DESCRIPTION OF PROPOSED CHANGE NPF-10/15-52 AND SAFETY EVALUATION

This is a request to revise Technical Specifications 3/4.2.4 and 3.3.1 (Table 3.3-1, Action 6) and associated bases.

Existing Specification

See Attachment A for Units 2 and 3

Proposed Specification

See Attachment B for Units 2 and 3

Reason for Proposed Change

The purpose of this proposed change is to 1) improve DNBR operating margin when COLSS is out-of-service, 2) allow continued operation beyond a 7 day period when both CEA calculators (CEAC's) are out-of-service, and 3) clarify Action Statement 6 of Table 3.3-1 when COLSS is in or out-of-service.

Description

DNBR Operating Margin Improvement

Description

The CPC and COLSS systems are responsible for the safety and monitoring functions, respectively, of the reactor core. COLSS monitors the DNB Power Operating Limit (POL) and various operating parameters to help the operator maintain plant operation within the limiting conditions for operation (LCO). Operating within the LCO guarantees that in the event of an Anticipated Operational Occurrence (AOO), the CPC's will provide a reactor trip in time to prevent unacceptable fuel damage.

The COLSS reserves the Required Overpower Margin (ROPM) to account for the Loss of Flow transient which is the limiting AOO. When the COLSS is Out of Service (COOS) the monitoring function is performed via the CPC calculation of DNBR in conjunction with a COOS Limit Line (Technical Specification Figure 3.2-2) which restricts the reactor power sufficiently to preserve the ROPM.

This proposed change increases the COLSS out-of-service margin by 10%. The thermal margin gain is reflected in the new COLSS out-of-service limit lines as presented in revised Figure 3.2-2 and new Figure 3.2-3 of Attachment B. These lines take into account a reevaluated CPC overall uncertainty consistent with the requirements of LCO monitoring.

Note that two COLSS out-of-service curves are being proposed: one applicable at and above 80% rated thermal power and one applicable below 80% rated thermal power. This is done to maximize allowable power level near full power operation.

Improvement If COLSS and/or CEAC's Are Out-of-Service

Normally, the Control Element Assembly Calculators (CEACs) assist the Core Protection Calculators (CPCs) in providing protection against various transients involving CEA deviations. This is done by providing CPCs with Departure from Nucleate Boiling Ratio (DNBR) and Linear Heat Rate (LHR) penalties based on the effect the deviation has on the radial peaking factor. Rod position information is provided by the Reed Switch Position Transmitters (RSPT) to the two CEACs.

When both CEACs are "out-of-sevice", the CEACs can no longer be relied upon to provide appropriate penalties to the CPCs. One of the actions required by the Technical Specifications (Table 3.3-1, Action Item 6) is to set the RSPT/CEAC addressable constant to the inoperable status. This action causes the CPC to ignore all CEA position information and CEAC penalty factors. Instead, the CPC uses off-line calculated penalty factors. The purpose of these penalties is to compensate for the lack of CEA position information or CEAC penalties for certain events (e.g., CEA withdrawal) from the limited CEA insertion permitted by Action Item 6.

For example, if a single CEA is withdrawn from an initially inserted group, this will result in an increase in radial peak. However, since the CPCs are no longer receiving penalties from the CEACs, the off-line calculated penalties are needed to assure the fuel design limits on DNBR and LHR are not violated. The off-line calculated penalties are continuously applied since, due to the lack of CEA position information, the CPCs would not know if a CEA withdrawal were to occur. Note that all other parameter changes (e.g., inlet temperature, pressure, etc.) will be correctly "seen" by the CPCs. Thus, the penalties need only account for the effect of a possibly withdrawn CEA or CEA group.

For CEA drop events (single or subgroup), the CPCs will not detect the deviation. The other parameters monitored by CPC will indicate an increase in DNBR and decrease in LHR (i.e., power and T_c will decrease). Thus, a CPC trip will not occur. As a result, sufficient initial margin must be required to allow the event to occur without violating the fuel design limits. Since the Technical Specifications allow one hour following a CEA drop before action is required, the effects of xenon on radial peak for one hour following a drop must be included. The CEA drop events become the limiting events - requiring more thermal margin than the four pump loss of flow (the limiting event when CEACs are in-service).

The COLSS assures that enough thermal margin is available so that the four pump loss of flow does not violate the DNBR fuel design limit. Since more margin is required to protect against CEA drops when both CEAC's are out-of-service, an additional penalty on the COLSS calculated power operating limit is needed. This is the reason for the 22% penalty incorporated into Figure 3.2-1 for both CEAC's out-of-service.

Naturally, if COLSS is unavailable, the "monitoring" of the required thermal margin must be done using the CPCs. As stated previously, CPCs will use an off-line calcualted penalty factor to calculate DNBR when CEACs are out-of-service. This penalty, which was generated to protect against CEA withdrawal events, can be credited for CEA drop events. In this case, an additional penalty of 1.13 on BERR1 is needed to assure sufficient margin is available to protect against the CEA drop events. In other words, the combination of the off-line calculated CEA withdrawal penalty and the 1.13 factor on CPC assures that the same initial margin is available as would be when the COLSS calculated power operating limit is reduced by 22%. Both are ways of assuring CEA drops will not violate fuel design limits.

Table 1 outlines the actions and approximate power levels attainable under the current Technical Specifications.

TABLE 1

COLSS/CEAC's OUT OF SERVICE (O.O.S) ACTIONS
TO ASSURE NECESSARY THERMAL MARGIN

	COLSS(1) O.O.S.	CEAC's(2)(3) O.O.S.	COLSS and CEAC(3) O.O.S.
Tech. Spec. Action	Use DNBR Curve from Tech. Spec. 3.2.4	Reduce COLSS Calculated POL by 22% of full power	Apply 1.13 Multiplier on BERR1
CPC Penalty Automatically Applied	No	Yes(4)	Yes(4)
Approximate Power Capability	85%	70-75%	50-60%

(1) At least one CEAC in-service

(2) COLSS in-service

(3) When CEAC's are both O.O.S.; RSPT/CEAC Inoperable constant is set, CEA insertion is restricted and CEDMCS is placed in "OFF". (See action item 6 to table 3.3-1).

(4) Setting the inoperable constant automatically applies a penalty to CPC DNBR calculation.

Safety Evaluation

The proposed changes discussed above shall be deemed to involve a significant hazards consideration if there is a positive finding in any one of the following areas:

1. Will operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No

   The probability or consequences of an accident previously evaluated will not be significantly increased. The proposed changes affect the margin of safety of accidents previously evaluated.

2. Will operation of the facility in accordance with this proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No

   The proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Will operation of the facility in accordance with the proposed change involve a significant reduction in a margin of safety?

   Response: No

   The dynamic uncertainty components included in the CPC DNBR calculation, but not required in the LCO monitoring system, are removed from the COOS DNBR limit line. Previously, with COOS, the CPC's provided the monitoring function on DNBR very conservatively using the larger safety system uncertainties.

   The conservatisms in the CPC uncertainty analysis must cover many transient conditions and a very wide operating space. By limiting these requirements to be consistent with LCO monitoring, the uncertainty factors which are required can be reduced. The margin corresponding to this reduction in uncertainty factors is used in providing a new, less restrictive COLSS out-of-service limit. Note that none of the CPC channels is affected and, therefore, the safety system setpoints are unchanged. The margin credit for the reduced uncertainties is used to determine a less restrictive COLSS out-of-service limit.

   If one CEAC is inoperable for beyond the 7 day period, plant safety will not be compromised because both CEAC's will be flagged inoperable to the CPC's activating default penalties which will preserve the safe operating margin.

The proposed change is similar to example (vi) of amendments not likely to involve a significant hazards consideration published in 48 FR 14864 dated April 6, 1983 in that it may reduce in some way a safety margin but where the results of the change are clearly within the acceptable criteria specified in the Standard Review Plan.

Safety and Significant Hazards Consideration Determination

Based on the Safety Evaluation, it is concluded that: (1) the proposed change does not constitute a significant hazards consideration as defined by 10 CFR 50.92 and (2) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed change; and (3) this action will not result in a condition which signficantly alters the impact of the station on the environment as described in the NRC Environmental Statement.

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ATTACHMENT A

3/4.2.4 DNBR MARGIN

LIMITING CONDITION FOR OPERATION

3.2.4 The DNBR margin shall be maintained by operating within the region of acceptable operation of Figure 3.2-1 or 3.2-2, as applicable.

APPLICABILITY: MODE 1 above 20% of RATED THERMAL POWER.

ACTION:

With operation outside of the region of acceptable operation, as indicated by either (1) the COLSS calculated core power exceeding the COLSS calculated core power operating limit based on DNBR; or (2) when the COLSS is not being used, any OPERABLE Low DNBR channel exceeding the DNBR limit, within 15 minutes initiate corrective action to restore the DNBR to within the limits and either:

a. Restore the DNBR to within its limits within one hour, or

b. Be in at least HOT STANDBY within the next 6 hours.

SURVEILLANCE REQUIREMENTS

4.2.4.1 The provisions of Specification 4.0.4 are not applicable.

4.2.4.2 The DNBR shall be determined to be within its limits when THERMAL POWER is above 20% of RATED THERMAL POWER by continuously monitoring the core power distribution with the Core Operating Limit Supervisory System (COLSS) or, with the COLSS out of service, by verifying at least once per 2 hours that the DNBR, as indicated on all OPERABLE DNBR channels, is within the limit shown on Figure 3.2-2.

4.2.4.3 At least once per 31 days, the COLSS Margin Alarm shall be verified to actuate at a THERMAL POWER level less than or equal to the core power operating limit based on DNBR.

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SURVEILLANCE REQUIREMENTS (Continued)

4.2.4.4 The DNBR penalty factors included in the COLSS and CPC DNBR calculations shall be verified at least once per 31 EFPDs to be greater than or equal to the values listed below. This verification will be made on the basis of the BERR1 addressable constant for the CPC and the EPOL2 addressable constant for the COLSS.

Burnup $\frac{GWD}{MTU}$	DNBR Penalty (%)
0-10	0.5
10-20	1.0
20-30	2.0
30-40	3.5
40-50	5.5

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Figure 3.2-1

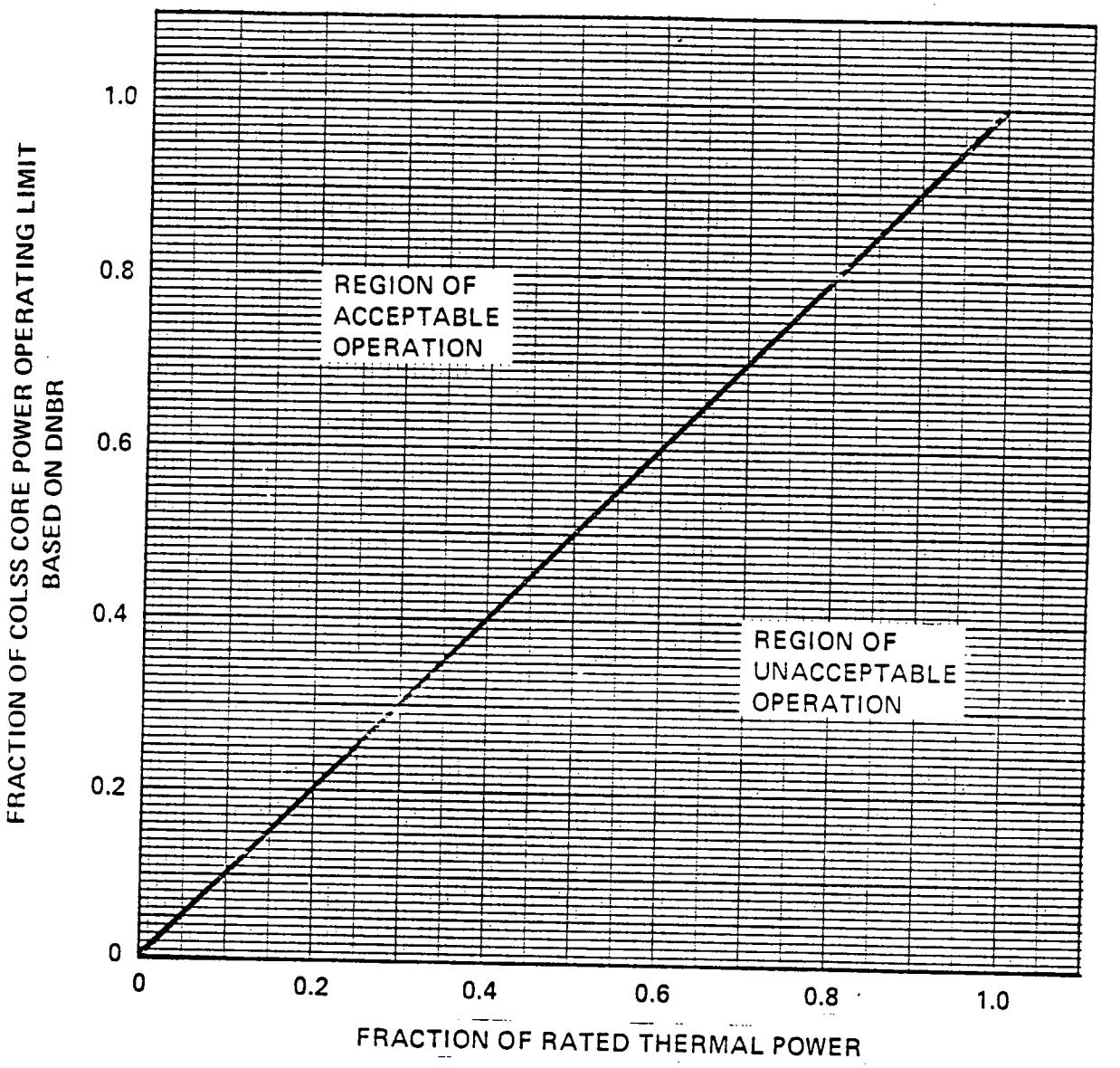

Figure 3.2-1 DNBR margin operating limit based on COLSS.

Figure 3.2-2

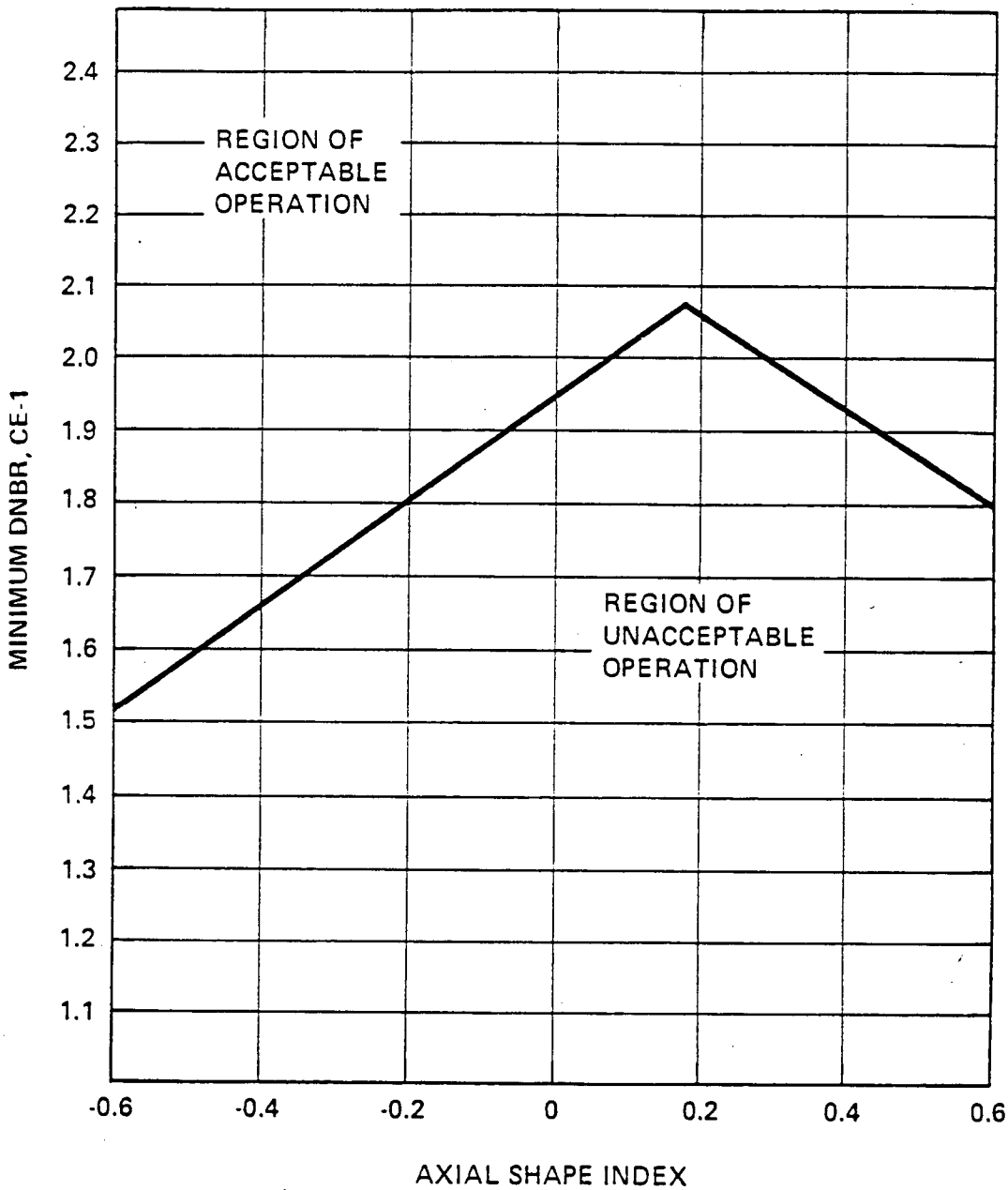

Figure 3.2-2 DNBR margin operating limit based on core protection calculators. (COLSS out of service)

TABLE 3.3-1 (Continued)

ACTION STATEMENTS

2.	Pressurizer Pressure - High	Pressurizer Pressure - High Local Power Density - High DNBR - Low
3.	Containment Pressure - High	Containment Pressure - High (RPS) Containment Pressure - High (ESF)
4.	Steam Generator Pressure - Low	Steam Generator Pressure - Low Steam Generator ΔP 1 and 2 (EFAS 1 and 2)
5.	Steam Generator Level	Steam Generator Level - Low Steam Generator Level - High Steam Generator ΔP (EFAS)
6.	Core Protection Calculator	Local Power Density - High DNBR - Low

STARTUP and/or POWER OPERATION may continue until the performance of the next required CHANNEL FUNCTIONAL TEST. Subsequent STARTUP and/or POWER OPERATION may continue if one channel is restored to OPERABLE status and the provisions of ACTION 2 are satisfied.

ACTION 4 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement, suspend all operations involving positive reactivity changes.

ACTION 5 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement, be in at least HOT STANDBY within 6 hours.

ACTION 6 -

a. With one CEAC inoperable, operation may continue for up to 7 days provided that at least once per 4 hours, each CEA is verified to be within 7 inches (indicated position) of all other CEAs in its group.

b. With both CEACs inoperable, operation may continue provided that:

1. Within 1 hour the margins required by Specifications 3.2.1 and 3.2.4 are increased and

TABLE 3.3-1 (Continued)

TABLE NOTATION

maintained at a value equivalent to greater than or equal to 19% of RATED THERMAL POWER.

2. Within 4 hours:

   a) All full length and part length CEA groups are withdrawn to and subsequently maintained at the "Full Out" position, except during surveillance testing pursuant to the requirements of Specification 4.1.3.1.2 or for control when CEA group 6 may be inserted no further than 127.5 inches withdrawn.

   b) The "RSPT/CEAC Inoperable" addressable constant in the CPCs is set to the inoperable status.

   c) The Control Element Drive Mechanism Control System (CEDMCS) is placed in and subsequently maintained in the "Off" mode except during CEA group 6 motion permitted by a) above, when the CEDMCS may be operated in either the "Manual Group" or "Manual Individual" mode.

3. At least once per 4 hours, all full length and part length CEAs are verified fully withdrawn except during surveillance testing pursuant to Specification 4.1.3.1.2 or during insertion of CEA group 6 as permitted by 1. a) above, then verify at least once per 4 hours that the inserted CEAs are aligned within 7 inches (indicated position) of all other CEAs in its group.

ACTION 7 - With three or more auto restarts of one non-bypassed calculator during a 12-hour interval, demonstrate calculator OPERABILITY by performing a CHANNEL FUNCTIONAL TEST within the next 24 hours.

ACTION 7A - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement restore the inoperable channel to OPERABLE status within 48 hours or open the reactor trip breakers within the next hour.

AZIMUTHAL POWER TILT - T_q (Continued)

T_q is the peak fractional tilt amplitude at the core periphery

g is the radial normalizing factor

θ is the azimuthal core location

θ_o is the azimuthal core location of maximum tilt

P_{tilt}/P_{untilt} is the ratio of the power at a core location in the presence of a tilt to the power at that location with no tilt.

3/4.2.4 DNBR MARGIN

The limitation on DNBR as a function of AXIAL SHAPE INDEX represents a conservative envelope of operating conditions consistent with the safety analysis assumptions and which have been analytically demonstrated adequate to maintain an acceptable minimum DNBR throughout all anticipated operational occurrences, of which the loss of flow transient is the most limiting. Operation of the core with a DNBR at or above this limit provides assurance that an acceptable minimum DNBR will be maintained in the event of a loss of flow transient.

Either of the two core power distribution monitoring systems, the Core Operating Limit Supervisory System (COLSS) and the DNBR channels in the Core Protection Calculators (CPCs), provide adequate monitoring of the core power distribution and are capable of verifying that the DNBR does not violate its limits. The COLSS performs this function by continuously monitoring the core power distribution and calculating a core operating limit corresponding to the allowable minimum DNBR. Reactor operation at or below this calculated power level assures that the limits of Figure 3.2-1 are not violated. The COLSS calculation of core power operating limit based on the minimum DNBR limit includes appropriate penalty factors which provide, with a 95/95 probability/confidence level, that the core power limit calculated by COLSS (based on the minumum DNBR limit) is conservative with respect to the actual core power limit. These penalty factors are determined from the uncertainties associated with planar radial peaking measurement, engineering design factors, state parameter measurement, software algorithm modelling, computer processing, rod bow and core power measurement.

Parameters required to maintain the margin to DNB and total core power are also monitored by the CPCs. Therefore, in the event that the COLSS is not being used, operation within the limits of Figure 3.2-2 can be maintained by utilizing a predetermined DNBR as a function of AXIAL SHAPE INDEX and by monitoring the CPC trip channels. The above listed uncertainty penalty factors plus those associated with startup test acceptance criteria are also included in the CPC's which assume a minimum core power of 20% of RATED THERMAL POWER. The 20% Rated Thermal Power threshold is due to the neutron flux detector system being inaccurate below 20% core power. Core noise level at low power is too large to obtain usable detector readings.

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ATTACHMENT B

POWER DISTRIBUTION LIMITS

3/4.2.4 DNBR MARGIN

LIMITING CONDITION FOR OPERATION

3.2.4 The DNBR margin shall be maintained by operating within the region of acceptable operation of Figure 3.2-1 or 3.2-2, as applicable.

change to: 3.2-1, 3.2-2, or 3.2-3

APPLICABILITY: MODE 1 above 20% of RATED THERMAL POWER.

ACTION:

With operation outside of the region of acceptable operation, as indicated by either (1) the COLSS calculated core power exceeding the COLSS calculated core power operating limit based on DNBR; or (2) when the COLSS is not being used, any OPERABLE Low DNBR channel exceeding the DNBR limit, within 15 minutes initiate corrective action to reduce the DNBR to within the limits and either:

a. Restore the DNBR to within its limits within one hour, or

b. Be in at least HOT STANDBY within the next 6 hours.

SURVEILLANCE REQUIREMENTS

4.2.4.1 The provisions of Specification 4.0.4 are not applicable.

4.2.4.2 The DNBR shall be determined to be within its limits when THERMAL POWER is above 20% of RATED THERMAL POWER by continuously monitoring the core power distribution with the Core Operating Limit Supervisory System (COLSS) or, with the COLSS out of service, by verifying at least once per 2 hours that the DNBR, as indicated on all OPERABLE DNBR channels, is within the limit shown on Figure 3.2-2.

Add: or Figure 3.2-3, whichever is applicable.

4.2.4.3 At least once per 31 days, the COLSS Margin Alarm shall be verified to actuate at a THERMAL POWER level less than or equal to the core power operating limit based on DNBR.

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SURVEILLANCE REQUIREMENTS (Continued)

4.2.4.4 The DNBR penalty factors included in the COLSS and CPC DNBR calculations shall be verified at least once per 31 EFPDs to be greater than or equal to the values listed below. This verification will be made on the basis of the BERR1 addressable constant for the CPC and the EPOL2 addressable constant for the COLSS.

Burnup $\frac{GWD}{MTU}$	DNBR Penalty (%)
0-10	0.5
10-20	1.0
20-30	2.0
30-40	3.5
40-50	5.5

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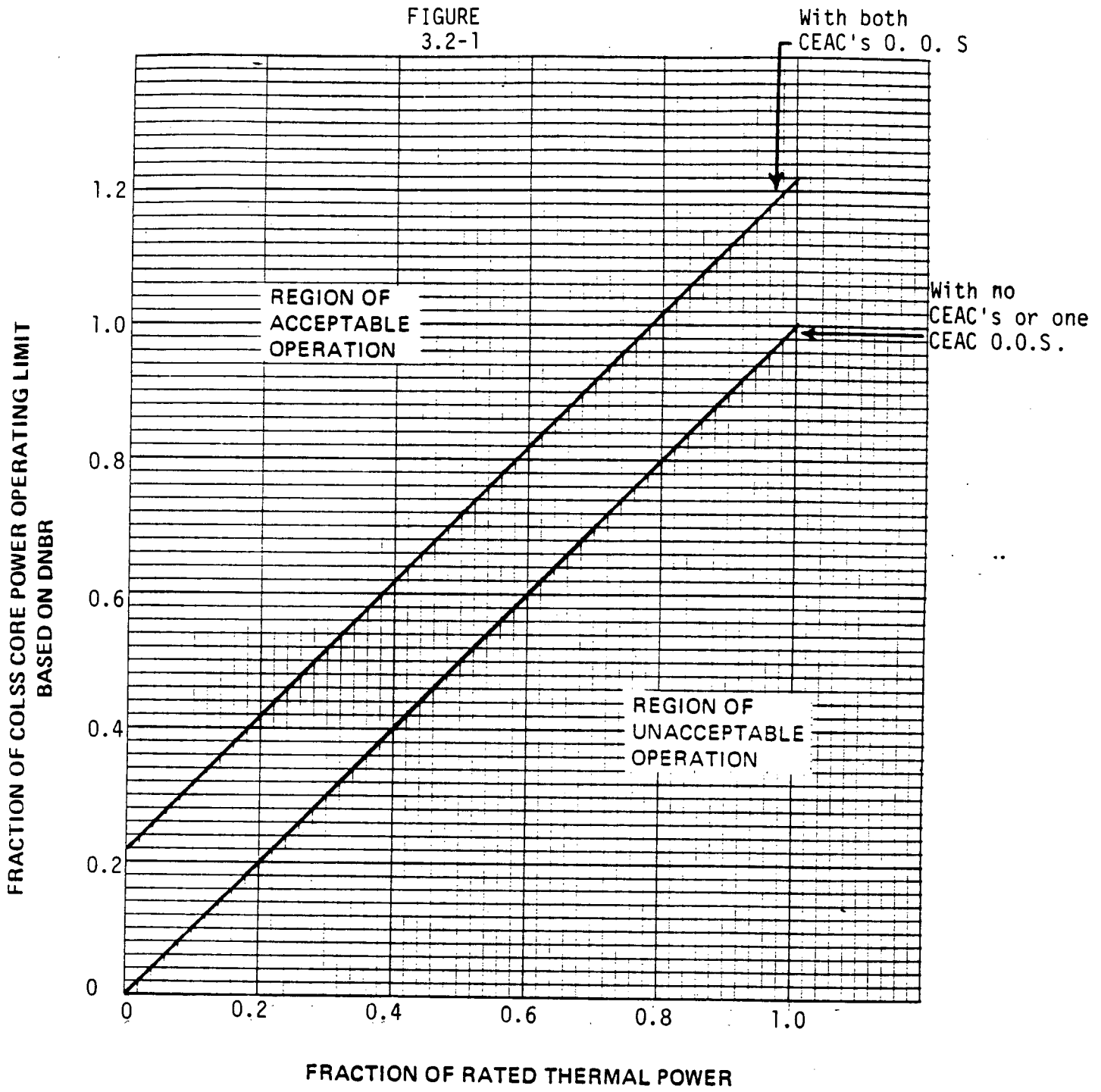

Figure 3.2-1 DNBR margin operating limit based on COLSS.

Figure 3.2-2

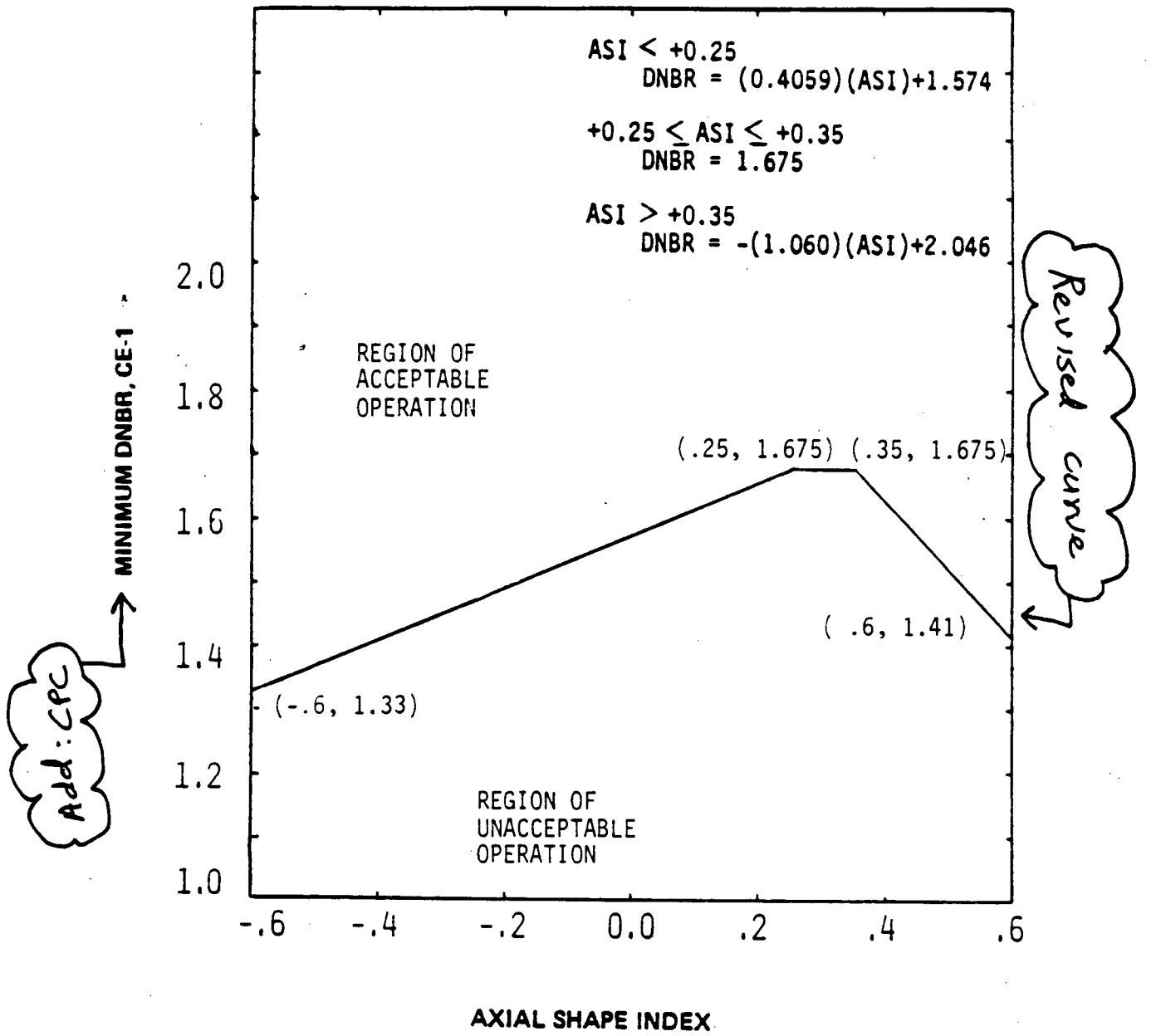

Figure 3.2-2 DNBR margin operating limit based on core protection calculators. (COLSS out of service)

Add: with RATED THERMAL POWER ≥ 80%.

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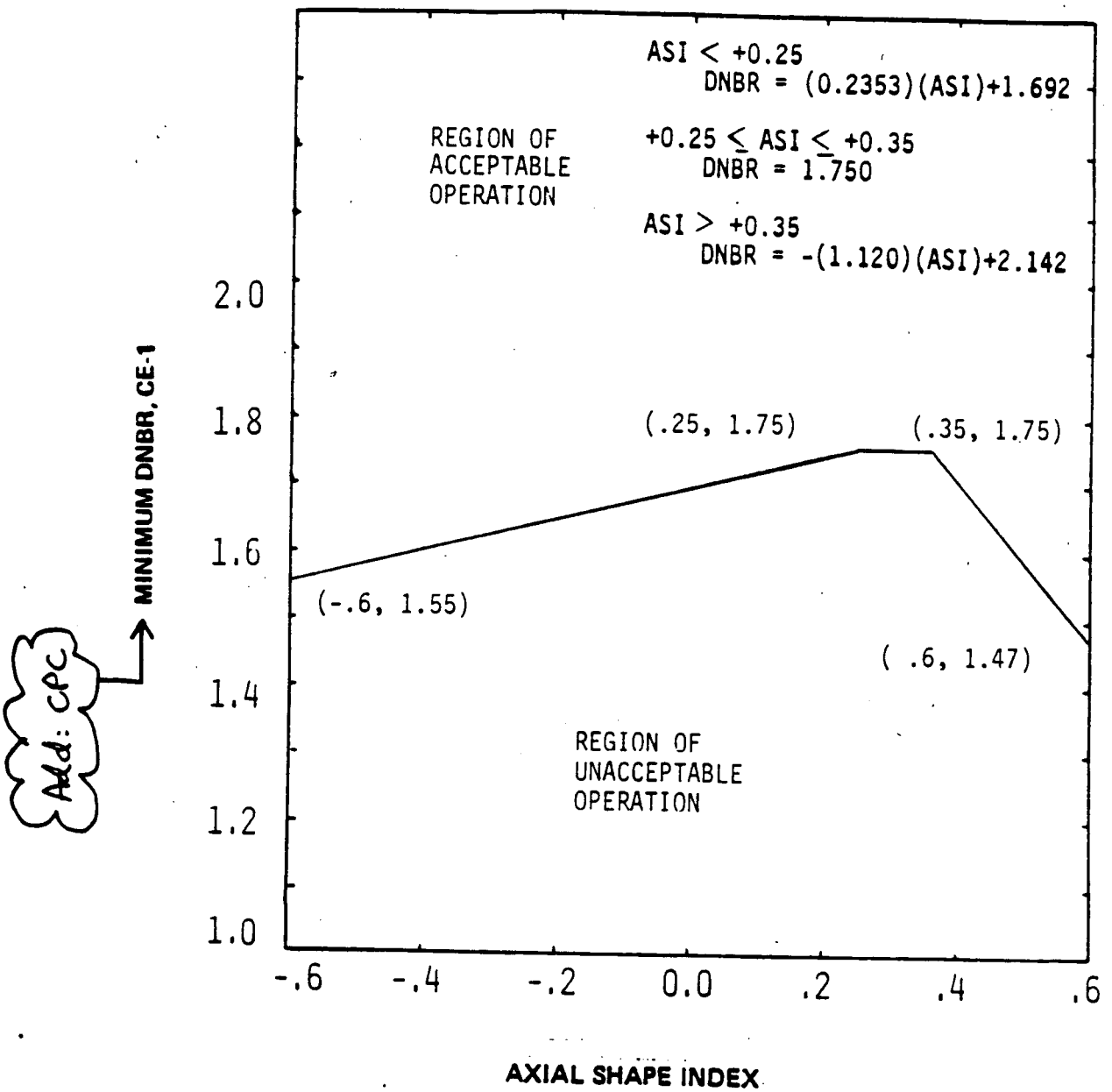
change to: 3.2-3

New Page

Figure 3.2-2



Add: CPC

Figure 3.2-2 DNBR margin operating limit based on core protection calculators (COLSS out of service)

Add: with RATED THERMAL POWER < 80%.

Change to: 3.2-3

SAN ONOFRE-UNIT 2

3/4 2-8

Change to: 3/4 2-8a

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REVISION TO ACTION ITEM 6 OF TABLE 3.3-1
IN SPECIFICATION 3.3.1

ACTION 6 - a. With one CEAC inoperable, operation may continue for up to 7 days provided that at least once per 4 hours, each CEA is verified to be within 7 inches (indicated position) of all other CEA's in its group. After 7 days, operation may continue provided that Action Items 6.b.1, .2 and .3 are met with COLSS is in-service, or Action Items 6.c.1, .2 and .3 are met with COLSS out-of-service*.

b. With both CEAC's inoperable and COLSS in-service, operation may continue provided that:*

1. Within 1 hour the DNBR margin operating limit required by Specification 3.2.4 (Figure 3.2-1) is satisfied for both CEAC's out-of-service.

2. Within 4 hours:

a) All full length and part length CEA groups are withdrawn to and subsequently maintained at the "Full Out" position, except during surveillance testing pursuant to the requirements of Specification 4.1.3.1.2 or for control when CEA group 6 may be inserted no further than 127.5 inches withdrawn.

b) The "RSPT/CEAC Inoperable" addressable constant in the CPC's is set to indicate that both CEAC's are inoperable.

c) The Control Element Drive Mechanism Control System (CEDMCS) is placed in and subsequently maintained in the "Off" mode except during CEA group 6 motion permitted by a) above, when the CEDMCS may be operated in either the "Manual Group" or "Manual Individual" mode.

3. At least once per 4 hours, all full length and part length CEA's are verified fully withdrawn except during surveillance testing pursuant to Specification 4.1.3.1.2 or during insertion of CEA group 6 as permitted by 2.a) above, then verify at least once per 4 hours that the inserted CEA's are aligned within 7 inches (indicated position) of all other CEA's in its group.

c. With both CEAC's inoperable and COLSS out-of-service operation may continue provided that:*

1. Within 1 hour multiply the CPC value of BERR1 corresponding to COLSS in-service by 1.13 and re-enter into the CPC's.

2. Within 4 hours:

   a) All full length and part length CEA groups are withdrawn to and subsequently maintained at the "Full Out" position, except during surveillance testing pursuant to the requirements of Specification 4.1.3.1.2 or for control when CEA group 6 may be inserted no further than 127.5 inches withdrawn.

   b) The "RSPT/CEAC Inoperable" addressable constant in the CPC's is set to indicate that both CEAC's are inoperable.

   c) The Control Element Drive Mechanism Control System (CEDMCS) is placed in and subsequently maintained in the "Off" mode except during CEA group 6 motion permitted by a) above, when the CEDMCS may be operated in either the "Manual Group" or "Manual Individual" mode.

3. At least once per 4 hours, all full length and part length CEA's are verified fully withdrawn except during surveillance testing pursuant to Specification 4.1.3.1.2 or during insertion of CEA group 6 as permitted by 2.a) above, then verify at least once per 4 hours that the inserted CEA's are aligned within 7 inches (indicated position) of all othr CEA's in its group.

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* Note: Requirements for CEA position indication given in Technical Specification 3.1.3.2.

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BASES

MOVABLE CONTROL ASSEMBLIES (Continued)

The CPCs provide protection to the core in the event of a large misalignment (greater than or equal to 19 inches) of a CEA by applying appropriate penalty factors to the calculation to account for the misaligned CEA. However, this misalignment would cause distortion of the core power distribution. This distribution may, in turn, have a significant effect on 1) the available SHUTDOWN MARGIN, 2) the time dependent long term power distributions relative to those used in generating LCOs and LSSS setpoints, and 3) the ejected CEA worth used in the safety analysis. Therefore, the ACTION statement associated with the large misalignment of a CEA requires a prompt realignment of the misaligned CEA.

The ACTION statements applicable to misaligned or inoperable CEAs include requirements to align the OPERABLE CEAs in a given group with the inoperable CEA. Conformance with these alignment requirements bring the core, within a short period of time, to a configuration consistent with that assumed in generating LCO and LSSS setpoints. However, extended operation with CEAs significantly inserted in the core may lead to perturbations in 1) local burnup, 2) peaking factors and 3) available shutdown margin which are more adverse than the conditions assumed to exist in the safety analyses and LCO and LSSS setpoints determination. Therefore, time limits have been imposed on operation with inoperable CEAs to preclude such adverse conditions from developing.

Operability of at least two CEA position indicator channels is required to determine CEA positions and thereby ensure compliance with the CEA alignment and insertion limits. The CEA "Full In" and "Full Out" limits provide an additional independent means for determining the CEA positions when the CEAs are at either their fully inserted or fully withdrawn positions. Therefore, the ACTION statements applicable to inoperable CEA position indicators permit continued operations when the positions of CEAs with inoperable position indicators can be verified by the "Full In" or "Full Out" limits.

CEA positions and OPERABILITY of the CEA position indicators are required to be verified on a nominal basis of once per 12 hours with more frequent verifications required if an automatic monitoring channel is inoperable. These verification frequencies are adequate for assuring that the applicable LCO's are satisfied.

The maximum CEA drop time restriction is consistent with the assumed CEA drop time used in the safety analyses. Measurement with T_{avg} greater than or equal to 520°F and with all reactor coolant pumps operating ensures that the measured drop times will be representative of insertion times experienced during a reactor trip at operating conditions.

ADD

Setting the "RSPT/CEAC Inoperable" addressable constant in the CPC's to indicate to the CPC's that one or both of the CEAC's is inoperable does not necessarily constitute the inoperability of the RSPT rod indications from the respective CEAC. Operability of the CEAC rod indications is determined from the normal surveillance

AZIMUTHAL POWER TILT - T_q (Continued)

T_q is the peak fractional tilt amplitude at the core periphery

g is the radial normalizing factor

θ is the azimuthal core location

θ_o is the azimuthal core location of maximum tilt

P_{tilt}/P_{untilt} is the ratio of the power at a core location in the presence of a tilt to the power at that location with no tilt.

3/4.2.4 DNBR MARGIN

The limitation on DNBR as a function of AXIAL SHAPE INDEX represents a conservative envelope of operating conditions consistent with the safety analysis assumptions and which have been analytically demonstrated adequate to maintain an acceptable minimum DNBR throughout all anticipated operational occurrences, of which the loss of flow transient is the most limiting. Operation of the core with a DNBR at or above this limit provides assurance that an acceptable minimum DNBR will be maintained in the event of a loss of flow transient.

Either of the two core power distribution monitoring systems, the Core Operating Limit Supervisory System (COLSS) and the DNBR channels in the Core Protection Calculators (CPCs), provide adequate monitoring of the core power distribution and are capable of verifying that the DNBR does not violate its limits. The COLSS performs this function by continuously monitoring the core power distribution and calculating a core operating limit corresponding to the allowable minimum DNBR. Reactor operation at or below this calculated power level assures that the limits of Figure 3.2-1 are not violated. The COLSS calculation of core power operating limit based on the minimum DNBR limit includes appropriate penalty factors which provide, with a 95/95 probability/confidence level, that the core power limit calculated by COLSS (based on the minumum DNBR limit) is conservative with respect to the actual core power limit. These penalty factors are determined from the uncertainties associated with planar radial peaking measurement, engineering design factors, state parameter measurement, software algorithm modelling, computer processing, rod bow and core power measurement.

Parameters required to maintain the margin to DNB and total core power are also monitored by the CPCs. Therefore, in the event that the COLSS is not being used, operation within the limits of Figure 3.2-2 can be maintained by utilizing a predetermined DNBR as a function of AXIAL SHAPE INDEX and by monitoring the CPC trip channels. The above listed uncertainty penalty factors plus those associated with startup test acceptance criteria are also included in the CPC's which assume a minimum core power of 20% of RATED THERMAL POWER. The 20% Rated Thermal Power threshold is due to the neutron flux detector system being inaccurate below 20% core power. Core noise level at low power is too large to obtain usable detector readings.

Add : or 3.2-3

Insert A

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Ⓐ: Uncertainty terms already taken into account ~~required only~~ in the CPC's safety monitoring are removed from Figures 3.2-2 and 3.2-3 since the curves are intended to monitor only the LCO during steady state operation.

Add Ⓐ to last line on page B 3/4 2-3