

ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9003080383 DOC.DATE: 90/02/22 NOTARIZED: NO DOCKET #
 FACIL:50-315 Donald C. Cook Nuclear Power Plant, Unit 1, Indiana & 05000315
 50-316 Donald C. Cook Nuclear Power Plant, Unit 2, Indiana & 05000316
 AUTH.NAME AUTHOR AFFILIATION
 ALEXICH,M.P. Indiana Michigan Power Co. (formerly Indiana & Michigan Ele
 RECIP.NAME RECIPIENT AFFILIATION
 MURLEY,T.E. NRC - No Detailed Affiliation Given

SUBJECT: Submits annual rept of changes to or errors in acceptable
 LOCA evaluation models or application of models for plant.

DISTRIBUTION CODE: A001D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 11
 TITLE: OR Submittal: General Distribution

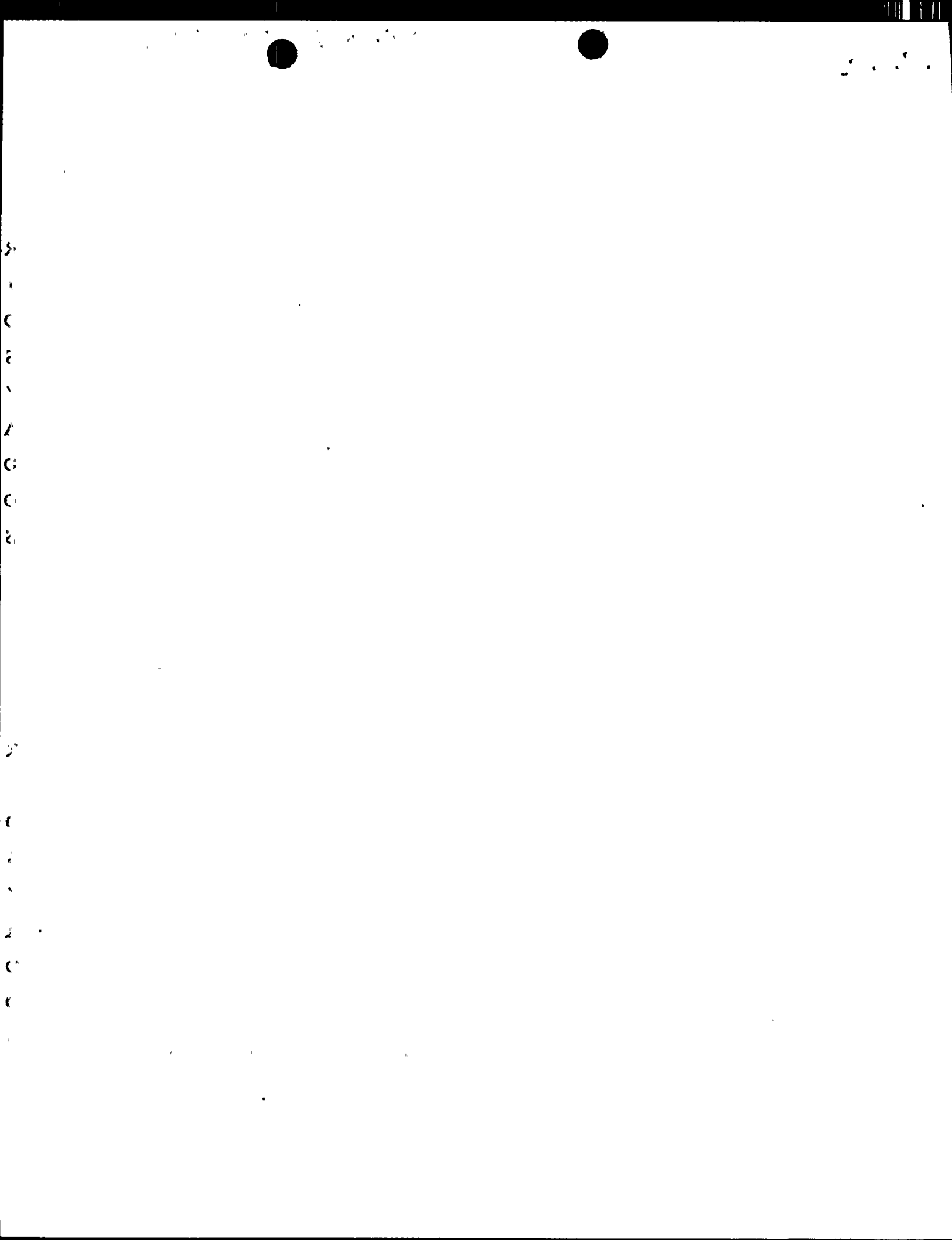
NOTES:

	RECIPIENT		COPIES			RECIPIENT		COPIES	
	ID CODE/NAME		LTTR	ENCL		ID CODE/NAME		LTTR	ENCL
	PD3-1 LA		1	1		PD3-1 PD		1	1
	GIITTER,J.		5	5					
INTERNAL:	NRR/DET/ECMB 9H		1	1		NRR/DOEA/OTSB11		1	1
	NRR/DST 8E2		1	1		NRR/DST/SELB 8D		1	1
	NRR/DST/SICB 7E		1	1		NRR/DST/SRXB 8E		1	1
	NUDOCS-ABSTRACT		1	1		OC/LFMB		1	0
	OGC/HDS1		1	0		REG FILE 01		1	1
	RES/DSIR/EIB		1	1					
EXTERNAL:	LPDR		1	1		NRC PDR		1	1
	NSIC		1	1					

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK,
 ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION
 LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 21 ENCL 19





AEP:NRC:1118
10 CFR 50.46

Donald C. Cook Nuclear Plant Units 1 and 2
License Nos. DPR-58 and DPR-74
Docket Nos. 50-315 and 50-316
ANNUAL REPORT OF LOCA EVALUATION MODEL CHANGES
PURSUANT TO 10 CFR 50.46(a)(3)(ii)

U.S. Nuclear Regulatory Commission
Attn: T. E. Murley
Washington, D.C. 20555

Attn: T. E. Murley

February 22, 1990

Dear Dr. Murley:

Pursuant to the requirements of 10 CFR 50.46(a)(3)(ii), this letter constitutes our annual report of changes to or errors in acceptable LOCA evaluation models or in the application of the models for the Donald C. Cook Nuclear Plants. Attachment 1 contains an attachment of a letter from Westinghouse Electric Corp. (Westinghouse) providing information on changes to the Unit 1 small and large break LOCA analyses. Attachment 2 contains a letter from Advanced Nuclear Fuels Corp. (ANF) providing information on changes to the Unit 2 large break LOCA analyses.

The small break LOCA analyses of record for Unit 2 were performed by Westinghouse using the WFLASH code. As a result of NUREG-0737, Westinghouse developed the NOTRUMP code and demonstrated that the results predicted with WFLASH were conservative compared to the NOTRUMP results. The NOTRUMP code was used for the current Unit 1 analyses. For the Unit 2 Cycle 8 reload, the WFLASH analyses will be superseded by NOTRUMP analyses as part of a transition from ANF to Westinghouse fuel. The analyses were submitted in our letter AEP:NRC:1071E, and are presently under NRC review. Since the present Unit 2 WFLASH analyses will cease to be applicable at the end of the present cycle, tentatively June of this year, we have not included a listing of LOCA model changes for the WFLASH analyses. The discussion in Attachment 1 relative to the NOTRUMP code is applicable to the NOTRUMP analyses submitted for Unit 2 in AEP:NRC:1071E.

9003080383 900222
PDR ADOCK 05000315
R PNC

APD
1/11

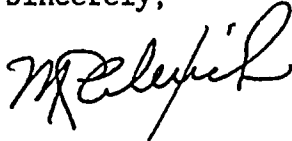
Dr. T. E. Murley

-2-

AEP:NRC:1118

This letter has been prepared following Corporate procedures that incorporate a reasonable set of controls to ensure its accuracy and completeness prior to signature by the undersigned.

Sincerely,

A handwritten signature in cursive script, appearing to read 'M. P. Alexich'.

M. P. Alexich
Vice President

ldp

Attachments

cc: D. H. Williams, Jr.
A. A. Blind - Bridgman
R. C. Callen
G. Charnoff
A. B. Davis - Bridgman
NRC Resident Inspector - Bridgman
NFEM Section Chief

ATTACHMENT 1 TO AEP:NRC:1118

INFORMATION FROM WESTINGHOUSE ELECTRIC CORP.
RELATED TO DONALD C. COOK NUCLEAR PLANT UNIT 1
SMALL AND LARGE BREAK LOCA ANALYSES

EFFECT OF WESTINGHOUSE ECCS EVALUATION MODEL
MODIFICATIONS ON THE LOCA ANALYSIS RESULTS
FOUND IN CHAPTERS 14.3.1 AND 14.3.2 OF THE
D.C. COOK UNIT 1
FINAL SAFETY ANALYSIS REPORT

The October 17, 1988 revision to 10CFR50.46 required applicants and holders of operating licenses or construction permits to notify the Nuclear Regulatory Commission (NRC) of errors and changes in the ECCS Evaluation Models on an annual basis, when the errors and changes are not significant. Reference 1 defines a significant error or change as one which results in a calculated peak fuel cladding temperature different by more than 50°F from the temperature calculated for the limiting transient using the last acceptable model, or is a cumulation of changes and errors such that the sum of the absolute magnitudes of the respective temperature changes is greater than 50°F.

In Reference 2, information regarding modifications to the Westinghouse large break and small break LOCA ECCS Evaluation Models was submitted to the NRC. The following presents an assessment of the effect of the modifications to the Westinghouse ECCS Evaluation Models on the loss-of-coolant accident (LOCA) analysis results found in Chapter 14.3.1 of the D. C. Cook Unit 1 Final Safety Analysis Report.

LARGE BREAK LOCA

The large break LOCA analyses for D. C. Cook Unit 1 were examined to assess the effect of the applicable modifications to the Westinghouse large break LOCA ECCS Evaluation Model on peak cladding temperature (PCT) results reported in Chapter 14.3.1 of the FSAR. The large break LOCA analyses results were calculated using the 1981 version of the Westinghouse large break LOCA ECCS Evaluation Model (incorporating the BASH analysis technology). The analysis assumed the following information important to the large break LOCA analyses;

- 1) A reactor power level of 3413 Mwt, a total core peaking factor (F_q) of 2.15 and uniform 15% steam generator tube plugging.
- 2) The analysis considered plant operation at reduced temperature and pressure.
- 3) A case was also analyzed where the RHR cross tie valves were closed. For this case, the reactor power level was lowered to offset the reduction in safety injection flow.

For D. C. Cook Unit 1, the limiting break resulted from the double ended guillotine rupture of the cold leg piping with a discharge coefficient of $CD = 0.6$ at the high temperature, high pressure condition assuming maximum safeguards. The calculated peak cladding temperature was 2180.5°F.

The following modifications to the Westinghouse ECCS Evaluation Models discussed in Reference 2 would affect the large break LOCA analysis results found in Chapter 14.3.1 of the D. C. Cook Unit 1 Final Safety Analysis Report.

1981 ECCS EVALUATION MODEL INCORPORATING BASH ANALYSIS TECHNOLOGY

Several improvements were made to the BASH computer code to treat special analysis cases which are related to the tracking of fluid interfaces:

- 1) Modifications, to prevent the code from aborting, were made to increase the dimensions of certain arrays for special applications.
- 2) A modification was made to write additional variables to the tape of information to be provided to LOCBART.
- 3) Typographical errors in the coding of some convective heat transfer terms were corrected, but the corrections have no effect on the BASH analysis results since the related terms are always set equal to zero.

For D. C. Cook Unit 1, LOCA analysis results could be affected by the modifications specified in items 1, 2, and 3 above. There is no adverse effect on the PCT calculation for changes discussed above which apply to D. C. Cook Unit 1.

As discussed above, modifications to the Westinghouse large break LOCA ECCS Evaluation Model could affect the result by altering the PCT.

A.	Analysis calculated result	2180.5°F
B.	Modifications to Westinghouse ECCS Evaluation Model	+ 0.0°F
C.	ECCS Evaluation Model Modifications Resultant PCT	2180.5°F

SMALL BREAK LOCA

The small break LOCA analyses for D. C. Cook Unit 1 were also examined to assess the effect of the applicable modifications to the Westinghouse ECCS Evaluation Models on peak cladding temperature (PCT) results reported in Chapter 14.3.2 of the FSAR. The small break LOCA analyses results were calculated using the 1985 version of the Westinghouse small break LOCA ECCS Evaluation Model incorporating the NOTRUMP analysis technology. For D. C. Cook Unit 1, the limiting size small break resulted from a 3-inch equivalent diameter break in the cold leg. The calculated peak cladding temperature was 2122.7°F. The analysis assumed the following information important to the small break LOCA analyses;

- 1) A reactor power level of 3588 Mwt, a total core peaking factor (Fq) of 2.32 and uniform 15% steam generator tube plugging.
- 2) The analysis considered plant operation at reduced temperature and pressure.

- 3) Closure of the high head safety injection (HHSI) cross tie valves was also considered in the analysis.

The following modifications to the Westinghouse ECCS Evaluation Models discussed in References 2 & 3 would affect the small break LOCA analysis results found in Chapter 14.3.2 of the D. C. Cook Unit 1 Final Safety Analysis Report.

NOTRUMP ECCS EVALUATION MODEL

NOTRUMP Cycle 21:

The Westinghouse small break LOCA ECCS Evaluation Model analyses for D.C. Cook Unit 1 were performed with a version of the NOTRUMP computer which incorporated all of the potentially significant modifications noted in Reference 1.

Since the small break LOCTA-IV code modifications could, at most, result in a very small benefit the effect of modification to the small break LOCTA-IV code modifications do not need to be assessed or tracked.

Consequently, the effect of the potentially significant ECCS Evaluation Model modifications on the small break LOCA analyses for D. C. Cook Unit 1 are already taken into account and no additional margin utilization needs to be debited due to ECCS Evaluation Model changes when determining the available margin to the limits of 10CFR50.46."

CONCLUSIONS

An evaluation of the effect of modifications to the Westinghouse ECCS Evaluation Model as reported in references 2 & 3 was performed for both the large break LOCA and small break LOCA analysis results found in Chapters 14.3.1 and 14.3.2 of the D. C. Cook Unit 1 Final Safety Analysis Report.

It was determined that compliance with the requirements of 10CFR50.46 would be maintained when the effects of the ECCS model changes were combined with the current plant analysis results.

REFERENCES

1. "Emergency Core Cooling Systems; Revisions to Acceptance Criteria," Federal Register, Vol. 53, No. 180, pp.35996-36005, Dated September 16, 1988
2. NS-NRC-89-3463, "10CFR50.46 Annual Notification for 1989 of Modifications in the Westinghouse ECCS Evaluation Models," Letter from W. J. Johnson (Westinghouse) to T. E. Murley (NRC), Dated October 5, 1989.
3. NS-NRC-89-3464, "Correction of Errors and Modifications to the NOTRUMP Code in the Westinghouse Small Break LOCA ECCS Evaluation Model Which Are Potentially Significant," Letter from W. J. Johnson (Westinghouse) to T. E. Murley (NRC), Dated October 5, 1989.
4. WCAP-9220-P-A, Revision 1 (Proprietary), WCAP-9221-A, Revision 1 (Non-Proprietary), "Westinghouse ECCS Evaluation Model - 1981 Version," 1981, Eicheldinger, C.
5. WCAP-9561-P-A, Addendum 3 (Proprietary), WCAP-9562-A, Addendum 3 (Non-Proprietary), Young, M. Y., "Addendum to: BART-1A: A Computer Code for the Best Estimate Analysis of Reflood Transients (Special Report: Thimble Modeling in Westinghouse ECCS Evaluation Model)," 1986.
6. WCAP-10266-P-A, Revision 2 (Proprietary), WCAP-10267-A, Revision 2 (Non-Proprietary), Besspiata, J.J., et.al., "1981 Version of the Westinghouse ECCS Evaluation Model Using the BASH Code," March 1987.
7. WCAP-10924-P-A (Proprietary), WCAP-12130-A (Non-Proprietary), "Westinghouse Large Break LOCA Best Estimate Methodology," Hochreiter, L.E., et.al., January 1987.
8. "Report on Small Break Accidents for Westinghouse Nuclear Steam Supply System," WCAP-9601 (Non-Proprietary), June 1979, WCAP-9600 (Proprietary), June 1979.
9. "Generic Evaluation of Feedwater Transients and Small Break Loss-of-Coolant Accidents in Westinghouse Designed Operating Plants," NUREG-0611, January 1980.
10. "Clarification of TMI Action Plan Requirements," NUREG-0737, November 1980.
11. "Clarification of TMI Action Plan Item II.K.3.31," NRC Generic Letter 83-85 from D. G. Eisenhut, November 2, 1983.
12. "NOTRUMP - A Nodal Transient Small Break and General Network Code," WCAP-10079-P-A (Proprietary), WCAP-10080-A (Non-Proprietary), Meyer, P. E., et. al., August 1985.

13. "Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code," WCAP-10054-P-A (Proprietary), WCAP-10081-A (Non-Proprietary), Lee, N., et. al., August 1985.
14. "Westinghouse Small Break ECCS Evaluation Model Generic Study with the NOTRUMP Code," WCAP-11145, Rupprecht, S. D., et. al., August 1985.

ATTACHMENT 2 TO AEP:NRG:1118

LETTER FROM ADVANCED NUCLEAR FUELS CORP.
RELATED TO DONALD C. COOK NUCLEAR PLANT UNIT 2
LARGE BREAK LOCA ANALYSES

ADVANCED NUCLEAR FUELS CORPORATION

2101 HORN RAPIDS ROAD, PO BOX 130, RICHLAND, WA 99352-0130
(509) 375-8100 TELEX: 15-2878

FUEL ENGINEERING &
TECHNICAL SERVICES

January 10, 1990
ANF-AEP/0721
HGS:016:90

Mr. Thomas A. Georgantis
Nuclear Fuel and Analyses
Indiana & Michigan Electric Company
c/o American Electric Power Service Corp.
One Riverside Plaza
Columbus, OH 43216-6631

- Reference:
- (1) Letter, T. A. Georgantis (AEP) to H. G. Shaw (ANF), AEP-ANF/0399, December 19, 1989
 - (2) Donald C. Cook Unit 2 Limiting Break LOCA/ECCS Analysis, 10% Steam Generator Tube Plugging, and K(Z) Curve, XN-NF-85-68(P), Revision 1, April 1986
 - (3) Letter, G. N. Ward (ANF) to R. Bennett (AEP), GNW:123:86, November 14, 1986
 - (4) Letter, H. G. Shaw (ANF) to R. B. Bennett (AEP), ANF/AEP-0559, April 14, 1987
 - (5) Letter, H. G. Shaw (ANF) to T. A. Georgantis (AEP), HGS:390:88, December 1, 1988
 - (6) Letter, H. G. Shaw (ANF) to T. A. Georgantis (AEP), D. C. Cook Unit 2 Core-Wide Metal-Water Reaction for Two-Point RHR Injection Cases, ANF-AEP-0682, December 15, 1988

Dear Mr. Georgantis:

This letter provides a response to your request (Reference 1) for information on changes or errors in the ANF LOCA analyses of record for D. C. Cook Unit 2 during the past year in accordance with 10 CFR 50.46(a)(3)(i) and (ii).

ANF's understanding is that the large break LOCA analyses of record are reported in References 2 through 6. The limiting peak cladding temperature for the two-point RHR injection case was reported in Reference 4 to be 1988°F.

Mr Thomas A. Georgantis
January 10, 1990
Page 4

There have been no changes or model errors discovered in the analyses of record as defined by these references. ANF did not perform the small break LOCA analysis of record for D. C. Cook Unit 2.

If you have any questions, please feel free to contact me.

Sincerely,

R.C. Gottula for

H. G. Shaw
Contract Administrator

skm