

## ANO-2 CYCLE 10

### COLSS and CPCS Addressable Constants for Reduction of Operable Incore Detectors

#### PREPARED BY:

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#### VERIFICATION STATUS

The information contained in this document has been verified in accordance with the ABB Combustion Engineering Nuclear Fuel Quality Assurance Program.

☒ Yes      ☐ No

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As proposed by CE (Reference 1) and approved by Entergy/ANO, an analysis was performed to determine the impact of a reduction in the number of operable incore detectors on the ANO-2 Cycle 10 COLSS and CPCS addressable constants transmitted in References 2 and 3. Reference 2 transmitted the original Cycle 10 COLSS and CPCS addressable constants and Reference 3 provided the revised BERR1 and BERR3 constants for reduced inlet temperature.

The analysis considered Technical Specification incore detector failure limits of up to 50% along with a bounding 1% increase in the CECOR Fxy measurement uncertainty which is consistent with the analysis performed at Entergy (Reference 4). The only addressable constants affected by this analysis are the COLSS EPOL2/4 and UNCERT constants and the CPCS BERR1 and BERR3 constants. All of the other addressable constants transmitted in Reference 2 remain unchanged.

The values of revised COLSS and CPCS addressable constants are given in Tables 1 and 2, respectively.

As stated in Reference 1, the COLSS database constant K09 must be modified to incorporate the revised minimum number of operable incore detectors. The value of K09 for the 50% failure limit is 110.

The COLSS addressable constants listed in Table 1 are appropriate for use with the COLSS algorithms and database constants described in ANO-2 COLSS Functional Design Requirements (References 5 and 6) and the COLSS Database Document for ANO-2 Cycle 10 (Reference 7), provided the appropriate value of K09 is incorporated.

The CPCS addressable constants listed in Table 2 are consistent with the Functional Design Requirements described in References 8 and 9, and the database constants listed in Reference 10.

Please note that all the assumptions, requirements, and guidelines specified in References 2 and 3 remain effective.

Table 1 ANO-2 Cycle 10 Current and Revised COLSS Addressable Constants for a Reduced Number of Operable Incore Detectors			
Constant	Description	Value	
		Current*	≤ 50% Failed
UNCERT	Uncertainty Factor for LHR POL	1.09	1.11
EPOL2/4	Uncertainty Factor for DNBR POL	0.11	0.12
* Values come from Page A2-2 of Reference 2.			

Table 2 ANO-2 Cycle 10 Current and Revised CPC Addressable Constants for a Reduced Number of Operable Incore Detectors			
Constant	Description	Value	
		Current*	≤ 50% Failed
BERR1	Power Uncertainty Factor Used in DNBR Calculation	1.21	1.22
BERR3	Power Uncertainty Factor Used in Local Power Density Calculation	1.25	1.26
* Values come from Page 2 of Reference 3.			

References:

1. D. R. Earles to F. T. Philpott, "Proposal to Support Reduction of Operable Incore Detectors for ANO-2 Cycle 10 and Beyond," A-93-025, September 8, 1993.
2. D. R. Earles to F. T. Philpott, "ANO-2 Cycle 10 Final CPC/CEAC, COLSS and CEFAST Information," A-92-050, October 8, 1992.
3. D. R. Earles to F. T. Philpott, "ANO-2 Cycle 10 Revised BERR1 and BERR3 Values in CPC and Revised Planar Radial Peaks in CPC and COLSS," A-92-065, December 23, 1992.
4. R. B. Lang, "ANO-2 Cycle 10 CECOR Reliability Factors," 041-01;QR-220-18, CEO-93/00367, September 17, 1993.
5. "Functional Design Requirements for a Core Operating Limit Supervisory System (COLSS)," CE-NPSD-344-P, Revision 01-P, December 1986.
6. "Arkansas Nuclear ONE Unit 2 COLSS Functional Design Specification - Plant Specific Supplement," CE-NPSD-352-P, Rev. 00-P, July 1986.
7. "ANO-2 COLSS Database Document," CE-NPSD-315, Rev. 05-P, October 1992.
8. "Functional Design Requirements for a Core Protection Calculator," CE-NPSD-335-P, Rev. 02-P, April 1988.
9. "Functional Design Requirements for a Control Element Assembly Calculator," CE-NPSD-336-P, Rev. 01-P, April 1988.
10. "ANO-2 CIP CPC and CEAC Database Listing," CE-NPSD-351-P, Revision 01-P, April 1988.

Software Media Transfer Form

ACCL NO. 127

CORE PROTECTION CALCULATOR SYSTEM  
ADDRESSABLE CONSTANTS AND SOFTWARE MEDIA  
TRANSFER FORM

A. Originator S. Etemadi Plant ANO-2 Cycle 10 Date September 21, 1993

B. Package Contents (C-E Windsor):

Revised BERR1 and BERR3 values for reduction of operable incore detectors

C. Receipt of Change (NSSS Site):

1. Receipt of CPC Addressable Constants/Software media is acknowledged.

Name \_\_\_\_\_ Date \_\_\_\_\_

2. The change has been reviewed and found acceptable, except as noted:

3. Please return to: Mr. M. A. Book  
CEP: 5318-GC28  
1000 Prospect Hill Road  
Post Office Box 500  
Windsor, CT 06095-0500

D. Acknowledgement of Receipt of Change (C-E Windsor):

1. ACCL Entries Completed \_\_\_\_\_ Date \_\_\_\_\_

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NOTE: Originator to send copies of completed forms to all concerned C-E Engineering groups.