

Section I - Initiator Use Only

PROCEDURE
REVISION VERIFICATION

Procedure Number QI-NI-2

Master Revision No. 0

Title: Incore Intrusion Operability Requirements

Signature K. Kelles

Date 2-29-96 Time 1159

Reason/Purpose To allow continued operation with less than 75% but greater than 28% operable in-core detector strings.

Preparer Name CML P. STAFFORD Initials CPS Date 2/28/96 Extension 6670

Mod. No. N/A

Review By: () QR (X) PRC KELLES Date 2-29-96

Assigned RDH/PRC Member Date Assigned Primary Qualified Reviewer

Section II - For PRC/Qualified Reviewer Use Only

10CFR50.59 screening has been performed and reviewed? (X) Yes () No
10CFR50.59 Safety Eval performed (FC-154, Section B) (X) Yes () No
(If yes, must be PRC reviewed)
Completed Procedure V and/or V'd? () Attach (X) N/R
Incorporate into Operating Manual? (X) Yes () No
Change affects associated forms? () Yes (X) No
(If yes, attach FC-168)
Change affects an Alignment Checklist? () Yes (X) No
(If yes, attach FC-681)
Requires SARC (NSRG) review? (X) Yes () No
Requires PED-SEI-9 change? () Yes (X) No
Requires 3000 Series Surv Test review? () Yes (X) No
Changes ST frequency, T.S. Ref. or new ST? () Yes (X) No
QA/QC requirements reduced? (If yes, Manager QA/QC must review and approve) () Yes (X) No
Manager QA/QC Date
EP Procedure changed? () Yes (X) No
Could change impact field work? (X) Yes () No
(If yes, notify Field Copy Control Room)
Biennial Review responsibility (New Procedure)
SEB Commitments maintained? () Yes (X) N/A
Is Training required? (If yes, attach FC-681) (X) Yes () No
Does this procedure change affect ongoing commitments? (If yes, Supervisor-NL must review/approve) () Yes (X) No
Supervisor-NL Date
Cross-Disciplinary/Cross Functional/Other Review

Print Name CARL STAFFORD Signature/Date (initials) 2/29/96

Recommended for Approval? () Yes () No
James Kelly 2/29/96
Coordinating PRC Member/Primary Qualified Reviewer Date

Approved By: Paul Brown Date 2-29-96 Effective Date 3-1-96

ST Review (Init/Date)	SARC (NSRG) Review (Init/Date)	Typing Review (Init/Date)	WP (Init/Date)	Proofread By (Init/Date)	Rev. No. Date W/PC: <u>93-01-96</u>
	<u>ARP 3/6/96</u>	<u>MSG 3/4/96</u>	<u>KK 35</u>	<u>MC 3-4</u>	

Section III - For PRC Review Use Only

Recommended Review By: (X) Quorum () Subcommittee

Review by Quorum (minimum of five) Changes Made
(three must be primary) During Review

(X) James Kelly 3-1-96 Yes () No (X)

(X) Paul Brown 3-1-96 Yes () No (X)

() Manager-Maintenance Date Yes () No ()

(X) Steve Kelles 3-1-96 Yes () No (X)

(X) Paul Brown 3-1-96 Yes () No (X)

() Manager-Nuc Licensing Date Yes () No ()

() Manager-Training Date Yes () No ()

() Manager-Nuc Planning Date Yes () No (X)

() Other Date Yes () No ()

Other

PRC RECOMMENDS APPROVAL

MAR 01 1996

PRC MTG. MINUTES

FIELD COPY 3-1-96

Section IV - Review by Subcommittee

Unanimous Concurrence by Subcommittee Members Yes () No ()

Subcommittee Meeting Number

Subcommittee Chairman Date

FIELD Copy 1430

Effective Date: 3/1/96

NUCLEAR SAFETY EVALUATION
SEE NOD-QP-3 FOR INSTRUCTIONS

msr
3/1/96
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ID No. 47733
(from 9.1)

SECTION A

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10 CFR 50.59 Applicability Screening

9.1	Activity Identification
Procedure Change No. <u>47733</u>	affecting Procedure <u>OI-NI-2</u>
Modification Request No. _____	Design [] Installation [] Testing []
Temporary Modification No. _____	Engineering Change Notice No. _____
Other _____	
Document Title: <u>INCOE INSTRUMENTATION OPERABILITY REQUIREMENTS</u>	

Nuclear Safety Evaluation Conclusion

- [] This activity is not a 10 CFR 50.59 activity, because it:
- Does not change the facility as described in the USAR.
 - Does not change procedures as described in the USAR.
 - Does not involve conducting tests or experiments not described in the USAR.
 - Does not affect Nuclear Safety in a way not previously evaluated in the USAR.
- [X] This activity is being done pursuant to 10 CFR 50.59. This activity MUST be approved by the PRC.
- This safety evaluation must be reviewed by SARC; ref Tech. Spec. 5.5.2.7.
 - This activity must be reported in the annual report; ref 10 CFR 50.59, Item b, Paragraph 2.
- [] This activity involves an Unreviewed Safety Question. The activity must be canceled, or revised and re-evaluated, or NRC authorization is required prior to implementation; ref 10 CFR 50.59, Item c.

We hereby certify that this Nuclear Safety Evaluation is complete and accurate to the best of our knowledge.

Prepared by MARCUS J. GUINN Date 2/29/96 Time 1415
msr
1255 3-1-96
Print Name

Myz Extension 7277
Signature DM 3/1/96 1315

Reviewed by Seborah Matthews Date 2-29-96 Time 1610
Print Name

Seborah Matthews Extension 6807
Signature

Revised by Guinn 2/29/96
A-1
3/1/96

NUCLEAR SAFETY EVALUATION
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SECTION A

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10 CFR 50.59 Applicability Screening

9.2 What (specifically) is being done?

Revising the operability requirements of the INCORE instrumentation (ICI) in OI-NI-2, to allow continued operation with less than 75% but greater than ~~20%~~ operable INCORE instrumentation strings.
28% now 3/1/96

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3/1/96

9.3 Why is this being done (briefly)?

To justify the relaxation of the operability requirement for the ICI system and allow a higher number of ICIs to be inoperable and still provide the ability to adequately monitor the power distribution limits as required by the Technical Specifications and described in USAR section 7.5.4.3.

9.4 Does the activity involve a change to the Technical Specifications other than the Basis Sections?

☒ NO - • This activity meets the requirements of current Technical Specifications. The following sections were reviewed: _____

2.10.1, 2.10.2, 2.10.4, 5.8

• Continue with 9.5

☐ YES - • Technical Specification Section _____ must be revised prior to performing this activity.

• Exit this procedure and continue with NOD-QP-7.

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NUCLEAR SAFETY EVALUATION
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10 CFR 50.59 Applicability Screening

9.5 Does the activity involve a change in the facility?

☒ NO - Go to 9.6

☐ YES - Is this aspect of the facility described in the USAR?

List USAR Sections/Figures reviewed: _____

☐ NO - Go to 9.6

☐ YES - List USAR Sections/Figures _____

- Does the USAR description require any changes or revisions due to this activity?

☐ NO - continue with 9.6

☐ YES - • 10 CFR 50.59 applies to this activity

- Section B of the Nuclear Safety Evaluation must also be completed.

- Continue with 9.6

9.6 Does the activity involve changes to procedures?

☐ NO - Go to 9.7

☒ YES - Are related procedures (including definitions or descriptions of activities or controls over functions) outlined, summarized, completely described, or implied in the USAR?

List USAR Sections/Figures reviewed: 7.1, 7.5, 14.24

☐ NO - Go to 9.7

☒ YES - List USAR Sections/Figures 7.5.4.3

- Does the USAR description require any changes or revisions due to this activity?

☐ NO - Continue with 9.7

☒ YES - • 10 CFR 50.59 applies to this activity

- Section B of the Nuclear Safety Evaluation must also be completed

- Continue with 9.7

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9.7 Does the activity involve tests or experiments?

☒ NO - Go to 9.8

☐ YES - Is the test/experiment one which has been previously anticipated in the USAR?

☐ YES • list USAR Sections _____

• Go to 9.8

☐ NO - (i.e., it is not described in the USAR; including one-of-a-kind tests or new system configurations)

Could this test/experiment degrade the margins of safety during normal operations or anticipated transients, or could it degrade the adequacy of structures, systems or components to prevent accidents or mitigate accident conditions?

☐ NO - _____

- Continue with 9.8

- ☐ YES - • 10 CFR 50.59 applies to this activity
- Section B of the Nuclear Safety Evaluation must also be completed.
 - Continue with 9.8

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10 CFR 50.59 Applicability Screening

9.8 Could the activity adversely affect nuclear safety?(Consider System Interactions)

☒ NO - Explain An inadvertent loading of a fuel assembly
into an improper location cannot occur with this change
MSR
2/6/76 to USAR 7.5.1.7 since no fuel movement is planned
until shutdown for the Fall 1996 refueling outage.
The statistical validity of the tilt estimate and an
adequate core coverage are assured even with the current
failures since one four-fold tilt group has no failures (cont.)

- Go to Nuclear Safety Evaluation Conclusion or continue with Section B of the Nuclear Safety Evaluation, if required.

☐ YES - How _____

Has this effect been previously evaluated in the USAR?

☐ YES - discussed in USAR Section _____

- Continue with Nuclear Safety Evaluation Conclusion

☐ NO - • 10 CFR 50.59 applies to this activity

- Continue with Section B of the Nuclear Safety Evaluation

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ATTACHMENT SHEET

9.8

at any of the detector levels. Additionally, USAR 7.5.4.3 states that the azimuthal tilt calculation is valid for a minimum of two operable ICI strings per quadrant.

For Cycle 6, ABB-CE analyzed a similar situation of failures. An explicit analyses of current and projected detector failure patterns was performed (CEN-150(0)-P, "Analysis of CECOR Power Peaking Uncertainties for Fort Calhoun Unit I Cycle 6", February 1981). This analysis was formally submitted to the NRC in the form of an Interim TS, and the NRC granted the TS changes which allowed operation with a reduced compliment of incore detectors (Amendment 55). The changes proposed for Cycle 16 are the same as those requested in Cycle 6 except this request does not require a TS change and the minimum allowed operable strings is 28%. Since there have been no changes made to the design of the ICI System since Cycle 6, the analysis utilized in Cycle 6 remains valid. This is based upon the use of the same methodology, the same ICI System configuration, and the same application of peaking factor measurement uncertainties. The current peaking factor uncertainties are slightly different in value that the peaking factor uncertainties used in Cycle 6 due to current use of the latest revised CECOR topical methodology (CENPD-153-P, Rev. 1-P-A) which was implemented after Cycle 6. The peaking factor uncertainties derived from the use of the current prediction codes (CASMO/SIMULATE) are bounded by both the Cycle 6 and Cycle 16 peaking factor uncertainties derived from CENPD-153-P. The CENPD-153-P peaking factor uncertainties are currently applied in the FCS reload methodology. Therefore, the principal difference between the Cycle 6 and the current Cycle 16 request is using the 10 CFR 50.59 process now versus the TS amendment in Cycle 6. As a result, the application of an additional uncertainty of 1% to the peaking factors and PLHR is conservative since the Cycle 6 analysis determined that the increase in uncertainty to 80% failed was less than 1%.

Applying the 1% increase will result in the following peaking factor total uncertainties:

5.3% (*) + 1% = 6.3% for F_{xy} * From CENPD-153-P, Rev. 1-P-A,

5.0% (*) + 1% = 6.0% for F_r "INCA/CECOR Power Peaking

6.2% (*) + 1% = 7.2% for F_o Uncertainty," May 1980.

The 1% increase in F_o uncertainty for monitoring linear heat rate will be accomplished by updating the card value for the measurement calculational uncertainty factor in CECOR and Mini-CECOR. For F_{xy} and F_r the 1% uncertainty will be conservatively applied to the untilted peaking factor measured values using the following formulas:

$$F_r = 1.01 F_{r, \text{measured}}$$

$$F_{xy} = 1.01 F_{xy, \text{measured}}$$

Peak Linear Heat Rate is calculated by (F_o * core average LHR).

The current trend of the peaking factors for Cycle 16 is decreasing, having peaked at approximately 6 GWD for F_{xy} and F_r and 2 GWD for F_o .

MSR 3-1-96

DJM 3/1/96

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Continued

This peaking factor trend will continue for the remainder of Cycle 16. Application of the 1% uncertainty to current values of peaking factors will not exceed the TS limits. The azimuthal power tilt will be unaffected, as the requirement for two strings per quadrant remains unchanged. This ensures adequate core coverage. During the 1996 Refueling outage, all currently inoperable ICI strings are scheduled to be replaced with new instruments. Therefore, Cycle 17 will begin with at least 75% operable strings, as described in USAR 7.5.4.3.

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SECTION B

Unreviewed Safety Question Determination

10.1.1 Identify Plant Specific Design, Operating and Technical Documents		
Document Title	ID Number	Revision
USAR	SECTION 7.5.4.3	5 dated 10/95 DGM 3/96
OI-NI-2		Ø MSR 3/96
10.1.2 Identify Applicable NRC Documents/Industry Standards		
Title	ID Number	Revision
Tech Spec Amendment	55	
Tech Spec Amendment	167	
10.1.3 Identify Related Drawings		
Title	ID Number	Revision
TDB FIGURE	I.A. 2. a	4
10.2 List safety functions the affected structures or components perform: <u>TECH SPEC MONITORING OF PEAK LINEAR Heat rate, PLANAR RADIAL PEAKING FACTOR, INTEGRATED RADIAL Peaking Factor, and AZIMUTHAL TILT</u>		
List applicable accidents for which these safety functions are required: <u>NONE</u>		

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SECTION B

Unreviewed Safety Question Determination

10.3 System Interactions Analyses			
Criteria	Applicable	Criteria	Applicable
Fire Protection	[]	Structural Impact	[]
Electrical Equipment Qualifications	[]	Separation Criteria	[]
High Energy Line Break Review	[]	Single Failure Criteria	[]
Seismic Interaction and Qualification	[]	Possibility of Operator Error	[]
Electrical Systems Analysis	[]	Heavy Loads	[]
Human Factors Review	[]	Impact on HVAC	[]
Security Review	[]	System/Component Performance	[✓]
Environmental Radiological Release	[]	Natural Phenomena	[]
Materials Compatibility	[]	Installation of Temporary Modifications	[]
Containment Integrity	[]	Testing of Temporary Modifications	[]
Control Room Habitability	[]	Other: _____	[]
Missile Protection	[]		

Discussion of Applicable Systems Interactions Analyses

(Include Attachment Sheet as needed) ICI OPERATION IS JUSTIFIED FOR
UP TO 80% INOPERABLE strings WITH the addition of an additional uncertainty
(CEN-150(0)-P, FEB. 1981, "ANALYSIS OF CECOR POWER PEAKING UNCERTAINTIES FOR
FC UNIT 1, CYCLE 6.") FOR NORMAL OPERATING CONDITIONS. ICIS ARE ONLY USED
TYPICALLY DURING NORMAL operation conditions. This change only addresses

failures for up to 72% of the total B-2 number of strings.

DM 3/1/96 mjc 3/1/96

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SECTION B

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Unreviewed Safety Question Determination

- 10.4 Could the proposed activity increase the probability of occurrence of an accident previously evaluated in the USAR? YES []
NO [X]

Explain: No changes are being made to affect the configuration or operation of the system or plant. Therefore, the probability of occurrence of an accident previously evaluated in the USAR is NOT increased.

- 10.5 Could the proposed activity increase the consequences of an accident previously evaluated in the USAR? YES []
NO [X] ^{msr 3/1/96}

Explain: Additional measurements and the application of penalties on the values of measured by the wear detectors prior to comparisons with the limits in the Teen Specs and COLR will ensure that the fuel design limits are protected and the core power assumptions used in the analyses remain valid with up to 72% more ICI strings failed. Therefore, there is no increase in the consequences of an accident previously evaluated in the USAR. ^{msr 3/1/96}

- 10.6 Could the proposed activity increase the probability of occurrence of a malfunction of equipment important to safety previously evaluated in the USAR? YES []
NO [X]

Explain: The proposed activity would relax the requirement for the number and distribution of operable incore detectors. No physical alteration to the ICI System will occur, thus, the original design specifications of the ICI System will be maintained. Therefore, since the proposed change does not adversely affect the ICI System, the probability of a malfunction of equipment important to safety evaluated in the USAR will not increase. ^{msr 2/1/96 DGM 2/29/96}

- 10.7 Could the proposed activity increase the consequences of a malfunction of equipment important to safety previously evaluated in the USAR? YES []
NO [X] ^{msr 3/1/96}

Explain: Sufficient measurements will be required to adequately verify compliance with power distribution limits specified in the COLR. Penalties will be applied to the values measured by the ICIs prior to comparisons with the limits specified in the COLR and TSS when the number of operable strings falls below the current requirement. This will ensure that all ^{via performance of RE-ST-AK-0001 every 15 days}

current TSS and fuel design limits are protected and the core power distribution assumptions in all analyses remain valid. Therefore, the proposed change does not involve a significant increase in the consequences of an accident previously evaluated. ^{B-3}
(SO-G-30, NOD-QP-3)

NUCLEAR SAFETY EVALUATION
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SECTION B

Unreviewed Safety Question Determination

- 10.8 Could the proposed activity create the possibility of an accident of a different type than any previously evaluated in the USAR? YES []
NO [X]

Explain: The proposed changes do not represent a change in configuration or operation of the plant. Therefore, the proposed change does not create the possibility of an accident of a different type than any previously evaluated in the USAR.

- 10.9 Could the proposed activity create the possibility of a malfunction of equipment important to safety of a different type than any previously evaluated in the USAR? YES []
NO [X]

Explain: Since this change does not alter the configuration or operation of the plant, the current limits measured by the ICI system will still be met. Therefore, the proposed change does not create the possibility of a malfunction of a different type than any previously evaluated in the USAR.

- 10.10 Does the proposed activity reduce the margin of safety as defined in the basis for any Technical Specification? YES []
NO [X]

Explain: There is no explicit TS or basis that address the operability of the ICI system. Other TS's and bases were reviewed to ensure that the assumptions used in the safety analyses remain valid. Therefore, the proposed change does not involve a reduction in the margin to safety as defined in the basis for any TS.

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NUCLEAR SAFETY EVALUATION
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SECTION B

Unreviewed Safety Question Determination

- 10.11 Summarize USAR changes which are needed or attach marked-up copy of affected pages:

See attached USAR 7.5.4.3 mark-up

- 10.12 Annual report of 10 CFR 50.59 changes, tests and experiments. Provide a brief description of the activity: Changing Operating

Instruction OE-NE-2 to allow the ECE System to remain
operable with less than 75% and down to a minimum of 20% of
all ECE springs operable for the remainder of Cycle 16
operations.

Summarize the safety evaluation: These changes do not
involve an Unreviewed Safety Question.

- Go to the Nuclear Safety Evaluation Conclusion

B-5

The in-core instrumentation system consists of 28 fixed in-core detector assemblies inserted into selected fuel assemblies. Each assembly contains four rhodium detectors, and one thermocouple. Outputs may be read on the terminals and printers in the control room. These units with their cabling are contained inside an Inconel sheath.

Assemblies are inserted into the core through six instrumentation ports in the reactor vessel head. Each assembly is guided into position in an empty CEA tube in the center of the fuel assembly via a fixed stainless steel guide tube. The seal plug forms a pressure boundary for each assembly at the reactor vessel head as does the GraLock adaptor hub to the reactor vessel flange assembly.

The neutron detectors produce a current proportional to neutron flux by a neutron-beta reaction in the detector wire. The emitter, which is the central conductor in the coaxial detector, is made of Rhodium 103 and has a high thermal neutron capture cross section. The rhodium detectors are provided to measure flux at four axial locations in the fuel assemblies.

The data from the detectors are read by the Emergency Response Facilities (ERF) plant computer which scans all assemblies and prints out the data periodically or on demand. The computer continually computes integrated flux at each detector to update detector sensitivity factors to compensate for detector burnout.

7.5.4.3

ICI Requirements for Monitoring Technical Specifications

On July 16, 1993, the USNRC issued a Final Policy Statement on Technical Specification Improvements for Nuclear Power Reactors. The Final Policy Statement contains four criteria which can be used to determine which constraints on the design and operation of nuclear power plants are appropriate for inclusion in the plant's Technical Specifications. The ICI System does not meet any of those four criteria. Subsequently, on February 10, 1995, OPPD requested the elimination of Technical Specification 2.10.3 and the relocation of the Technical Specification limitations on the use of the ICI System to the Fort Calhoun Station Updated Safety Analysis Report (USAR).

The USNRC issued a Safety Evaluation Report (SER), dated June 26, 1995, approving OPPD's request (Reference Amendment No. 167). The SER stated that in order to change the requirements concerning the number and location of functional detectors, a successful 10 CFR 50.59 safety evaluation with a rigorous evaluation and justification is required. The following considerations must be included in a 10 CFR 50.59 evaluation if changes to the ICI System requirements are proposed:

- 1) How an inadvertent loading of a fuel assembly into an improper location will be detected,
- 2) How the validity of the tilt estimates will be ensured,
- 3) How adequate core coverage will be maintained,
- 4) A list of the measurement uncertainties and why the added uncertainties are adequate to guarantee that measured peak linear heat rates, peak pin powers radial peaking factors, and azimuthal power tilts will meet TS limits, and
- 5) How the ICI System will be restored to at least 75 percent prior to the beginning of a new cycle.

The following information represents the ICI requirements for measuring ^{note} Technical Specification values: 2-1-76

~~The ICI System shall be operable with:~~

~~At least 75% of all in-core instruments, and~~

~~A minimum of two in-core detector strings per full axial length quadrant whenever the ICI System is used to monitor the planar radial peaking factor (F_{xy}), the integrated radial peaking factor (F_r), the radial power distribution, the peak linear heat rate, and the azimuthal power tilt.~~

INSERT

①

An operable in-core instrument shall consist of three or more operable rhodium detectors.

A quadrant symmetric in-core instrument location shall consist of a location with a symmetric counterpart in any other quadrant. ^s

Following each fuel loading:

- The ICI System must have at least 75% of the in-core instruments operable, and
- The initial measurement of the linear heat rate, F_{xy} , F_r and azimuthal power tilt shall consist of the first full core power distribution calculation based on in-core detector signals made at a power level greater than 40 percent of rated power.

For recalibration of the ex-core detectors, a minimum of four in-core instrument locations at each detector level (or a total of 16 detectors) with at least one location in the center seven rows of fuel assemblies and at least one location outside the center seven rows of fuel assemblies shall be operable.

With the ICI System inoperable, do not use the ICI System for 1) recalibration of the ex-core detector inputs to the axial power distribution trip calculator, and 2) monitoring of peak linear heat rate and radial power distribution.

The linear heat rate shall not exceed the limits of the Allowable Peak Linear Heat Rate vs. Burnup Figure provided in the COLR when the following uncertainties are appropriately applied:

- A flux peaking augmentation factor as shown in Technical Specification Figure 2-8,
- A measurement calculational uncertainty factor of 1.062, for more than 75% of the ICIs operable and 1.072 for between 75% and 20% of the ICIs operable.
- An engineering uncertainty factor of 1.03,
- A linear heat rate uncertainty factor of 1.002 due to axial fuel densification and thermal expansion, and
- A power measurement uncertainty factor of 1.02.

Using the root mean squared method, the combination of the above uncertainties yields a 1.072 multiplier to the measured peak linear heat rate measurement.

1.1180

for more than 75% of the ICIs operable and a 1.1285 multiplier for between 75% and 20% of the ICIs operable

7.5-14a

RO 10/95

Dgm
2/1/76

① The ICI System shall be operable with either:

- 1) At least 75% of all in-core instruments and a minimum of two in-core detector strings per full axial length quadrant whenever the ICI System is used to monitor the planar radial peaking factor (F_{xy}^T), the integrated radial peaking factor (F_R^T), the total peaking factor (F_Q^T), the radial power distribution, the peak linear heat rate, and the azimuthal power tilt, or
- 2) At least 28% but less than 75% of all In-core Detector Strings and:
 - At least two In-core Detector Strings are operable per Axial Quadrant whenever the ICI System is used to monitor the planar radial peaking factor (F_{xy}^T), the integrated radial peaking factor (F_R^T), the total peaking factor (F_Q^T), the radial power distribution, the peak linear heat rate, and the azimuthal power tilt, and
 - An increase of 1% to the total uncertainties applied to the planar radial peaking factor (F_{xy}^T), the integrated radial peaking factor (F_R^T), and the total peaking factor (F_Q^T), and,
 - The frequency of performing RE-ST-RX-0001 is changed to a minimum of once every 15 days.

DAW
3/1/96

FORT CALHOUN STATION
GENERAL FORM

FC-68A
R10

Training Requirements

PART 1 - Training Requirements and Preferred Method of Training (Completed by Cognizant PRC Member or Qualified Reviewer)

Setpoint/Procedure Change No. 47733 Date: 2/29/96

Commitment Item No. _____ Commitment Date _____ [] N/A

Identify the OPPD Training Group/Department affected by this procedure. (Circle "A" if the training is to be done After the effective date of implementation or "B" if Training is to be done Before the effective date of implementation.

NOTE: It is the responsibility of the affected Department Head, in conjunction with the Training Supervisor for that area to determine applicability to personnel in that department.

Training Groups:

Lic Staff	(A) (B)	I&C	(A) (B)	RP	(A) (B)
LO	(A) (B)	EM	(A) (B)	Chem	(A) (B)
NLO	(A) (B)	MM	(A) (B)	Dept Supv	(A) (B)
Shift Supv	(A) (B)	PE	(A) (B)	PRC	(A) (B)
Security	(A) (B)	GM	(A) (B)	Con Mgt Eng	(A) (B)
GET	(A) (B)	Const Mgt Crafts	(A) (B)	Sys Engr	(A) (B)
E Plan	(A) (B)	Maint Plan	(A) (B)	Des Engr	(A) (B)
Fire Brig	(A) (B)	Asbestos	(A) (B)	STA	(A) (B)
		Cent Maint	(A) (B)	NSRG	(A) (B)
		QA/QC	(A) (B)		

Other: _____ (A) (B)

Preferred Method of Training

☒ Hotline [] Required Reading [] On Shift [] Regularly Scheduled ☒ Other

James Key 3-29-96
Cognizant PRC Member/Qualified Reviewer Date

Part 2 - Changes to Training Requirements
(Completed by Cognizant PRC Member or Qualified Reviewer and Training Department)

Changes to proposed requirements _____

Notified: _____
Cognizant PRC Member/Qualified Reviewer Date

Changes by: _____
Training Department Representative

Part 3 - Completion of Training Requirements

Training Completed Before Implementation of Procedure:

Manager - Training or Alternate _____

NOTE: A Completed TAP 10A form must be attached to the FC-68A form.

FORT CALHOUN STATION
ADMINISTRATION FORM

FC-68H
R0

TRAINING TRANSMITTAL

DATE: March 5, 1996

TO: Dean Podoll
TPCM Coordinator

FROM: Document Control

The following procedure(s) have been identified as requiring
training BEFORE x AFTER implementation.

FC-68 #47384

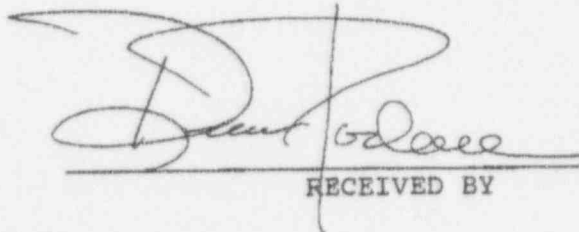
EPIP-RR-17A

FC-68 #47727

EPIP-TSC-8

FC-68 #47733

OI-NI-2



RECEIVED BY

03/05/96
Date

(SO-G-30)

FC/FORMS

IN-CORE INSTRUMENTATION OPERABILITY REQUIREMENTS

SAFETY RELATED

ATT PURPOSE

PAGE

1. Operability Requirements

2

PRECAUTIONS

1. Definition:

- Core Quadrant - An area containing seven In-core Detector Strings. Core Quadrants are not strictly defined
- Operable In-core Detector String - three or more operable Rhodium Detectors
- Quadrant Symmetric In-core Detector String Location - consist of a location with a symmetric counterpart in any other quadrant
- Tilt Groups - Sets of four approximately symmetric incore detectors used in the Mini CECORE/BASS calculation of tilts

2. Loss of the ERF renders the In-core Detector System inoperable AND Technical Specification 2.10.4(1)(b) applies.

3. The minimum number of detectors and proper distribution must be met to ensure operation within the Limits used as Initial Conditions for the Safety Analysis are met:

- a. Radial Peaking Factors (F_{xy}^T and F_R^T) are less than the limits of Technical Specifications 2.10.4(2) and 2.10.4(3) as provided in the COLR.
- b. Specified Kw/ft Limits are less than the Peak Linear Heat Rate vs. Burnup figure in the COLR AND ensured by actuating alarms set on each individual instrument.
- c. To determine the Axial Shape Index for the periodic calibration verification of the Ex-core Detector System.
- d. To determine azimuthal power tilt.

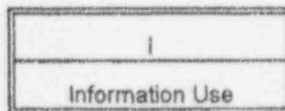
REFERENCES/COMMITMENTS

1. Technical Specification:
 - 2.10.4: Power Distribution Limits
 - Technical Specification Amendment No. 167
2. Technical Data Book Figures
 - I.A.6
 - I.A.7.a, b, c
3. Commitments:

None

APPENDICES

None



Attachment 1

Operability Requirements

PREREQUISITES

(V)

INIT.

1. Procedure Revision Verification

Master Revision Number _____ Date: _____

PROCEDURE

INSERT

II

1. ~~WHEN the following are met,~~
~~THEN the In-core Detector System is considered operable.~~

~~a. At least 75% of all In-core Detector Strings are operable.~~

~~b. At least two In-core Detector Strings are operable per full Axial
Quadrant.~~

2. IF the In-core Detector System is inoperable,
THEN do NOT use the system to monitor F_{XY}^T , F_R^T , Radial Power
Distribution, and Peak Linear Heat Rate.
3. IF calibrating the Ex-core Detectors,
THEN a minimum of four In-core Locations at each In-core Detector
Level (16 detectors total) with at least one location in the center seven
rows AND one location outside the center seven rows of fuel
assemblies shall be operable.

II

1. WHEN either of the following conditions are met,
THEN the In-core Detector System is considered operable:

a. At least 75% of all In-core Detector Strings are operable and at least two In-core Detector Strings are operable per full Axial Quadrant, or

b. Between ²⁵⁻⁷⁵ ~~20~~ and 75% of all In-core Detector Strings are operable and:

- 1) At least two In-core Detector Strings are operable per full Axial Quadrant,
- 2) An increase of 1% to the total ^{shall be} ~~uncertainties~~ applied to the planar radial peaking factor (F_{xy}^T), the integrated radial peaking factor (F_r^T), and the total peaking factor (F_q^T), and
- 3) The frequency of performing RE-ST-RX-0001 is changed to a minimum of once every 15 days.

(✓)

INIT.

1
Information Use

Attachment 1

Operability Requirements

PROCEDURE (continued)

(v)

INIT.

CAUTION

Reactor Power shall be restricted to less than 75% of Peak Linear Heat Rate when initial measurements cannot be made.

4. The initial measurements of F_{xy}^T , F_R^T , Linear Heat Rate, and Azimuthal Power Tilt after each fuel loading shall be made with the following:

- a. An operable In-core Detector System with the following:

1) At least 75% of all In-core Detector Strings operable. _____

2) At least two Quadrant Symmetric In-core Detector String Locations per Core Quadrant. _____

- b. Power Level greater than 40% for the first Full Core Power Distribution Calculation based on In-core Detector Signals. _____

Completed by _____ Date/Time _____ / _____

R0

Fort Calhoun Station
Unit No. 1

OI-NI-2

OPERATING INSTRUCTION

Title: IN-CORE INSTRUMENTATION OPERABILITY REQUIREMENTS

FC-68 Number: 47244

Reason for Change: This procedure was developed to replace Technical
Specification 2.10.3 that was removed by Amendment No. 167.

Contact Person: Robert Ross

ISSUED: 08-10-95 4:00 pm

R0

IN-CORE INSTRUMENTATION OPERABILITY REQUIREMENTS

SAFETY RELATED

ATT PURPOSE

PAGE

1. Operability Requirements

2

PRECAUTIONS

1. Definition:

- Core Quadrant - An area containing seven In-core Detector Strings. Core Quadrants are not strictly defined
- Operable In-core Detector String - three or more operable Rhodium Detectors
- Quadrant Symmetric In-core Detector String Location - consist of a location with a symmetric counterpart in any other quadrant
- Tilt Groups - Sets of four approximately symmetric incore detectors used in the Mini CECORE/BASS calculation of tilts

2. Loss of the ERF renders the In-core Detector System inoperable AND Technical Specification 2.10.4(1)(b) applies.

3. The minimum number of detectors and proper distribution must be met to ensure operation within the Limits used as Initial Conditions for the Safety Analysis are met:

- a. Radial Peaking Factors (F_{xy}^T and F_R^T) are less than the limits of Technical Specifications 2.10.4(2) and 2.10.4(3) as provided in the COLR.
- b. Specified Kw/ft Limits are less than the Peak Linear Heat Rate vs. Burnup figure in the COLR AND ensured by actuating alarms set on each individual instrument.
- c. To determine the Axial Shape Index for the periodic calibration verification of the Ex-core Detector System.
- d. To determine azimuthal power tilt.

REFERENCES/COMMITMENTS

1. Technical Specification:
 - 2.10.4: Power Distribution Limits
 - Technical Specification Amendment No. 167
2. Technical Data Book Figures
 - I.A.6
 - I.A.7.a, b, c
3. Commitments:

None

APPENDICES

None

I
Information Use

Attachment 1

Operability Requirements

PREREQUISITES

(v)

INIT.

1. Procedure Revision Verification

Master Revision Number _____ Date: _____

PROCEDURE

1. WHEN the following are met,
THEN the In-core Detector System is considered operable:

a. At least 75% of all In-core Detector Strings are operable. _____

b. At least two In-core Detector Strings are operable per full Axial
Quadrant. _____

2. IF the In-core Detector System is inoperable,
THEN do NOT use the system to monitor F_{xy}^T , F_R^T , Radial Power
Distribution, and Peak Linear Heat Rate. _____

3. IF calibrating the Ex-core Detectors,
THEN a minimum of four In-core Locations at each In-core Detector
Level (16 detectors total) with at least one location in the center seven
rows AND one location outside the center seven rows of fuel
assemblies shall be operable. _____

1
Information Use

Attachment 1

Operability Requirements

PROCEDURE (continued)

(V)

INIT.

CAUTION

Reactor Power shall be restricted to less than 75% of Peak Linear Heat Rate when initial measurements cannot be made.

4. The initial measurements of F_{xy}^T , F_R^T , Linear Heat Rate, and Azimuthal Power Tilt after each fuel loading shall be made with the following:
- a. An operable In-core Detector System with the following:
 - 1) At least 75% of all In-core Detector Strings operable. _____
 - 2) At least two Quadrant Symmetric In-core Detector String Locations per Core Quadrant. _____
 - b. Power Level greater than 40% for the first Full Core Power Distribution Calculation based on In-core Detector Signals. _____

Completed by _____ Date/Time _____

R0

LIC-96-0157

Attachment 2

AUG 15 1996

Date: 8/9/96

- R10

Appendix B

PAGE 2 of 2

Operability Evaluation Form

CR No. 199600978

VI. Justification of Decision (See Section 7.4.4):

Although the tilt calculation in CECOR increased significantly, it ~~is currently~~ ^{is currently} calculating ~~an overly conservative tilt with fewer and fewer tilt group detectors remaining.~~ ^{more} ~~more conservative, CECOR tilt calculations continue to be valid for the number of tilt group detectors remaining.~~ ^{TS 3.10(6)g}

VII. List any recommended corrective actions to correct the initial operability concern. For the remainder of Cycle 10 operations, in order to monitor the most accurate determination of azimuthal power tilt, monitor tilt with the excres as allowed by

* Prepared by: [Signature] Date: 8/9/96 Time: 10:35 TS 3.10(6)g
(10 CFR 50.59 Preparer Qualified)
All remaining CECOR functions, including PLMR, planning factors, and ASI will continue to be monitored by CECOR and mini-CECOR/BASS.

Reviewed by: [Signature] Date: 8/9/96 Time: 11:35
(10 CFR 50.59 Reviewer Qualified)

Independent Review by: [Signature] Date: 8/9/96 Time: 11:35
(10 CFR 50.59 Reviewer Qualified)

† ISI Coordinator: N/A Date: _____ Time: _____

Concurrence: [Signature] Date: 8-9-96 Time: 1745
(Licensed Senior Operator)

Concurrence: [Signature] Date: 8-09-96 Time: 1708
(Shift Supervisor)

Concurrence: [Signature] Date: 8-9-96 Time: 1749
(Plant Manager/Supv-Operations)

* NOTE: All Operability Evaluations REQUIRE PRC Review.

† ISI Coordinator's signature ONLY required for ISI-related SSC.

Therefore, the ESE System tilt calculation is considered invalid and not applicable for the calibration of the excres with respect to azimuthal power tilt. Other CECOR monitored parameters, including PLMR, FrT, FyT, and ASI, are calculated independent of the tilt calculation and remain valid because two ICI strings per full axial quadrant are operable.

3.0 SURVEILLANCE REQUIREMENTS

3.10 Reactor Core Parameters (Continued)

(6) Azimuthal Power Tilt (Tq)

Whenever the core power is above 70% of rated power, the azimuthal power tilt shall be determined to be within its limits by calculating the tilt at least once every day using either:

- a. The excore detectors with at least four safety channels operable, or
- b. The incore detectors with at least two strings of three rhodium detectors per full core height quadrant operable.

(7) DNB Parameters

- a. The cold leg temperature, pressurizer pressure, and axial shape index shall be verified to be within the limits of Section 2.10.4(5) at least once per shift.
- b. The reactor vessel coolant total flow rate shall be determined to be within its limit by measurement at least once per month.

2.0 LIMITING CONDITIONS FOR OPERATION

2.10 Reactor Core (Continued)

2.10.4 Power Distribution Limits (Continued)

(4) Azimuthal Power Tilt (T_q)

When operating above 70% of rated power,

- (a) The azimuthal power tilt (T_q) shall not exceed 0.10 whenever Mini CECOR/BASSS is operable, the CEA's are at or above the Long Term Insertion Limit and Mini CECOR/BASSS is being utilized to monitor F_{xy}^T and F_R^T .
- (b) The azimuthal power tilt (T_q) shall not exceed 0.03 whenever the provisions of 2.10.4(4)(a) do NOT allow Mini CECOR/BASSS to be utilized to monitor F_{xy}^T and F_R^T . With the indicated azimuthal power tilt determined to be >0.03 but <0.10 , correct the power tilt within two hours or determine within the next 6 hours and at least once per subsequent 8 hours, that the total integrated radial peaking factor, F_R^T , is within the limit of Specification 2.10.4(2) and that the total planar radial peaking factor, F_{xy}^T , is within the limit of 2.10.4(3), or reduce power to less than 70% of rated power within 8 hours of confirming $T_q > 0.03$.
- (c) With the indicated power tilt determined to be $\geq .10$, power operation may proceed up to 2 hours provided F_R^T and F_{xy}^T do not exceed the power limits of the F_R^T , F_{xy}^T and the Core Power Limitations Figure provided in the COLR, or be in at least hot standby within 6 hours. Subsequent operation for the purpose of measurement to identify the cause of the tilt is allowable provided the power level is restricted to 20% of the maximum allowable thermal power level for the existing reactor coolant pump combination.



August 5, 1996
FC-FE-0062

Mr. Marcus Guinn
Omaha Public Power District
P.O. Box 399
Ft. Calhoun, NE 68023-0399

Subject: Power Distribution Calculation with CECOR

Dear Mr. Guinn:

Based on the conversations with Mr. T. Heng of OPPD, the following statements apply to the validity of the CECOR results with the current complement of operable ICIs at Ft. Calhoun. The statements are based on the assumption that a sufficient number of ICIs are operable to satisfy the requirements of the 10 CFR 50.59 already in place at Ft. Calhoun, for a minimum of 28% ICIs operable. Under this assumption, the 3-D power distribution calculated by CECOR is valid and the calculated power distribution includes the effect of tilt measured by the ICIs. Therefore:

1. The power distribution calculated by CECOR is valid although the tilt estimate may not be valid.
2. The calibration of the ex-core ASI to the core average ASI is appropriate as long as the core is unrodded.
3. The calculation of the Alarm Limit Signals is valid since the 3-D core power distribution calculation is valid.
4. The core power peaks are valid as tilted values because the 3-D power distribution calculation uses all available ICI signals which result in a tilted core power distribution.

Since the CECOR tilt estimate is not valid, the 1S requirement on tilt has to be satisfied by the ex-core system.

The information has not been independently reviewed and is not quality assured according to ABB CFNO Quality Assurance Program.

If you have any questions, please call me at (860) 285-5512.

Sincerely,

COMBUSTION ENGINEERING, INC.

D. Bellacasa
Supervisor, Setpoint Analysis

cc	N. L. Shapiro	ABB
	G. F. Vincent	"
	R. C. Whipple	"
	R. T. Pearce	"

ABB Combustion Engineering Nuclear Operations