not restored to within its limits,~~ the reactor continues to operate with an axial power distribution mismatch. Continued operation in this configuration may induce an axial xenon oscillation that causes increased LHRs when the xenon redistributes. ~~If T_q cannot be restored to within its limits within 2 hours, reactor power must be reduced.~~ Reducing THERMAL POWER to ≤ 50% RTP within ~~2~~ 4 hours provides conservative protection from increased peaking due to potential xenon redistribution. ~~The Required Actions are modified by a Note that requires all subsequent actions to be performed once power reduction commences after entering the Condition if T_q is not restored to < 0.10. This procedure ensures corrective action is taken before unrestricted power operation resumes. Following THERMAL POWER reduction to ≤ 50% RTP, T_q must be restored to ≤ [0.03] before THERMAL POWER is increased (Required Action C.3). This Required Action prevents the operator from increasing THERMAL POWER above the conservative limit when the Condition, T_q outside its limits, has existed but allows the unit to continue operation for diagnostic purposes. The Completion Time of Required Action C.3 is modified with a Note to indicate that the cause of the out of limit condition must be corrected prior to increasing THERMAL POWER. This Note also indicates that subsequent power operation above 50% RTP may proceed provided that the measured T_q is verified ≤ [0.03] at least once per hour for 12 hours, or until verified at 95% RTP. This ensures that the power distribution is responding as predicted. The Completion Time of 12 hours is a historical value that allows an acceptable exit from the LCO after the T_q value is verified acceptable for 12 hours or until 95% RTP is reached.~~ 7

BASES

SURVEILLANCE REQUIREMENTS

SR 3.2.4.1 3 4

[T_q must be calculated at 12 hour intervals. The 12 hour Frequency prevents significant xenon redistribution between Surveillances. 2

Tq must be determined at 12 hour intervals when the subchannel deviation alarm is inoperable, and at 12 hour intervals when one excore detector is inoperable and > 75% RTP.

OR

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

-----------------------------------REVIEWER'S NOTE-----------------------------------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
--]

REFERENCES

1. U FSAR, Chapter [15]. 2
2. FSAR, Chapter [6]. NUREG 0800, Section 4.2, Appendix B
3. Technical Requirements Manual
3. 4 10 CFR 50, Appendix A.
4. 5 10 CFR 50.

B 3.2 POWER DISTRIBUTION LIMITS (Analog) 5

B 3.2.4 AZIMUTHAL POWER TILT (T_q) (Analog) 4

3

BASES

BACKGROUND

The purpose of this LCO (AZIMUTHAL POWER TILT (T_q)) is to limit the core power distribution to the initial values assumed in the accident analyses. Operation within the limits imposed by this LCO limits or prevents potential fuel cladding failures that could breach the primary fission product barrier and release fission products to the reactor coolant in the event of a loss of coolant accident (LOCA), loss of flow accident, ejected control element assembly (CEA) accident, or other postulated accident requiring termination by a Reactor Protection System trip function. This LCO limits the amount of damage to the fuel cladding during an accident by ensuring that the plant is operating within acceptable bounding conditions at the onset of a transient.

Methods of controlling the power distribution include:

a. Using CEAs to alter the axial power distribution,

b. Decreasing CEA insertion by boration, thereby improving the radial power distribution, and

c. Correcting off optimum conditions (e.g., a CEA drop or misoperation of the unit) that cause margin degradations.

The core power distribution is controlled so that, in conjunction with other core operating parameters (e.g., CEA insertion and alignment limits), the power distribution does not result in violation of this LCO. The limiting safety system settings and this LCO are based on the accident analyses (Refs. 1 and 2), so that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences (AOOs), and the limits of acceptable consequences are not exceeded for other postulated accidents. 2

Limiting power distribution skewing over time also minimizes the xenon distribution skewing, which is a significant factor in controlling the axial power distribution.

Power distribution is a product of multiple parameters, various combinations of which may produce acceptable power distributions. Operation within the design limits of power distribution is accomplished by generating operating limits for linear heat rate (LHR) and departure from nucleate boiling (DNB).

BASES

BACKGROUND (continued)

LINEAR HEAT RATE ( ) AXIAL SHAPE INDEX (4

The limits on LHR, Total Planar Radial Peaking Factor (F^T_{XY}), Total Integrated Radial Peaking Factor (F^T_r), T_q, and ASI represent limits within which the LHR algorithms are valid. These limits are obtained directly from the core reload analysis. 1

)

Either of the two core power distribution monitoring systems, the Excore Detector Monitoring System or the Incore Detector Monitoring System, provides adequate monitoring of the core power distribution and is capable of verifying that the LCO limits are not exceeded. The Excore Detector Monitoring System performs this function by continuously monitoring ASI with OPERABLE quadrant symmetric excore neutron detectors and by verifying ASI is maintained within the limits specified in the COLR.

In conjunction with the use of the Excore Detector Monitoring System and in establishing the ASI limits, the following assumptions are made:

a. The CEA insertion limits of LCO 3.1.5, "Shutdown CEA Insertion Limits," and LCO 3.1.6, "Regulating CEA Insertion Limits," are satisfied,

3

b. The T_q restrictions of LCO 3.2.4 are satisfied, and 4

c. F^T_{xy} F^T_r does not exceed the limits of LCO 3.2.2. 4

The Incore Detector Monitoring System continuously provides a more direct measure of the peaking factors, and the alarms that have been established for the individual incore detector segments ensure that the peak LHRs are maintained within the limits specified in the COLR. The setpoints for these alarms include tolerances, set in conservative directions, for: described in Reference 3. 1 3

a. A measurement calculational uncertainty factor of 1.062,

b. An engineering uncertainty factor of 1.03,

c. An allowance of 1.002 for axial fuel densification and thermal expansion, and

d. A THERMAL POWER measurement uncertainty factor of 1.02.

BASES

APPLICABLE SAFETY ANALYSES

The fuel cladding must not sustain damage as a result of normal operation (Condition 1) or AOOs (Condition 2) (Ref. 3, GDC 10). The power distribution and CEA insertion and alignment LCOs preclude core power distributions that violate the following fuel design criteria: 4 1

a. During a LOCA, peak cladding temperature must not exceed 2200°F (Ref. 4), 5 1

b. During a loss of flow accident, there must be at least 95% probability at the 95% confidence level (the 95/95 DNB criterion) that the hot fuel rod in the core does not experience a DNB condition (Ref. 3, GDC 10), 4 1

c. During an ejected CEA accident, the fission energy input to the fuel must not exceed 280 cal/gm (Ref. [ ]), and 3 2 2

d. The control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck fully withdrawn (Ref. 3, GDC 26). 4 1

The power density at any point in the core must be limited to maintain the fuel design criteria (Ref. 4). This process is accomplished by maintaining the power distribution and reactor coolant conditions so that the peak LHR and DNB parameters are within operating limits supported by the accident analysis (Ref. 1) with due regard for the correlations between measured quantities, the power distribution, and uncertainties in determining the power distribution. 5 1

Fuel cladding failure during a LOCA is limited by restricting the maximum linear heat generation rate (LHGR) so that the peak cladding temperature does not exceed 2200°F (Ref. 4). High peak cladding temperatures are assumed to cause severe cladding failure by oxidation due to a Zircaloy water reaction. 1 1 5

The LCOs governing LHR, ASI, and the Reactor Coolant System ensure that these criteria are met as long as the core is operated within the ASI, F^T_{XY}, and F^T_r limits specified in the COLR, and within the T_q limits. The latter are process variables that characterize the three dimensional power distribution of the reactor core. Operation within the limits for these variables ensures that their actual values are within the range used in the accident analyses. 4

BASES

APPLICABLE SAFETY ANALYSES (continued)

Fuel cladding damage does not normally occur while the reactor is operating at conditions outside these LCOs during ~~otherwise~~ normal operation. Fuel cladding damage could result, however, if an accident or AOO occurs from initial conditions outside the limits of these LCOs. [This potential for fuel cladding damage exists because] Changes in the power distribution cause increased power peaking and correspondingly increased local LHRs. 1 1

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

LCO

The power distribution [certain] LCO limits are based on correlations between power peaking and ~~the~~ measured variables used as inputs to the LHR and DNB operating limits. The power distribution LCO limits, except T_q, are provided in the COLR. The limits on LHR ensure that in the event of a LOCA, the peak temperature of the fuel cladding does not exceed 2200°F. 1

APPLICABILITY

In MODE 1 with THERMAL POWER > 50% RTP, T_q must be maintained within the limits assumed in accident analysis to ensure that fuel damage does not result following an AOO. In other MODES, this LCO does not apply because THERMAL POWER is not sufficient to require a limit on T_q.

ACTIONS

A.1 and A.2

If the measured T_q is > ~~[~~0.03~~]~~ and ~~<~~ [≤] 0.10, the calculation of T_q may be nonconservative. T_q must be restored within 2 hours or ~~F^T_{XY} and~~ F^T_r must be determined [within 2 hours] to be within the limits of LCO 3.2.2 ~~and LCO 3.2.3~~, and determined to be within these limits every 8 hours thereafter, as long as T_q is out of limits. Two hours is sufficient time to allow the operator to reposition CEAs, and significant radial xenon redistribution cannot occur within this time. The 8 hour Completion Time ensures changes in ~~F^T_{XY} and~~ F^T_r can be identified before the limits of LCO 3.2.2 ~~and LCO 3.2.3, respectively,~~ are exceeded. 4 4

~~B~~[C].1 6

If Required Actions and associated Completion Times of Condition A [or B] are not met, THERMAL POWER must be reduced to ≤ 50% RTP. This requirement provides [conservative protection from increased peaking due to potential xenon redistribution and] reasonable assurance that the core is operating within its thermal limits ~~and places the core in a conservative condition~~. Four hours is a reasonable time to reach 50% RTP in an orderly manner and without challenging plant systems. 1

BASES

ACTIONS (continued)

B B.2

C.1, C.2, and C.3 6

its

With $T_q > 0.10$, F_{XY}^T and F_r^T must be within their specified limits to ensure that acceptable flux peaking factors are maintained. Based on operating experience, 1 hour is sufficient time for the operator to evaluate these factors. If F_{XY}^T and F_r^T are within limits, operation may proceed for a total of 2 hours after the Condition is entered while attempts are made to restore T_q to within its limit. 4

is

If $T_q \leq 0.10$ cannot be achieved, power must be reduced to ≤ 50% RTP within 2 hours. If the tilt is generated due to a CEA misalignment, operating at ≤ 50% RTP allows for the recovery of the CEA. Except as a result of CEA misalignment, $T_q > 0.10$ is not expected; if it occurs, continued operation of the reactor may be necessary to discover the cause of the tilt. If this procedure is followed, operation is restricted to only those conditions required to identify the cause of the tilt. It is necessary to account explicitly for power asymmetries because the radial power peaking factors used in core power distribution calculations are based on an untilted power distribution. 7

4

because

If T_q is not restored to within its limits, the reactor continues to operate with an axial power distribution mismatch. Continued operation in this configuration may induce an axial xenon oscillation that causes increased LHRs when the xenon redistributes. If T_q cannot be restored to within its limits within 2 hours, reactor power must be reduced. Reducing THERMAL POWER to ≤ 50% RTP within 2 hours provides conservative protection from increased peaking due to potential xenon redistribution. The Required Actions are modified by a Note that requires all subsequent actions to be performed once power reduction commences after entering the Condition if T_q is not restored to < 0.10. This procedure ensures corrective action is taken before unrestricted power operation resumes. Following THERMAL POWER reduction to ≤ 50% RTP, T_q must be restored to ≤ [0.03] before THERMAL POWER is increased (Required Action C.3). This Required Action prevents the operator from increasing THERMAL POWER above the conservative limit when the Condition, T_q outside its limits, has existed but allows the unit to continue operation for diagnostic purposes. The Completion Time of Required Action C.3 is modified with a Note to indicate that the cause of the out of limit condition must be corrected prior to increasing THERMAL POWER. This Note also indicates that subsequent power operation above 50% RTP may proceed provided that the measured T_q is verified ≤ [0.03] at least once per hour for 12 hours, or until verified at 95% RTP. This ensures that the power distribution is responding as predicted. The Completion Time of 12 hours is a historical value that allows an acceptable exit from the LCO after the T_q value is verified acceptable for 12 hours or until 95% RTP is reached. 7

4

5
4

BASES

SURVEILLANCE REQUIREMENTS

SR 3.2.4.1
3

4

[T_q must be calculated at 12 hour intervals. The 12 hour Frequency prevents significant xenon redistribution between Surveillances.

Tq must be determined at 12 hour intervals when one excore detector is inoperable and > 75% RTP.

2

OR

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

-----------------------------------REVIEWER'S NOTE-----------------------------------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
---]

REFERENCES

1. U FSAR, Chapter [15].

2

2. FSAR, Chapter [6]. NUREG 0800, Section 4.2, Appendix B

3. Technical Requirements Manual

3. 4 10 CFR 50, Appendix A.

4. 5 10 CFR 50.

1 4

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.3, BASES, AZIMUTHAL POWER TILT (T_q)

1. Changes are made (additions, deletions, and/or changes) to the ISTS that reflect the plant specific nomenclature, number, reference, system description, analysis, licensing basis, or licensing basis description.

2. The ISTS contains bracketed information and/or values that are generic to all Combustion Engineering vintage plants. The brackets are removed, and the proper plant specific information/value is provided. This is acceptable since the information/value is changed to reflect the current licensing basis.

3. The ISTS contains tolerances to be applied to the incore detector alarm setpoints. PSL Unit 1 UFSAR, Section 13.8, Licensee-Controlled Technical Specification Requirements, and PSL Unit 2 UFSAR, Section 13.7, Licensee-Controlled Technical Specification Requirements, each contain these tolerances to be applied to the incore detector alarm setpoints. Additionally, these tolerances will be provided in the Technical Requirements Manual. Therefore, the tolerances to be applied to the incore detector alarm setpoints are deleted.

4. The ISTS includes ISTS 3.2.1, Linear Heat Rate (LHR), ISTS 3.2.2, Total Planar Radial Peaking Factor (F_{xy}^T), ISTS 3.2.3, Total Integrated Radial Peaking Factor (F_r^T), ISTS 3.2.4, Azimuthal Power Tilt (T_q), and ISTS 3.2.5, Axial Shape Index (ASI). CTS do not include a Specification for ISTS 3.2.2, Total Planar Radial Peaking Factor (F_{xy}^T). The CTS and ISTS are renumbered. CTS 3.2.3, Total Integrated Radial Peaking Factor (F_r^T), CTS 3.2.4, Azimuthal Power Tilt (T_q), and CTS 3.2.5, Axial Shape Index (ASI), are renumbered as ITS 3.2.2, ITS 3.2.3, and ITS 3.2.4, respectively.

5. The type of plant (Analog) is deleted since it is unnecessary. This information is provided in NUREG-1432, Rev. 5.0, to assist in identifying the appropriate Specification to be used as a model for the plant specific ITS conversion but serves no purpose in a plant specific implementation.

6. ISTS Condition B is renumbered as ITS Condition C, and ISTS Condition C is renumbered as ITS Condition B. ITS Condition C deletes the verbiage “of Condition A” so ITS Condition C and Required Action C.1 apply to both ITS Condition A and ITS Condition B.

7. ISTS Bases Actions C.1, C.2, and C.3 changes support the CTS 3.2.4 and ITS 3.2.3 changes.

Specific No Significant Hazards Considerations (NSHCs)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS
ITS 3.2.3, AZIMUTHAL POWER TILT (T_q)

There are no specific No Significant Hazards Considerations for this Specification.

ATTACHMENT 4

ITS 3.2.4, AXIAL SHAPE INDEX (ASI)

Current Technical Specifications (CTS) Markup and Discussion of Changes (DOCs)

POWER DISTRIBUTION LIMITS

~~DNB PARAMETERS~~ AXIAL SHAPE INDEX (ASI)

LIMITING CONDITION FOR OPERATION

3.2.~~5~~ 4 The following DNB related parameters shall be maintained within the limits: (See ITS 3.4.1)

a. Cold Leg Temperature as shown on Table 3.2-1 of the COLR,

b. Pressurizer Pressure* as shown on Table 3.2-1 of the COLR,

c. Reactor Coolant System Total Flow Rate - greater than or equal to 375,000 gpm, and

LCO 3.2.4 ~~d.~~ ~~AXIAL SHAPE INDEX as shown on Figure 3.2-4 of~~ The ASI shall be maintained within the limits specified in the COLR.

Applicability **APPLICABILITY**: MODE 1 with THERMAL POWER ≥ 40% RTP. (L01)

ACTION:

Required Action A.1 ~~With any of the above parameters~~ ASI not within limits ~~exceeding its limit~~, restore ~~the parameter~~ ASI to within ~~its~~ limits

Required Action B.1 within 2 hours or reduce THERMAL POWER to ~~≤ 5~~ < 40% ~~of RATED THERMAL POWER~~ RTP within ~~the next~~ 4 hours. (L01)

SURVEILLANCE REQUIREMENTS

SR 3.2.4.1 (ASI) ~~4.2.5.1~~ ~~Each of the DNB related parameters shall be verified to be~~ Verify ASI is within ~~their~~ limits specified in the COLR ~~by instrument readout~~ in accordance with the Surveillance Frequency Control Program. (See ITS 3.4.1)

~~4.2.5.2~~ The Reactor Coolant System total flow rate shall be determined to be within its limit by measurement** in accordance with the Surveillance Frequency Control Program. (See ITS 3.4.1)

---

* Limit not applicable during either a THERMAL POWER ramp increase in excess of 5% per minute of RATED THERMAL POWER or a THERMAL POWER step increase of greater than 10% of RATED THERMAL POWER.

** Not required to be performed until THERMAL POWER is ≥ 90% of RATED THERMAL POWER.

~~Relocated to the COLR~~

POWER DISTRIBUTION LIMITS

DNB PARAMETERS

AXIAL SHAPE INDEX (ASI)

LIMITING CONDITION FOR OPERATION

3.2.5 4

The following DNB-related parameters shall be maintained within the limits:

a. Cold Leg Temperature as shown on Table 3.2-2 of the COLR,

b. Pressurizer Pressure* as shown on Table 3.2-2 of the COLR,

c. Reactor Coolant System Total Flow Rate - greater than or equal to 375,000 gpm, and

See ITS 3.4.1

LCO 3.2.4 d. AXIAL SHAPE INDEX as shown on Figure 3.2-4 of the COLR.

The ASI shall be maintained within the limits specified in

Applicability **APPLICABILITY**: MODE 1.

with THERMAL POWER ≥ 40% RTP

L01

ACTION:

ASI not within limits

ASI

s

Required Action A.1 With any of the above parameters exceeding its limit, restore the parameter to within its limit within
Required Action B.1 2 hours or reduce THERMAL POWER to ≤ 5% of RATED THERMAL POWER within the next 4 hours.

< 40

RTP

L01

SR 3.2.4.1 (ASI) **SURVEILLANCE REQUIREMENTS**

Verify ASI is

specified in the COLR

4.2.5.1 Each of the DNB-related parameters shall be verified to be within their limits by instrument readout in accordance with the Surveillance Frequency Control Program.

See ITS 3.4.1

4.2.5.2 The Reactor Coolant System total flow rate shall be determined to be within its limit by measurement** in accordance with the Surveillance Frequency Control Program.

See ITS 3.4.1

---

* Limit not applicable during either a THERMAL POWER ramp increase in excess of 5% per minute of RATED THERMAL POWER or a THERMAL POWER step increase of greater than 10% of RATED THERMAL POWER.

** Not required to be performed until THERMAL POWER is ≥ 90% of RATED THERMAL POWER.

~~DELETED~~

ADMINISTRATIVE CHANGES

A01 In the conversion of the St. Lucie Plant (PSL) Unit 1 and Unit 2, Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1432, Rev. 5.0, "Standard Technical Specifications-Combustion Engineering Plants" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

MORE RESTRICTIVE CHANGES

None

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

None

LESS RESTRICTIVE CHANGES

L01 *(Category 2 – Relaxation of Applicability)* CTS 3.2.5 states that the Applicability is MODE 1 and when the LCO is not met, the actions require restoring the parameter within 2 hours or reducing THERMAL POWER to ≤ 5% of RATED THERMAL POWER (i.e, MODE 2) within the next 4 hours. ITS 3.2.4 states that the Applicability is MODE 1 with THERMAL POWER ≥ 40% RTP and the Required Actions are consistent with CTS except THERMAL is reduced to < 40% RTP, which results placing the unit in a condition where ASI no longer applies. This changes the CTS by relaxing the Applicability to MODE 1 with THERMAL POWER ≥ 40% RTP and corresponding change to only require THERMAL POWER to be reduced < 40% RTP consistent with the revised Applicability.

The purpose of CTS 3.2.5 Applicability and ITS 3.2.4 Applicability is to establish the plant conditions where ASI is assumed in the safety analysis. PSL Unit 1 and Unit 2 safety analysis apply ASI at ≥ 40% RTP. The ASI limits curve specified in the COLR also explicitly state that the limits do not apply below 40% RTP. Therefore, below 40% RTP, the ASI power distribution limit is not applicable. Other limits assumed in the accident analysis ensure fuel damage does not occur below 40% RTP (e.g., linear heat rate (LHR) limit, power dependent rod insertion limits, CEA alignment, sequence, and overlap limits, and reactor coolant conditions; pressure, temperature, flow). The power distribution limits are based on correlations between power peaking and certain measured variables used as inputs to the LHR and DNB operating limits. The limitation on ASI, along with the limitations of LCO 3.3.1, "Reactor Protection System Instrumentation," represents a conservative envelope of operating conditions consistent with the assumptions that have been analytically demonstrated adequate for maintaining an acceptable minimum DNBR throughout all AOOs.

This change is acceptable because the LCO requirements applied in the ITS Applicability continues to ensure process variables, structures, systems, and components are maintained in the conditions assumed in the safety analyses and licensing basis. In MODE 1 with THERMAL POWER ≥ 40% RTP, ASI must be maintained within the power distribution limits assumed in the accident analyses to ensure that fuel damage does not result following an AOO. In MODE 1 with THERMAL POWER < 40% RTP, THERMAL POWER is not sufficient to require a limit on ASI power distribution.

This change is designated as less restrictive because the LCO requirements will not be applied under plant conditions in which they would be applied under the CTS.

Improved Standard Technical Specifications (ISTS) Markup and Justification for Deviations (JFDs)

3.2 POWER DISTRIBUTION LIMITS (Analog)

3.2.5 AXIAL SHAPE INDEX (ASI) (Analog) 4 3
4

LCO 3.2.5 LCO 3.2.5 The ASI shall be maintained within the limits specified in the COLR.
4

Applicability DOC L01 APPLICABILITY: MODE 1 with THERMAL POWER > 20% RTP. 5
≥ 40

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
Action — A. ASI not within limits.	A.1 Restore ASI to within limits.	2 hours
Action DOC L01 — B. Required Action and associated Completion Time not met.	B.1 Reduce THERMAL POWER to ≤ 20% RTP. < 40	4 hours 5

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
4.2.5.1 — SR 3.2.5.1 (4) Verify ASI is within limits specified in the COLR.	[12 hours (3) OR (2) In accordance with the Surveillance Frequency Control Program]

3.2 POWER DISTRIBUTION LIMITS (Analog) 4

3.2.5 AXIAL SHAPE INDEX (ASI) (Analog) 3
4

LCO 3.2.5 LCO 3.2.5 The ASI shall be maintained within the limits specified in the COLR.
4

Applicability DOC L01 APPLICABILITY: MODE 1 with THERMAL POWER > 20% RTP. 5
≥ 40

ACTIONS

	CONDITION	REQUIRED ACTION	COMPLETION TIME	
Action	A. ASI not within limits.	A.1 Restore ASI to within limits.	2 hours	
Action DOC L01	B. Required Action and associated Completion Time not met.	B.1 Reduce THERMAL POWER to ≤ 20% RTP. < 40	4 hours	5

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY	
4.2.5.1	SR 3.2.5.1 Verify ASI is within limits specified in the COLR. 4	[12 hours OR In accordance with the Surveillance Frequency Control Program]	3 2

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.4, AXIAL SHAPE INDEX (ASI)

1. Changes are made (additions, deletions, and/or changes) to the ISTS that reflect the plant specific nomenclature, number, reference, system description, analysis, licensing basis, or licensing basis description.

2. The ISTS contains bracketed information and/or values that are generic to all Combustion Engineering vintage plants. The brackets are removed, and the proper plant specific information/value is provided. This is acceptable since the information/value is changed to reflect the current licensing basis.

3. The ISTS includes ISTS 3.2.1, Linear Heat Rate (LHR), ISTS 3.2.2, Total Planar Radial Peaking Factor (F_{xy}^{T}), ISTS 3.2.3, Total Integrated Radial Peaking Factor (F_{r}^{T}), ISTS 3.2.4, Azimuthal Power Tilt (T_q), and ISTS 3.2.5, Axial Shape Index (ASI). CTS do not include a Specification for ISTS 3.2.2, Total Planar Radial Peaking Factor (F_{xy}^{T}). The CTS and ISTS are renumbered. CTS 3.2.3, Total Integrated Radial Peaking Factor (F_{r}^{T}), CTS 3.2.4, Azimuthal Power Tilt (T_q), and CTS 3.2.5, Axial Shape Index (ASI), are renumbered as ITS 3.2.2, ITS 3.2.3, and ITS 3.2.4, respectively.

4. The type of plant (Analog) is deleted since it is unnecessary. This information is provided in NUREG-1432, Rev. 5.0, to assist in identifying the appropriate Specification to be used as a model for the plant specific ITS conversion but serves no purpose in a plant specific implementation.

5. ISTS 3.2.5 (renumbered as ITS 3.2.4) Applicability and Required Action B.1 are changed to reflect relaxing the CTS Applicability. ITS 3.2.4 Applicability is MODE 1 with THERMAL POWER ≥ 40% RTP. This changes the CTS by relaxing the Applicability from MODE 1, to MODE 1 with THERMAL POWER ≥ 40% RTP. See DOC L01 for a discussion of changes for relaxing the CTS Applicability.

Improved Standard Technical Specifications (ISTS) Bases Markup and Justification for Deviations (JFDs)

B 3.2 POWER DISTRIBUTION LIMITS (Analog) 5

B 3.2.5 AXIAL SHAPE INDEX (ASI) (Analog) 4
4

BASES

BACKGROUND

The purpose of this LCO (AXIAL SHAPE INDEX (ASI)) is to limit the core power distribution to the initial values assumed in the accident analysis. Operation within the limits imposed by this LCO either limits or prevents potential fuel cladding failures that could breach the primary fission product barrier and release fission products to the reactor coolant in the event of a loss of coolant accident (LOCA), loss of flow accident, ejected control element assembly (CEA) accident, or other postulated accident requiring termination by a Reactor Protection System trip function. This LCO limits the amount of damage to the fuel cladding during an accident by ensuring that the plant is operating within acceptable bounding conditions at the onset of a transient.

Methods of controlling the power distribution include:

a. Using CEAs to alter the axial power distribution,

b. Decreasing CEA insertion by boration, thereby improving the radial power distribution, and

c. Correcting off optimum conditions (e.g., a CEA drop or misoperation of the unit) that cause margin degradations.

The core power distribution is controlled so that, in conjunction with other core operating parameters (e.g., CEA insertion and alignment limits), the power distribution does not result in violation of this LCO. The limiting safety system settings and this LCO are based on the accident analyses (Refs. 1 and 2), so that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences (AOOs), and the limits of acceptable consequences are not exceeded for other postulated accidents. 1

Limiting power distribution skewing over time also minimizes the xenon distribution skewing, which is a significant factor in controlling the axial power distribution.

Power distribution is a product of multiple parameters, various combinations of which may produce acceptable power distributions. Operation within the design limits of power distribution is accomplished by generating operating limits on linear heat rate (LHR) and departure from nucleate boiling (DNB).

BASES

BACKGROUND (continued)

The limits on LINEAR HEAT RATE (LHR), ~~Total Planar Radial Peaking Factor (F^T_{XY}),~~ Total Integrated Radial Peaking Factor (F^T_r), AZIMUTHAL POWER TILT (T_q), and ASI represent limits within which the LHR algorithms are valid. These limits are obtained directly from the core reload analysis. 4 1

Either of the two core power distribution monitoring systems, the Excore Detector Monitoring System and the Incore Detector Monitoring System, provide adequate monitoring of the core power distribution and ~~are~~ is capable of verifying that the LHR does not exceed its limits. The Excore Detector Monitoring System performs this function by continuously monitoring ~~the~~ ASI with the OPERABLE quadrant symmetric excore neutron flux detectors and verifying that the ASI is maintained within the allowable limits specified in the COLR. 1

In conjunction with the use of the Excore Detector Monitoring System and in establishing the ASI limits, the following conditions are assumed:

a. The CEA insertion limits of LCO 3.1.5, "Shutdown CEA Insertion Limits," and LCO 3.1.6, "Regulating CEA Insertion Limits," are satisfied,

b. The T_q restrictions of LCO 3.2.~~4~~ 3 are satisfied, and

c. ~~F^T_{xy}~~ F^T_r does not exceed the limits of LCO 3.2.2. 4

The Incore Detector Monitoring System continuously provides a more direct measure of the peaking factors, and the alarms ~~that have been~~ established for the individual incore detector segments ensure that the peak LHR is maintained within the limits specified in the COLR. The setpoints for these alarms include tolerances ~~, set in conservative directions, as follows:~~ described in Reference 3. 1 3

~~a. A measurement calculational uncertainty factor of 1.062,~~

~~b. An engineering uncertainty factor of 1.03,~~

~~c. An allowance of 1.002 for axial fuel densification and thermal expansion, and~~

~~d. A THERMAL POWER measurement uncertainty factor of 1.02.~~

BASES

APPLICABLE SAFETY ANALYSES

The fuel cladding must not sustain damage as a result of normal operation (Condition 1) or AOOs (Condition 2) (Ref. 3, GDC 10). The power distribution and CEA insertion and alignment LCOs prevent core power distributions from reaching levels that violate the following fuel design criteria: 4 1

a. During a LOCA, peak cladding temperature must not exceed 2200°F (Ref. 4), 5 1

b. During a loss of flow accident, there must be at least 95% probability at the 95% confidence level (the 95/95 DNB criterion) that the hot fuel rod in the core does not experience a DNB condition (Ref. 3, GDC 10), 4 1

c. During an ejected CEA accident, the fission energy input to the fuel must not exceed 280 cal/gm (Ref. [ ]), and 3 2 2

d. The control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck fully withdrawn (Ref. 3, GDC 26). 4 1

The power density at any point in the core must be limited to maintain the fuel design criteria (Ref. 4). This limitation is accomplished by maintaining the power distribution and reactor coolant conditions so that the peak LHR and DNB parameters are within operating limits supported by the accident analyses (Ref. 1) with due regard for the correlations among measured quantities, the power distribution, and uncertainties in the determination of power distribution. 5 1 between 1

Fuel cladding failure during a LOCA is limited by restricting the maximum linear heat generation rate so that the peak cladding temperature does not exceed 2200°F (Ref. 4). High peak cladding temperatures are assumed to cause severe cladding failure by oxidation due to a Zircaloy water reaction. 5 1

The LCOs governing LHR, ASI, and the Reactor Coolant System ensure that these criteria are met as long as the core is operated within the ASI, F^T_{XY}, and F^T_r limits specified in the COLR, and within the T_q limits. The latter are process variables that characterize the three dimensional power distribution of the reactor core. Operation within the limits for these variables ensures that their actual values are within the ranges used in the accident analyses. 4

BASES

APPLICABLE SAFETY ANALYSES (continued)

Fuel cladding damage does not normally occur while the reactor is operating at conditions outside these LCOs during normal operation. Fuel cladding damage results, however, when an accident or AOO occurs from initial conditions outside the limits of these LCOs. This potential for fuel cladding damage exists because changes in the power distribution can cause increased power peaking and correspondingly increased local LHRs.

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

LCO

The power distribution LCO limits are based on correlations between power peaking and certain measured variables used as inputs to the LHR and DNB operating limits. These power distribution LCO limits, except T_q, are provided in the COLR. The limitation on LHR ensures that in the event of a LOCA, the peak temperature of the fuel cladding does not exceed 2200°F.

The limitation on ASI, along with the limitations of LCO 3.3.1, "Reactor Protection System Instrumentation," represents a conservative envelope of operating conditions consistent with the assumptions that have been analytically demonstrated adequate for maintaining an acceptable minimum DNBR throughout all AOOs. Of these, the loss of flow transient is the most limiting. Operation of the core with conditions within the specified limits ensures that an acceptable minimum margin from DNB conditions is maintained in the event of any AOO, including a loss of flow transient.

APPLICABILITY

In MODE 1 with THERMAL POWER ≥ 40 > 20% RTP, power distribution must be maintained within the limits assumed in the accident analyses to ensure that fuel damage does not result following an AOO. In other MODES, this LCO does not apply because THERMAL POWER is not sufficient to require a limit on the core power distribution. Below 20% RTP the incore detector accuracy is not reliable. 6

ACTIONS

A.1

Operating the core within ASI limits specified in the COLR and within the limits of LCO 3.3.1 ensures an acceptable margin for DNB and for maintaining local power density in the event of an AOO. Maintaining ASI within limits also ensures that the limits of 10 CFR 50.46 are not exceeded during accidents. The Required Actions to restore ASI must be completed within 2 hours to limit the duration the plant is operated outside the initial conditions assumed in the accident analyses. In addition, this Completion Time is sufficiently short that the xenon distribution in the core cannot change significantly.

BASES

ACTIONS (continued)

B.1

If the ASI cannot be restored to within its specified limits, or ASI cannot be determined because of Excore Detector Monitoring System inoperability, core power must be reduced. Reducing THERMAL POWER to ≤ 20% RTP provides reasonable assurance that the core is operating farther from thermal limits and places the core in a conservative condition. Four hours is a reasonable amount of time, based on operating experience, to reduce THERMAL POWER to ≤ 20% RTP in an orderly manner and without challenging plant systems. 6

< 40

< 40

SURVEILLANCE REQUIREMENTS

SR 3.2.5.1 4

4

Verifying that the ASI is within the specified limits provides reasonable assurance that the core is not approaching DNB conditions. [A Frequency of 12 hours is adequate for the operator to identify trends in conditions that result in an approach to the ASI limits, because the mechanisms that affect the ASI, such as xenon redistribution or CEA drive mechanism malfunctions, cause the ASI to change slowly and should be discovered before the limits are exceeded. 2

OR

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

-----------------------------------REVIEWER'S NOTE-----------------------------------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement. 2
---]

REFERENCES

1. U FSAR, Chapter [15]. 2

2. FSAR, Chapter [6]. NUREG 0800, Section 4.2, Appendix B

3. Technical Requirements Manual

3. 4 10 CFR 50, Appendix A.

4. 5 10 CFR 50.46.

B 3.2 POWER DISTRIBUTION LIMITS (Analog) 5

B 3.2.5 AXIAL SHAPE INDEX (ASI) (Analog) 4
4

BASES

BACKGROUND

The purpose of this LCO (AXIAL SHAPE INDEX (ASI)) is to limit the core power distribution to the initial values assumed in the accident analysis. Operation within the limits imposed by this LCO either limits or prevents potential fuel cladding failures that could breach the primary fission product barrier and release fission products to the reactor coolant in the event of a loss of coolant accident (LOCA), loss of flow accident, ejected control element assembly (CEA) accident, or other postulated accident requiring termination by a Reactor Protection System trip function. This LCO limits the amount of damage to the fuel cladding during an accident by ensuring that the plant is operating within acceptable bounding conditions at the onset of a transient.

Methods of controlling the power distribution include:

a. Using CEAs to alter the axial power distribution,

b. Decreasing CEA insertion by boration, thereby improving the radial power distribution, and

c. Correcting off optimum conditions (e.g., a CEA drop or misoperation of the unit) that cause margin degradations.

The core power distribution is controlled so that, in conjunction with other core operating parameters (e.g., CEA insertion and alignment limits), the power distribution does not result in violation of this LCO. The limiting safety system settings and this LCO are based on the accident analyses (Refs. 1 and 2), so that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences (AOOs), and the limits of acceptable consequences are not exceeded for other postulated accidents. 1

Limiting power distribution skewing over time also minimizes the xenon distribution skewing, which is a significant factor in controlling the axial power distribution.

Power distribution is a product of multiple parameter rs, various combinations of which may produce acceptable power distributions. Operation within the design limits of power distribution is accomplished by generating operating limits on linear heat rate (LHR) and departure from nucleate boiling (DNB).

BASES

BACKGROUND (continued)

LINEAR HEAT RATE ( ) AZIMUTHAL POWER TILT ( )

The limits on LHR, Total Planar Radial Peaking Factor (F^T_{XY}), Total Integrated Radial Peaking Factor (F^T_r), T_q, and ASI represent limits within which the LHR algorithms are valid. These limits are obtained directly from the core reload analysis. 4 1

Either of the two core power distribution monitoring systems, the Excore Detector Monitoring System and the Incore Detector Monitoring System, provide adequate monitoring of the core power distribution and are is capable of verifying that the LHR does not exceed its limits. The Excore Detector Monitoring System performs this function by continuously monitoring the ASI with the OPERABLE quadrant symmetric excore neutron flux detectors and verifying that the ASI is maintained within the allowable limits specified in the COLR. 1

In conjunction with the use of the Excore Detector Monitoring System and in establishing the ASI limits, the following conditions are assumed:

a. The CEA insertion limits of LCO 3.1.5, "Shutdown CEA Insertion Limits," and LCO 3.1.6, "Regulating CEA Insertion Limits," are satisfied,

b. The T_q restrictions of LCO 3.2.4 3 are satisfied, and

c. F^T_{xy} F^T_r does not exceed the limits of LCO 3.2.2. 4

The Incore Detector Monitoring System continuously provides a more direct measure of the peaking factors, and the alarms that have been established for the individual incore detector segments ensure that the peak LHR is maintained within the limits specified in the COLR. The setpoints for these alarms include tolerances, set in conservative directions, as follows: described in Reference 3. 1 3

a. A measurement calculational uncertainty factor of 1.062,

b. An engineering uncertainty factor of 1.03,

c. An allowance of 1.002 for axial fuel densification and thermal expansion, and

A THERMAL POWER measurement uncertainty factor of 1.02.

BASES

APPLICABLE SAFETY ANALYSES

The fuel cladding must not sustain damage as a result of normal operation (Condition 1) or AOOs (Condition 2) (Ref. 3, GDC 10). The power distribution and CEA insertion and alignment LCOs prevent core power distributions from reaching levels that violate the following fuel design criteria: 4 1

a. During a LOCA, peak cladding temperature must not exceed 2200°F (Ref. 4), 5 1

b. During a loss of flow accident, there must be at least 95% probability at the 95% confidence level (the 95/95 DNB criterion) that the hot fuel rod in the core does not experience a DNB condition (Ref. 3, GDC 10), 4 1

c. During an ejected CEA accident, the fission energy input to the fuel must not exceed 280 cal/gm (Ref. [ ]), and 3 2 2

d. The control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck fully withdrawn (Ref. 3, GDC 26). 4 1

The power density at any point in the core must be limited to maintain the fuel design criteria (Ref. 4). This limitation is accomplished by maintaining the power distribution and reactor coolant conditions so that the peak LHR and DNB parameters are within operating limits supported by the accident analyses (Ref. 1) with due regard for the correlations between among measured quantities, the power distribution, and uncertainties in the determination of power distribution. 5 1 1

Fuel cladding failure during a LOCA is limited by restricting the maximum linear heat generation rate so that the peak cladding temperature does not exceed 2200°F (Ref. 4). High peak cladding temperatures are assumed to cause severe cladding failure by oxidation due to a Zircaloy water reaction. 5 1

The LCOs governing LHR, ASI, and the Reactor Coolant System ensure that these criteria are met as long as the core is operated within the ASI, F^T_{XY}, and F^T_r limits specified in the COLR, and within the T_q limits. The latter are process variables that characterize the three dimensional power distribution of the reactor core. Operation within the limits for these variables ensures that their actual values are within the ranges used in the accident analyses. 4

BASES

APPLICABLE SAFETY ANALYSES (continued)

Fuel cladding damage does not normally occur while the reactor is operating at conditions outside these LCOs during normal operation. Fuel cladding damage results, however, when an accident or AOO occurs from initial conditions outside the limits of these LCOs. This potential for fuel cladding damage exists because changes in the power distribution can cause increased power peaking and correspondingly increased local LHRs.

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

LCO

The power distribution LCO limits are based on correlations between power peaking and certain measured variables used as inputs to the LHR and DNB operating limits. These power distribution LCO limits, except T_q, are provided in the COLR. The limitation on LHR ensures that in the event of a LOCA, the peak temperature of the fuel cladding does not exceed 2200°F.

The limitation on ASI, along with the limitations of LCO 3.3.1, "Reactor Protection System Instrumentation," represents a conservative envelope of operating conditions consistent with the assumptions that have been analytically demonstrated adequate for maintaining an acceptable minimum DNBR throughout all AOOs. Of these, the loss of flow transient is the most limiting. Operation of the core with conditions within the specified limits ensures that an acceptable minimum margin from DNB conditions is maintained in the event of any AOO, including a loss of flow transient.

APPLICABILITY

In MODE 1 with THERMAL POWER ≥ 40 > 20% RTP, power distribution must be maintained within the limits assumed in the accident analyses to ensure that fuel damage does not result following an AOO. In other MODES, this LCO does not apply because THERMAL POWER is not sufficient to require a limit on the core power distribution. Below 20% RTP the incore detector accuracy is not reliable. 6

ACTIONS

A.1

Operating the core within ASI limits specified in the COLR and within the limits of LCO 3.3.1 ensures an acceptable margin for DNB and for maintaining local power density in the event of an AOO. Maintaining ASI within limits also ensures that the limits of 10 CFR 50.46 are not exceeded during accidents. The Required Actions to restore ASI must be completed within 2 hours to limit the duration the plant is operated outside the initial conditions assumed in the accident analyses. In addition, this Completion Time is sufficiently short that the xenon distribution in the core cannot change significantly.

BASES

ACTIONS (continued)

B.1

If the ASI cannot be restored to within its specified limits, or ASI cannot be determined because of Excore Detector Monitoring System inoperability, core power must be reduced. Reducing THERMAL POWER to ≤ 20% RTP provides reasonable assurance that the core is operating farther from thermal limits and places the core in a conservative condition. Four hours is a reasonable amount of time, based on operating experience, to reduce THERMAL POWER to ≤ 20% RTP in an orderly manner and without challenging plant systems. < 40 6

SURVEILLANCE REQUIREMENTS

SR 3.2.5.1 4 4

Verifying that the ASI is within the specified limits provides reasonable assurance that the core is not approaching DNB conditions. [A Frequency of 12 hours is adequate for the operator to identify trends in conditions that result in an approach to the ASI limits, because the mechanisms that affect the ASI, such as xenon redistribution or CEA drive mechanism malfunctions, cause the ASI to change slowly and should be discovered before the limits are exceeded. 2

OR

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

-----------------------------------REVIEWER'S NOTE-----------------------------------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement. 2
---]

REFERENCES

1. U FSAR, Chapter [15]. 2
2. FSAR, Chapter [6]. NUREG 0800, Section 4.2, Appendix B
3. Technical Requirements Manual
3. 4 10 CFR 50, Appendix A.
4. 5 10 CFR 50.46.

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.4, BASES, AXIAL SHAPE INDEX (ASI)

1. Changes are made (additions, deletions, and/or changes) to the ISTS that reflect the plant specific nomenclature, number, reference, system description, analysis, licensing basis, or licensing basis description.

2. The ISTS contains bracketed information and/or values that are generic to all Combustion Engineering vintage plants. The brackets are removed, and the proper plant specific information/value is provided. This is acceptable since the information/value is changed to reflect the current licensing basis.

3. The ISTS contains tolerances to be applied to the incore detector alarm setpoints. PSL Unit 1 UFSAR, Section 13.8, Licensee-Controlled Technical Specification Requirements, and PSL Unit 2 UFSAR, Section 13.7, Licensee-Controlled Technical Specification Requirements, each contain these tolerances to be applied to the incore detector alarm setpoints. Additionally, these tolerances will be provided in the Technical Requirements Manual. Therefore, the tolerances to be applied to the incore detector alarm setpoints are deleted.

4. The ISTS includes ISTS 3.2.1, Linear Heat Rate (LHR), ISTS 3.2.2, Total Planar Radial Peaking Factor (F_{xy}^{T}), ISTS 3.2.3, Total Integrated Radial Peaking Factor (F_{r}^{T}), ISTS 3.2.4, Azimuthal Power Tilt (T_q), and ISTS 3.2.5, Axial Shape Index (ASI). CTS do not include a Specification for ISTS 3.2.2, Total Planar Radial Peaking Factor (F_{xy}^{T}). The CTS and ISTS are renumbered. CTS 3.2.3, Total Integrated Radial Peaking Factor (F_{r}^{T}), CTS 3.2.4, Azimuthal Power Tilt (T_q), and CTS 3.2.5, Axial Shape Index (ASI), are renumbered as ITS 3.2.2, ITS 3.2.3, and ITS 3.2.4, respectively.

5. The type of plant (Analog) is deleted since it is unnecessary. This information is provided in NUREG-1432, Rev. 5.0, to assist in identifying the appropriate Specification to be used as a model for the plant specific ITS conversion but serves no purpose in a plant specific implementation.

6. ISTS 3.2.5 Bases (renumbered as ITS 3.2.4) Applicability discussion and Action B.1 discussion are changed to reflect relaxing the CTS Applicability. ITS 3.2.4 Applicability is MODE 1 with THERMAL POWER ≥ 40% RTP. This changes the CTS by relaxing the Applicability from MODE 1, to MODE 1 with THERMAL POWER ≥ 40% RTP. See DOC L01 for a discussion of changes for relaxing the CTS Applicability. Additionally, in the Applicability discussion, the statement “below 20% RTP the incore detector accuracy is not reliable” is deleted because the state of the incore detector accuracy at 20% RTP it is not relevant to the condition that below 40% RTP the ASI LCO no longer applies. In the Action B.1 discussion, the statement “or ASI cannot be determined because of Excore Detector Monitoring System inoperability” is deleted because the operability of the Excore Detector Monitoring System is not relevant to the Action B.1 action that when ASI is not restored to within limits within 2 hours, then THERMAL POWER must be reduced to below 40% RTP within 4 hours.

Specific No Significant Hazards Considerations (NSHCs)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS
ITS 3.2.4, AXIAL SHAPE INDEX (ASI)

There are no specific No Significant Hazards Considerations for this Specification.

ATTACHMENT 5

ISTS Not Adopted

Improved Standard Technical Specifications (ISTS) Markup and Justification for Deviations (JFDs)

3.2 POWER DISTRIBUTION LIMITS (Analog)

3.2.2 Total Planar Radial Peaking Factor (F^T_{xy}) (Analog)

LCO 3.2.2 The calculated value of F^T_{xy} shall not exceed the limits specified in the COLR.

APPLICABILITY: MODE 1.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ------------NOTE------------ Required Actions shall be completed if this Condition is entered. -------------------------------- F^T_{xy} not within limits.	A.1 Reduce THERMAL POWER to bring the combination of THERMAL POWER and F^T_{xy} to within the limits specified in the COLR. AND A.2 Withdraw the control element assemblies (CEAs) to or beyond the long term steady state insertion limits of LCO 3.1.6, "Regulating CEAs," as specified in the COLR.	6 hours 6 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 2.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.2.1	-----------------------------NOTE---------------------------- SR 3.2.2.2 and SR 3.2.2.3 shall be completed each time SR 3.2.2.1 is required. F^T_{xy} shall be determined by using the incore detectors to obtain a power distribution map with all full length CEAs at or above the long term steady state insertion limit, as specified in the COLR. ---	
	Verify the value of F^T_{xy}	Once prior to operation above 70% RTP after each fuel loading AND [Each 31 days of accumulated operation in MODE 1 OR In accordance with the Surveillance Frequency Control Program]
SR 3.2.2.2	Verify the value of F_{xy}.	In accordance with the Frequency requirements of SR 3.2.2.1

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.2.2.3 Verify the value of T_q.	In accordance with the Frequency requirements of SR 3.2.2.1

JUSTIFICATION FOR DEVIATIONS
ISTS 3.2.2, TOTAL PLANAR RADIAL PEAKING FACTOR ($\mathbf{F^T_{xy}}$) (ANALOG)

1. ISTS 3.2.2, Total Planar Radial Peaking Factor (F^T_{xy}) (Analog) Specification is not included in the St. Lucie Plant (PSL) Unit 1 and Unit 2 ITS because the PSL CTS do not include a Specification for Total Planar Radial Peaking Factor (F^T_{xy}) (Analog).

Improved Standard Technical Specifications (ISTS) Bases Markup and Justification for Deviations (JFDs)

B 3.2 POWER DISTRIBUTION LIMITS (Analog)

B 3.2.2 Total Planar Radial Peaking Factor (F^T_{XY}) (Analog)

BASES

BACKGROUND

The purpose of this LCO (Total Planar Radial Peaking Factor (F^T_{XY})) is to limit the core power distribution to the initial values assumed in the accident analyses. Operation within the limits imposed by this LCO decreases or prevents potential fuel cladding failures that could breach the primary fission product barrier and release fission products to the reactor coolant in the event of a loss of coolant accident (LOCA), loss of flow accident, ejected control element assembly (CEA) accident, or other postulated accident requiring termination by a Reactor Protection System trip function. This LCO limits damage to the fuel cladding during an accident by ensuring that the plant is operating within acceptable bounding conditions at the onset of a transient.

Methods of controlling the power distribution include:

a. Using CEAs to alter the axial power distribution,

b. Decreasing CEA insertion by boration, thereby improving the radial power distribution, and

c. Correcting off optimum conditions (e.g., a CEA drop or misoperation of the unit) that cause margin degradations.

The core power distribution is controlled so that, in conjunction with other core operating parameters (e.g., CEA insertion and alignment limits), the power distribution does not result in violation of this LCO. The limiting safety system settings (LSSS) and this LCO are based on accident analyses (Refs. 1 and 2), so that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences (AOOs) and the limits of acceptable consequences are not exceeded for other postulated accidents.

Limiting power distribution skewing over time also minimizes the xenon distribution skewing, which is a significant factor in controlling the axial power distribution.

Power distribution is a product of multiple parameters, various combinations of which may produce acceptable power distributions. Operation within the design limits of power distribution is accomplished by generating operating limits on the linear heat rate (LHR) and departure from nucleate boiling (DNB).

BASES

BACKGROUND (continued)

The limits on LHR, F^T_{XY}, Total Integrated Radial Peaking Factor (F^T_r), T_q, and ASI represent limits within which the LHR algorithms are valid. These limits are obtained directly from the core reload analysis.

Either of the two core power distribution monitoring systems, the Excore Detector Monitoring System or the Incore Detector Monitoring System, provides adequate monitoring of the core power distribution and is capable of verifying that the LHR does not exceed its limits. The Excore Detector Monitoring System performs this function by continuously monitoring the ASI with the OPERABLE quadrant symmetric excore neutron flux detectors and verifying that the ASI is maintained within the allowable limits specified in the COLR.

In conjunction with the use of the Excore Detector Monitoring System and in establishing the ASI limits, the following assumptions are made:

a. The CEA insertion limits of LCO 3.1.5, "Shutdown CEA Insertion Limits," and LCO 3.1.6, "Regulating CEA Insertion Limits," are satisfied,

b. The T_q restrictions of LCO 3.2.4 are satisfied, and

c. F^T_{XY} does not exceed the limits of this LCO.

The Incore Detector Monitoring System continuously provides a more direct measure of the peaking factors, and the alarms that have been established for the individual incore detector segments ensure that the peak LHRs are maintained within the limits specified in the COLR. The setpoints for these alarms include tolerances, set in conservative directions, for:

a. A measurement calculational uncertainty factor of 1.062,

b. An engineering uncertainty factor of 1.03,

c. An allowance of 1.002 for axial fuel densification and thermal expansion, and

d. A THERMAL POWER measurement uncertainty factor of 1.02.

BASES

APPLICABLE SAFETY ANALYSES

The fuel cladding must not sustain damage as a result of normal operation (Condition 1) or AOOs (Condition 2) (Ref. 3, GDC 10). The Power Distribution and CEA Insertion and Alignment LCOs preclude core power distributions that violate the following fuel design criteria:

a. During a LOCA, peak cladding temperature must not exceed 2200°F (Ref. 4),

b. During a loss of flow accident, there must be at least 95% probability at the 95% confidence level (the 95/95 DNB criterion) that the hot fuel rod in the core does not experience a DNB condition (Ref. 3, GDC 10),

c. During an ejected CEA accident, the fission energy input to the fuel must not exceed 280 cal/gm (Ref. [ ]), and

d. The control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck, fully withdrawn (Ref. 3, GDC 26).

The power density at any point in the core must be limited to maintain the fuel design criteria (Ref. 4). This limiting is accomplished by maintaining the power distribution and reactor coolant conditions such that the peak LHR and DNB parameters are within operating limits supported by the accident analyses (Ref. 1) with due regard for the correlations between measured quantities, the power distribution, and the uncertainties in the determination of power distribution.

Fuel cladding failure during a LOCA is limited by restricting the maximum linear heat generation rate so that the peak cladding temperature does not exceed 2200°F (Ref. 4). High peak cladding temperatures are assumed to cause severe cladding failure by oxidation due to a Zircaloy water reaction.

The LCOs governing LHR, ASI, and the Reactor Coolant System ensure that these criteria are met as long as the core is operated within the ASI, F^T_{XY}, F^T_r, and T_q limits specified in the COLR. The latter are process variables that characterize the three dimensional power distribution of the reactor core. Operation within the limits for these variables ensures that their actual values are within the ranges used in the accident analyses.

BASES

APPLICABLE SAFETY ANALYSES (continued)

Fuel cladding damage does not normally occur while at conditions outside the limits of these LCOs during normal operation. Fuel cladding damage could result, however, should an accident or AOO occur from initial conditions outside the limits of these LCOs. This potential for fuel cladding damage exists because changes in the power distribution can cause increased power peaking and correspondingly increased local LHR.

F^T_{XY} satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The power distribution LCO limits are based on correlations between power peaking and certain measured variables used as inputs to the LHR and DNB ratio operating limits. The power distribution LCO limits, except T_q, are provided in the COLR. The limitation on LHR ensures that in the event of a LOCA the peak temperature of the fuel cladding does not exceed 2200°F.

APPLICABILITY

In MODE 1, power distribution must be maintained within the limits assumed in the accident analyses to ensure that fuel damage does not result following an AOO. In other MODES, this LCO does not apply because there is not sufficient THERMAL POWER to require a limit on the core power distribution.

ACTIONS

A.1 and A.2

A Note modifies Condition A to require Required Actions A.1 and A.2 to be completed if the Condition is entered. This ensures that corrective action is taken prior to unrestricted operation.

The limitations on F^T_{XY} provided in the COLR ensure that the assumptions used in the analysis for establishing the LHR, LCO, and LSSS remain valid during operation at the various allowable CEA group insertion limits. If F^T_{XY} exceeds its basic limitation, operation may continue under the additional restrictions imposed by these Required Actions (reducing THERMAL POWER and withdrawing CEAs to or beyond the long term steady state insertion limits of LCO 3.1.6), because these additional restrictions adequately ensure that the assumptions used in establishing the LHR, LCO, and LSSS remain valid (Ref. 3). Six hours to return F^T_{XY} to within its limit is reasonable and ensures that all CEAs meet the long term steady state insertion limits of LCO 3.1.6.

BASES

ACTIONS (continued)

B.1

If F^T_r cannot be returned to within its limit, THERMAL POWER must be reduced. A change to MODE 2 provides reasonable assurance that the core is operating within its thermal limits and places the core in a conservative condition. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 2 from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2.2.1

The periodic Surveillance to determine the calculated F^T_{XY} ensures that F^T_{XY} remains within the range assumed in the analysis throughout the fuel cycle. Determining the measured F^T_{XY} after each fuel loading prior to the reactor exceeding 70% RTP ensures that the core is properly loaded.

[Performance of the Surveillance every 31 days of accumulated operation in MODE 1 provides reasonable assurance that unacceptable changes in the F^T_{XY} are promptly detected.

OR

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

------------------------------------REVIEWER'S NOTE------------------------------------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
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The power distribution map can only be obtained after THERMAL POWER exceeds 20% RTP because the incore detectors are not reliable below 20% RTP.

The SR is modified by a Note that requires that SR 3.2.2.2 and SR 3.2.2.3 be completed each time SR 3.2.1.1 is completed. (Values computed by these SRs are required to perform SR 3.2.2.1.) The Note also requires that the incore detectors be used to determine F^T_{XY} by using them to obtain a power distribution map with all full length CEAs above the long term steady state insertion limits, as specified in the COLR.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.2.2.2 and SR 3.2.2.3

Measuring the value of F_{XY} and T_q each time a calculated value of F^T_{XY} is required ensures that the calculated value of F^T_{XY} accurately reflects the condition of the core.

The Frequency for these Surveillances is in accordance with the Frequency requirements of SR 3.2.2.1, because these SRs provide information to complete SR 3.2.2.1.

REFERENCES

1. FSAR, Chapter [15].
2. FSAR, Chapter [6].
3. 10 CFR 50, Appendix A.
4. 10 CFR 50.46.

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