



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION III  
801 WARRENVILLE ROAD  
LISLE, ILLINOIS 60532-4351

August 11, 2000

MEMORANDUM TO: J. E. Dyer, Regional Administrator

FROM: Geoffrey E. Grant, Director, Division of Reactor Projects

SUBJECT: RECOMMENDATION OF AD HOC REVIEW PANEL FOR  
DIFFERING PROFESSIONAL VIEW: CEQ FAN ROOM WALL  
OPERABILITY

REFERENCES:

1. Memorandum Dyer to Grant: AD HOC REVIEW PANEL FOR DIFFERING PROFESSIONAL VIEW: CEQ FAN ROOM WALL OPERABILITY (D. C. COOK UNIT 2 STARTUP), dated June 23, 2000.
2. Memorandum Bajwa to Grobe: RESOLUTION OF DEGRADED CEQ FAN ROOM WALL, dated June 12, 1999.
3. D. C. Cook Action Request Status Report for AR A0156971, printed May 2, 2000.
4. D. C. Cook Condition Report P-99-27755 status screen page, printed April 18, 2000.
5. Summary of pour card data for CEQ walls, Calc. No. SD-000510-003, Page No. F5.
6. Westinghouse letter Rice to Hoskins: REACTOR CAVITY LOOP SUBCOMPARTMENT - PRESSURE TIME HISTORIES, dated April 27, 2000.
7. Westinghouse letter Rice to Greenlee: TMD ANALYSIS - CLARIFICATION OF 40 PERCENT DESIGN MARGIN, dated June 1, 2000.
8. Summary of May 4, 2000, D. C. Cook public meeting, dated May 17, 2000.
9. NRC Manual Chapter (MC) 9900, "Resolution of Degraded and Nonconforming Conditions," dated October 8, 1997.

In accordance with your memo of June 23, 2000, to me (Reference 1), an Ad Hoc Differing Professional View (DPV) Review Panel (Panel) was formed in accordance with NRC Management Directive (MD) 10.159 with myself as Chairman and Patrick Hiland (Region III) and Dr. Yong Kim (NRR) as members to review a DPV regarding the operability of CEQ Fan Room Walls at the D. C. Cook site. The purpose of this memorandum is to provide you with the Panel's review, conclusions, and recommendation for this DPV.

ALL

The DPV addressed two main issues related to the operability of the CEQ Fan Room Walls inside containment at D. C. Cook Unit 2. The first issue focused on the technical aspects of the walls and challenged both the conservatisms and uncertainties associated with the design margins of the walls. The second issue focused on the appropriateness of applying Generic Letter (GL) 91-18 to the degraded walls in support of unit restart. In reviewing this DPV, the Panel met on two occasions, had additional dialogue, interviewed the DPV Submitter, interviewed key members of the NRC D. C. Cook 0350 Restart Panel, and reviewed References 2-9. The primary document used was Reference 2 which contained the staff analysis/resolution of the issues the Submitter raised in the DPV and included material from the licensee June 1, 2000, presentation to the staff on the issue of the degraded walls. The issues (and sub-issues in the case of the use of GL 91-18) are discussed below.

#### ISSUE - Conservatisms and Uncertainties Associated with the CEQ Fan Room Walls

##### REVIEW

The first issue raised by the Submitter was the uncertainties due to the construction discrepancies of the CEQ Fan Room Walls at D. C. Cook Unit 2. The Submitter identified several construction discrepancies (i.e., cover and spacing of the reinforcing steel, quality of the grout and concrete, thickness differences on various pours, etc.). The Panel reviewed the results of a June 1, 2000, meeting between American Electric Power Company (licensee) and NRC to discuss this issue. The Submitter also participated in that meeting. In the meeting, the licensee acknowledged and addressed the construction discrepancies. The presentation included structural analysis results based on the degraded present structural conditions, and sought to demonstrate that the degraded walls were operable by showing a factor of safety of 1.21. The staff of NRR/DE/EMEB reviewed the analysis results, challenged some aspects of the analysis, and recalculated a factor of safety of roughly 1.05. Overall, the staff concluded that the licensee operability calculations for the walls were reasonable and acceptable.

In the Panel interview with the Submitter on June 28, 2000, he indicated that he accepts the staff calculated factor of safety of 1.05. However, he had an additional concern that the factor of safety of 1.05 would be smaller if: (1) the 28-days concrete strength of 4807 psi was used in the analysis rather than 4867 psi, and (2) 40 percent margin was included in the highest calculated differential pressure in the analysis.

Regarding the use of the concrete strength of 4867 psi, the staff indicated (Reference 2) that the licensee used the 4867 psi in the analysis based on the 95/05 confidence computation from the 28-days strengths of concrete cylinder samples taken during the construction. The 4807 psi was the lowest concrete strength among the samples.

With respect to the 40 percent margin increase, the NRC Standard Review Plan (SRP), Section 6.2.1, requires 40 percent margin to the design differential pressure for plants being reviewed for construction permits. However, the SRP allows the 40 percent margin requirement to be eliminated as long as as-built data is used in the calculations. In the June 1, 2000, meeting, the licensee informed the staff that it used as-built conditions of the structures in

the pressure calculation and the 40 percent allowance was not needed. The staff of NRR/DSSA/SPLB accepted the licensee pressure calculation.

In view of the questions surrounding these walls, the Submitter raised a general question about the confidence in other concrete structures and whether or not they were built as designed and meet their intent (extent of condition). The Panel understood that the licensee described their reviews of construction records and photographs of initial construction showing the placement of concrete reinforcement bars in the June 1, 2000, meeting. In addition, the licensee described the examination of as-built structures that were performed to assess whether the problems identified on the CEQ wall exist in other structures. After extensive discussion, the staff found that the circumstances that resulted in the condition of the CEQ walls were unique based on the provided data and construction information regarding other walls. The Panel reviewed the material presented and discussed the meeting dialogue on this issue with MC 0350 Panel members who were there.

### CONCLUSION

The Panel concurs with the staff that the use of 4867 psi based on the 95/05 confidence computation is a generally accepted engineering practice and reasonable approach for determining the operability of the walls and is therefore acceptable.

The Panel concurs with the staff that there is no need for the 40 percent margin requirement in the pressure calculation per the SRP guidelines.

While clearly an area of judgement, the Panel believes enough information was presented for the MC 0350 Panel to make an informed decision on the extent of condition.

### RECOMMENDATION

None

### ISSUE - Appropriate Use/Application of GL 91-18

SUB-ISSUE - Adequacy of the application of GL 91-18 guidelines regarding: 1) Availability of redundant or backup equipment; 2) Compensatory measures; and 3) Conservatism and margin

### REVIEW

The staff response to the above three issues states that the licensee demonstrated operability for the affected structural element, i.e., load factor is above 1.0; therefore, consideration of other factors is not necessary.

As noted in the guidance provided in MC 9900, Resolution of Degraded and Nonconforming Conditions, the above three items are included as items to consider for a "Reasonable Assurance of Safety." Additional items also listed include: safety function and events protected against; probability of needing the safety function; and PRA or IPE results. The guidelines in

MC 9900, Section 4.7, provide some insight into the NRC expectations for when a compensatory action is to be implemented. Since the licensee was not required to establish a compensatory measure to restore operability of the affected structure (load factor was agreed to be greater than 1.0), their decision to use it "as-is" for some interim basis is reasonable. This does not mean that action is not required to restore licensed design margin; rather, the operability demonstration suggests that the degree of degradation is less than for an item which requires compensatory action.

### CONCLUSION

The Panel concludes that the licensee use of GL 91-18, and the staff acceptance of the licensee operability evaluations with the interim "use-as-is" disposition (i.e. delay restoration of design margin), was in accordance with existing guidelines.

SUB-ISSUE - GL 91-18 refers to the impact on core damage frequency (CDF), but containment is needed for large early release frequency (LERF)

### REVIEW

The conclusion of the NRC staff, as documented for Restart Action Matrix Issue R.3.17, was that the licensee operability determination was reasonable and demonstrated the affected structure was operable. The staff response to this issue stated that since containment was operable but degraded, there was no substantive change in the probability of a large early release.

### CONCLUSION

The Panel concurs with the staff position that, based on the capability of the affected structure to perform its intended function as indicated in the operability determination, there was no substantive increase in a large early release frequency.

SUB-ISSUE - Timeliness of licensee actions with regards to GL 91-18

### REVIEW

The staff response to this issue described the sequence of observations and identified problems on the affected structure, which eventually led the licensee to conduct a detailed operability evaluation. References 3 and 4 document the licensee initial determination that the affected structure had "...severely degraded concrete coating and grout..." in February 1998. At the time of discovery, the noted discrepancies were believed, as documented in the associated Action Request, not to impact the structure's operability. In November 1999 the severity of the nonconformance was more defined after repair work identified that structural repair, not cosmetic, would be required. In early 2000, the licensee appears to have concentrated their efforts on a "use as-is" disposition for the affected structure. In May 2000 a public meeting was held with the licensee (Reference 8) and the NRC staff identified several pieces of technical

information that the NRC needed to perform a thorough evaluation. The Panel discussion with the NRC staff who were present at the May 2000 meeting indicated that the licensee was not prepared or they did not understand the severity of the nonconformance. On June 1, 2000, another public meeting was held with the licensee to discuss their operability determination. At that meeting, the licensee presented their corrective actions - post restart (Reference 2, Slide 29).

Manual Chapter 9900, Section 4.3, states that when degraded or nonconforming conditions are identified, "The licensee must [emphasis added] establish a time frame for completion of corrective action."

### CONCLUSION

The licensee use of GL 91-18, and the decision to rely on the demonstrated operability determination without restoring and/or revising their Safety Analysis Report design margin prior to restart of D. C. Cook Unit 2, was reasonable. As stated in the MC, the time frame governing corrective actions begins with the discovery of the condition. At issue is the response of the licensee to a known nonconformance originally identified in 1998. The documented information presents a reasonable argument that the licensee was effectively implementing their corrective actions according to the safety significance of the issue. The original nonconformance was believed to be only "cosmetic" problems with the concrete or grout. In late 1999 the licensee corrective action programs were effective in recognizing that the problem required more than a cosmetic repair.

Considering the analysis required and the increased severity of the degraded condition discovered in 2000, the licensee decision to defer a permanent repair on the degraded structure and address the operability of the current condition was reasonable.

One issue not well documented is the time frame for the licensee to complete corrective actions. Through review of records and interviews of NRC staff present at the June 1, 2000, public meeting, it appears that the licensee did not initially present specific details regarding their time frame for completion of corrective actions. As a matter of record, the licensee deferred development of a schedule for permanent resolution until Unit 1 restart (Reference 2, Slide 29). As noted during interviews, NRC management present at the June 1, 2000, meeting emphasized the NRC expectations that corrective actions be implemented in accordance with current NRC guidance, i.e., as soon as practical commensurate with the safety significance of the deficiency, but not later than the next refueling outage for Unit 2. The acceptability of the licensee "corrective action - post restart" was partially based on verbal agreement from the licensee that adequate corrective actions would be implemented based on a schedule to be presented after Unit 2 restart. While the Panel believes this was acceptable, a more substantive commitment or presentation from the licensee prior to restart of D. C. Cook Unit 2 would have more closely aligned with the guidance of MC 9900.

Overall, the Panel believes the licensee use of the guidance in GL 91-18 to restart D. C. Cook Unit 2 was appropriate. The licensee and the NRC followed the guidance documents with some judgement used for accepting the licensee's commitment for a timeframe for permanent corrective actions.

#### RECOMMENDATION

The Panel recommends that the MC 0350 Panel address with the licensee the issue of the need for a definitive timeframe for final corrective action.

cc: J. McDermott, HR/OD  
J. Caldwell, RIII  
D. Sotiropoulos, RIII  
B. Berson, RIII  
P. Hiland, RIII  
Y. Kim, NRR

INDEX OF COLLECTED DATA FOR DPV ON D.C. COOK, UNIT 2

**ITEM 1** - ACTION REQUEST STATUS REPORT (5 PAGES) FOR AR A0156971

**ITEM 2** - CONDITION REPORT P-99-27755 STATUS SCREEN PAGE DATED 4/18/00

**ITEM 3** - SUMMARY OF POUR CARD DATA SHOWING STRENGTH AT 4807 VS. 4867 psi

**ITEM 4** - WESTINGHOUSE LETTER DATED APRIL 27, 2000, REQUIRED 40% MARGIN

**ITEM 5** - WESTINGHOUSE LETTER DATED JUNE 1, 2000, REMOVES 40% MARGIN

REPORT REQUESTOR: BARTLETT, B.L.

\*\*\* ACTION REQUEST \*\*\*

Page: 1

A/R Type : CM  
Pri/Ctd : 35  
Request Org : ENPT  
Request Date: 11FEB98  
Requested By: PHELAN, S.M.  
Pend Reason :

A/R Number : A0156971  
A/R Status : COMPLT  
Status Date: 20APR00  
Last Update: 26APR00  
Print Date : 02MAY00

A. Equipment Code Related Information.

Comp Nbr: Unit: 2 System: Type:  
FEG : 295.01 Desc: UNIT 2 CONTAINMENT  
Disp FEG: 295.01  
Unit Loc: Bldg: Elevation: Room No.: Safety Rel:  
A/R Tag?: N Tag Loc: N/A Maint. Cat.: P

A/R Desc: INVESTIGATE DEGRADED CONCRETE IN 2-HV-CEQ-2 FAN ROOM.

B. Detail Description and Location of Problem.

DURING MATERIAL CONDITION WALKDOWN, SEVERELY DEGRADED  
CONCRETE COATING AND GROUT WITH LOOSE PIECES WERE FOUND  
AT THE TOP CORNER OF THE WEST WALL DIRECTLY OVER THE FAN  
HOUSING. (CONTINUED)

THIS CONDITION DOES NOT IMPACT 2-HV-CEQ-2 OPERABILITY.  
THE COMPONENT NUMBER WAS USED ONLY TO DESIGNATE LOCATION.

G. 295.01

SENT TO IPSO FOR U2R ADD REVIEW

NOT APPROVED FOR U2R97 PER ORB U2R99

ASSIGNED NNPC BY NNSC

ADDED TO U2R97 PER MT CM BACKLOG REVIEW

C45329-01 PRINTED/ISSUED TO P. RICHARD VIA JAY NIYOGI

C45329-01 REFILED DUE TO ENGINEERING FLAG

C45329-01 REPRINTED/RE-ISSUED TO PHIL RICHARD VIA GFR

C45329-01 SENT TO NRM 4/22/00

|     |         |
|-----|---------|
| SMP | 11FEB98 |
| SMP | 11FEB98 |
| SMP | 11FEB98 |
| SMP | 11FEB98 |
| SMP | 11FEB98 |
| SMP | 11FEB98 |
| JAH | 12FEB98 |
| JAH | 12FEB98 |
| JAH | 12FEB98 |
| JMC | 12FEB98 |
| LCH | 19DEC98 |
| JMC | 21OCT99 |
| JMC | 28FEB00 |
| JMC | 10APR00 |
| JMC | 26APR00 |



REPORT REQUESTOR: BARTLETT,B.L.

\*\*\* ACTION REQUEST \*\*\*

Page: 2

A/R Type : CM  
Pri/Ctd : 35  
Request Org : ENPT  
Request Date: 11FEB98  
Requested By: PHELAN,S.M.  
Pend Reason :

A/R Number : A0156971  
A/R Status : COMPLT  
Status Date: 20APR00  
Last Update: 26APR00  
Print Date : 02MAY00

=====

Date Required : N/A  
Supervisor Rvwd: VERTERAMO,A.X.  
Reg Doc Cd :  
A/R Pkg Nbr :

Date: 11FEB98  
Commitment Nbr:  
Recurring Task Nbr:

#### C. FAILURE STATUS CODE

Sta Review?: N      Tech Spec Rel? :  
Syst. Code : N      Severity Level : L  
Comp. Inop?: N      Equip Req'd Mode:  
SS Notified: N      SS Name: N/A  
RCM System Status Code: F

Detect Code : N  
Plant Effect: G      Syst Stat Code: A  
N/A /  
RCM When/How Discovered: I

#### D. Action Request Plan Information.

A/R Accepted By : ROLAND,G.F.

Date: 17JUN98

Assigned Org: NNCP      Assigned To: ROLAND,G.F.  
Action Plan Desc: INSPECT/REPAIR CONCRETE IN 2-HV-CEQ-2 AREA

Planning Code: RO2  
Network Name: U2R97

Design Change: - -00000-

CR Number: 00-00610      Work Complete: N      ECAP Updated: N  
CR Number: 99-27755      Work Complete: N      ECAP Updated: N

A/R Completed By: CLARK,J.M.

Date: 20APR00

REPORT REQUESTOR: BARTLETT, B.L.

\*\*\* ACTION REQUEST \*\*\*

Page: 3

A/R Type : CM  
Pri/Ctd : 35  
Request Org : ENPT  
Request Date: 11FEB98  
Requested By: PHELAN, S.M.  
Pend Reason :

A/R Number : A0156971  
A/R Status : COMPLT  
Status Date: 20APR00  
Last Update: 26APR00  
Print Date : 02MAY00

=====

|  |                   |                                  |
|--|-------------------|----------------------------------|
| Evaluation Nbr: 01                         | Eval Type: TSOP   | Eval Status/Date: COMPLT 13FEB98 |
| Evaluating Org: OPST                       |                   | Eval Due Date: 12FEB98           |
| Evaluation Ind: BRUCK, D.A.                |                   | Date Assigned: 12FEB98           |
| Eval Request Org : ENPT                    |                   |                                  |
| Eval Request Indv: PHELAN, S.M.            |                   |                                  |
| Eval Approved By : KARNES, D.R.            |                   | Eval Approved Date: 13FEB98      |
| Prob. Report Initiated :                   | Prob. Report Nbr: | Date Complt: N/A                 |
| Eval Desc: EVALUATE FOR TECH SPEC CONCERNS |                   |                                  |

CONCRETE COATINGS AND SURFACE DAMAGE DOES NOT EFFECT THE  
STRUCTURAL INTEGRITY OF THE CONCRETE IN THE CONTAINMENT  
WALLS. THIS IS A LONG TERM DEGRADATION ISSUE AND NOT AN  
NEAR TERM OPERABILITY ISSUE. THERE ARE NO OTHER  
OPERABILITY OR T/S CONCERNS.

|     |         |
|-----|---------|
| DAB | 12FEB98 |
| DAB | 12FEB98 |
| DAB | 12FEB98 |
| DAB | 12FEB98 |
| DAB | 12FEB98 |

REPORT REQUESTOR: BARTLETT, B. L.

\*\*\* ACTION REQUEST \*\*\*

Page: 4

A/R Type : CM  
Pri/Ctd : 35  
Request Org : ENPT  
Request Date: 11FEB98  
Requested By: PHELAN, S.M.  
Pend Reason :

```

A/R Number : A0156971
A/R Status : COMPLT
Status Date: 20APR00
Last Update: 26APR00
Print Date : 02MAY00

```

|   |                   |                                  |
|---|-------------------|----------------------------------|
| Evaluation Nbr: 02  | Eval Type: ENG    | Eval Status/Date: COMPLT 07JAN00 |
| Evaluating Org: NESD  |                   | Eval Due Date: 13JAN00           |
| Evaluation Ind: SEN,A.  |                   | Date Assigned: 07JAN00           |
| Eval Request Org : NNPC   |                   |                                  |
| Eval Request Indv: ROLAND,G.F.  |                   |                                  |
| Eval Approved By : SEN,A.P.   |                   | Eval Approved Date: 07JAN00      |
| Prob. Report Initiated :  | Prob. Report Nbr: | Date Complt: N/A                 |
| Eval Desc: PERFORM EVALUATION OF DISCREPANT CONDITION? DESIGN CHANGE? |                   |                                  |

PLEASE ASSIGN TO NESD. A.P.SEN IS EXPECTING THIS EVAL.  
DUE OF 01/13/00 WAS NEGOTIATED WITH A.P.SEN.

REFERENCE - JOA C45329-01  
CR #99-27755

QUESTIONS?      CONTACT GEORGE ROLAND      X-2281

THE PROPOSED ACTION FROM NESD (CR #99-27755) TO IS REPAIR  
THE CONCRETE "...PER PROCEDURE 12-CHP 5021 CCD.003  
(STRUCTURAL REPAIR).NO FURTHER EXCAVATION SHALL BE MADE."  
THIS WILL LEAVE "UN SOUND" CONCRETE IN THE REPAIR AREA.

THE QUESTION(S) NEEDED TO BE ANSWERED IS (ARE) -

- 1) IS THE 50.59 REVIEW PROCESS REQUIRED?
- 2) SINCE THIS "REPAIR" WILL LEAVE UNSOUND CONCRETE, IS A CHANGE TO THE PLANT (SSC)?
- 3) IS THIS A DESIGN CHANGE?
- 4) IS AN EVALUATION OF DISCREPANT CONDITION REQUIRED (12EHP5043EDC.001)?
- 5) IS A DRAWING REVISION REQUIRED TO IDENTIFY THE AREA OF UNSOUND CONCRETE?

NOTE - THIS EVALUATION IS SPECIFIC FOR THIS JOB AND NNPC  
MAKES NO RECOMMENDATION(S).

NOTE: IF ENGINEERING PROCESSES TO PRODUCE AN APPROVED RESULT SUCH AS TEMPORARY OR PERMANENT MODIFICATIONS, DRAWING UPDATES, COMPONENT EVALUATIONS, SET POINT CHANGES, ETC., ARE REQUIRED AS A RESULT OF THIS EVALUATION, THEN CLEARLY STATE WHICH PROCESS AND ACTION TO BE TAKEN TO INITIATE THAT PROCESS.

**NESD RESPONSE:**

NESD RESPONSE:  
NESD IS CURRENTLY PERFORMING EVALUATION OF THE  
DISCREPANT CONDITION. ACCEPT AS IS WILL ALSO REQUIRE  
50.59 AND POSSIBLE ANALYSIS OF THE WALL BY NESD.  
ALL THIS IS UNDER PROGRESS.

[illegible]



Item #2  
(1 page)

Page 1

**SUMMARY OF POUR CARD DATA FOR CEO/ACCUMULATOR/INSTRUMENT R  
WALLS FROM ELEVATION 612'-0" TO 638'-0"**

| Wall    | Elevations            | Pour Number      |
|---------|-----------------------|------------------|
| AZ 54°  | 631' - 638'           | 2C18D7 3/4/1974  |
|         | 622' - 631'           | 2C18D3 2/25/1974 |
|         | 612' - 622'           | Not Retrievable  |
| AZ 126° | 631'-5 1/4" - 638'-0" | 2C18D8 4/2/1974  |
|         | 622' - 631'-5 1/4"    | 2C18D4 3/21/1974 |
|         | 612' - 622'           | 2C18C5 3/6/1974  |
| AZ 234° | 631'-9 1/4" - 638'    | 2C18D9 6/11/1974 |
|         | 622' - 631' - 5 1/4"  | 2C18D5 4/2/1974  |
|         | 612' - 622'           | 2C18C6 3/21/1974 |
| AZ 307° | 626'-10 1/2" - 638'   | 2C18D6 6/3/1976  |
|         | 612' - 624'-4 1/2"    | 2C18C9 3/15/1976 |

**Concrete Break Strength in psi**

| Wall    | Pour # | 3 Day<br>1 <sup>st</sup> Test | 3 Day<br>2 <sup>nd</sup> test | 7 Day<br>1 <sup>st</sup> Test | 7 Day<br>2 <sup>nd</sup> test | 28 Day<br>1 <sup>st</sup> Test | 28 Day<br>2 <sup>nd</sup> test |
|---------|--------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|--------------------------------|
| AZ 54°  | 2C18D7 | 2805                          | 2858                          | 4220                          | 4294                          | 5585                           | 5547                           |
|         | 2C18D3 | 2455                          | 2557                          | 3785                          | 4018                          | 5656                           | 5759                           |
| AZ 126° | 2C18D8 | 2402                          | 2455                          | 4238                          | 4198                          | 5476                           | 5419                           |
|         | 2C18D4 | 2575<br>(4days)               | 2480<br>(4days)               | 4050                          | 4149                          | 4807                           | 4892                           |
|         | 2C18C5 | 2448                          | 2398                          | 4167                          | 4117                          | 5688                           | 5603                           |
| AZ 234° | 2C18D9 | 2253                          | 2349                          | 3353                          | 3180                          | 4949                           | 4998                           |
|         | 2C18D5 | 2402                          | 2455                          | 4238                          | 4198                          | 5476                           | 5419                           |
|         | 2C18C6 | 2575 (4<br>days)              | 2480 (4<br>days)              | 4050                          | 4149                          | 4807                           | 4892                           |
| AZ 307° | 2C18D6 |                               |                               | 4227                          | 4015                          | 5253                           | 5164                           |
|         |        |                               |                               | 4139                          | 3997                          |                                |                                |
|         | 2C18C9 | 3272                          | 3325                          | 4262                          | 4262                          | 5536                           | 5695                           |

*[Handwritten signature]*

Concrete strength  
should be 4807 psi  
not 4867 psi



Westinghouse  
Electric Company LLC

Box 355  
Pittsburgh Pennsylvania 15230-0355

AEP-00-139  
April 27, 2000

Mr. Mike Hoskins  
American Electric Power  
500 Circle Drive  
Buchanan, Michigan 49107

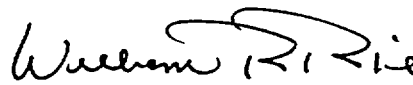
AMERICAN ELECTRIC POWER  
DONALD C. COOK NUCLEAR PLANT UNITS 1 AND 2  
**REACTOR CAVITY AND LOOP SUBCOMPARTMENT - PRESSURE TIME HISTORIES**

- References:
1. AEP-00-063, "American Electric Power Donald C. Cook Nuclear Plant Units 1 & 2, Reactor Cavity Subcompartment Analysis (CR 99-02649)", 2/15/00
  2. AEP-99-369, "American Electric Power Donald C. Cook Nuclear Plant Units 1 & 2, Input for Electronic Corrective Action Plan SN P-99-2650", 10/18/99

Dear Mr. Kingseed,

Westinghouse performed a reanalysis of the reactor cavity and loop subcompartment to include the effects of as-built plant data. The results of these analyses were formally transmitted to American Electric Power (References 1 and 2). Mr. Satyananda Chakrabarti, AEP, recently requested additional information regarding these analyses and clarification of the respective TMD subcompartment analyses. The specific questions asked by Mr. Chakrabarti and the Westinghouse responses to them are contained in the attached letter.

This work was performed under AEP Contract Number C-7693, Release 00-03 (DETR-00-018). Please contact Mr. Don Peck (412-374-2052) or me if you have further questions on this subject.

  
W. R. Rice  
Customer Projects Manager

Attachment

cc: Ken Green  
Jeff Smetters  
Satyananda Chakrabarti

- AEP (Buchannon)  
- AEP (SGRP Grp., D. C. Cook, Unit 1)  
- AEP (Buchannon)



LTR-CRA-00-94

From : Containment and Radiological Analysis  
WIN : 284-4079  
Date : April 27, 2000  
Subject : Donald C. Cook – Reactor Cavity & Loop Subcompartment – Pressure Time Histories

- Ref 1) : CN-CRA-00-10-R0, "D. C. Cook Units 1 and 2 (AEP/AMP) – Evaluation of Input Changes to the TMD Reactor Cavity Subcompartment Model", 02/09/2000.  
2) : CN-CRA-99-81-R0, "D. C. Cook Units 1 and 2 (AEP/AMP) – Evaluation of Input Changes to the TMD Loop Subcompartment Model", 10/15/1999.  
3) : AEP-00-063, "American Electric Power Donald C. Cook Nuclear Plant Units 1 & 2 Reactor Cavity Subcompartment Analysis (CR 99-02649)", 02/15/2000.  
4) : AEP-99-369, "American Electric Power Donald C. Cook Nuclear Plant Units 1 & 2 Input for Electronic Corrective Action Plan SN P-99-2650", 10/18/1999.  
5) : CN-COA-88-005, "AEP/AMP Thot Reduction Program – Subcompartment Evaluation", 08/3/1988.  
6) : CN-CRA-99-94-R0, "D. C. Cook Units 1 and 2 (AEP/AMP) – Evaluation of Input Changes to the TMD Fan/Accumulator Room Subcompartment Model", 10/28/1999.  
7) : CN-CRA-99-57-R1, "D. C. Cook Units 1 and 2 (AEP/AMP) – Ice Condenser Blowdown Loads", 11/09/1999.  
8) : AEP-99-397, "American Electric Power Donald C. Cook Nuclear Plant Units 1 & 2 Condition Report Number 99-2647 – Fan Accumulator Analysis", 11/3/99.

To: D. E. Peck

cc: E. C. Arnold  
W. R. Rice

Westinghouse reanalyzed the reactor cavity and loop subcompartment to include the effects of as-built plant data. Reference 1 and Reference 2 document the analysis. The results were formally transmitted to the customer in Reference 3 and Reference 4.

Mr. Chakrabarti of AEP has recently requested additional input and clarification of the respective TMD subcompartment analyses. Following is a listing of the specific questions and our responses:

1. Required Clarification for Design Margins

Does Westinghouse require a design margin to be applied to the pressures from TMD analyses? If yes, what is the required design margin?

Response

Following is an excerpt from the current Donald C. Cook Nuclear Plant UFSAR:

"The LOCA mass and energy analysis has been performed in accordance with the criteria shown in the Standard Review Plan (SRP) section 6.2.1.3. In this analysis, the relevant requirements of General Design Criteria (GDC) 50 and 10 CFR Part 50 Appendix K have been included by confirmation that the calculated



pressure is less than the design pressure, and because all available sources of energy have been included, which is more restrictive than the old GDC criteria, Appendix H of the original FSAR, to which the Donald C. Cook Plants are licensed. These sources include: reactor power, decay heat, core-stored energy, energy stored in the reactor vessel and internals, metal-water reaction energy, and stored energy in the secondary system.

Although the Donald C. Cook Nuclear Plant is not a standard review plan plant, the containment integrity peak pressure analysis has been performed in accordance with the criteria shown in the SRP Section 6.2.1.1.b, for ice condenser containments. Conformance to GDC's 16, 38, and 50 is demonstrated by showing that the containment design pressure is not exceeded at any time in the transient. This analysis also demonstrates that the containment heat removal systems function to rapidly reduce the containment pressure and temperature in the event of a LOCA."

Similarly for the subcompartment analyses, although the Donald C. Cook Nuclear Plant is not a standard review plan plant, the subcompartment pressure analyses have in general been performed in accordance with the criteria shown in the SRP. Applicable margins are discussed in SRP section 6.2.1.1.b (NUREG-0800 Rev. 2 July 1981), page 6.2.1.1.B-4,

"For plants being reviewed for construction permits, the design differential pressures for all ice condenser control volumes or subcompartments, and system components (e.g., reactor vessel, pressurizer, steam generators) and supports, should provide at least 40% margin above the highest calculated differential pressures. For plants being reviewed for operating licenses, the highest calculated differential pressures for all ice condenser control volumes or subcompartments should not exceed the corresponding design differential pressures."

Research by both AEP and Westinghouse, as part of the review of Condition Reports 99-02649 and 99-2650, determined that there was not a sound basis for all of the input used in the subcompartment analyses. In these instances, the data was recreated. However, the balance of the input, for which adequate documentation existed, was not recreated. This input could be based upon design information, or it could be current, but the status was not verified. The latest subcompartment re-analysis utilized this hybrid set of information. Since it has not been confirmed that all of the TMD input data is as-built information, it is Westinghouse's interpretation that the 40% margin is required. It is also the opinion of Westinghouse that this can be relaxed once all data is verified as being as-built.

Imp

## 2. Reactor Cavity (Ref. Westinghouse letter AEP-00-058)

a) We need the time history for the peak upper reactor cavity pressure of 79.0 psi.

### Response

Figure 1 illustrates the pressure time history for the upper reactor cavity.

b) We need the time history for the peak missile shield differential pressure of 79.2 psi.

### Response

The time history plot for the missile shield differential pressure is not available. However, Figure 1, which illustrates the pressure time history for the upper reactor cavity, and Figure 2, which illustrates the pressure time history for the upper containment, can be used to determine the time history differential pressure.

Westinghouse  
Electric Company LLC

Box 355  
Pittsburgh Pennsylvania 15230-0355

Item # 5  
(3 pages)

AEP-00-178

June 1, 2000

*08/11/00*  
Mr. Scott Greenlee  
American Electric Power  
500 Circle Drive  
Buchanan, Michigan 49107

AMERICAN ELECTRIC POWER  
DONALD C. COOK NUCLEAR PLANT UNITS 1 AND 2  
TMD Analysis - Clarification of 40% Design Margin

Dear Mr. Greenlee,

Per your request, Westinghouse is providing the attached letter to provide clarification of the 40 % design margin discussed in Standard Review Plan (SRP) section 6.2.1.1.B (NUREG-0800, Rev. 2, July 1981), page 6.2.1.1.B-4. Specifically, the attached letter discusses the applicability of the design margin to the Donald C. Cook Nuclear Plant TMD Analyses performed by Westinghouse.

Please contact Mr. Don Peck (412-374-2052) or me if you have further questions on this subject.

*William R. Rice*  
W. R. Rice  
Customer Projects Manager

Attachment

cc: Brenda Kovarik  
NDM  
- AEP, Bridgman  
- AEP, Bridgman - Mail Zone #1

LTR-CRA-00-124

From : Containment and Radiological Analysis  
WIN : 284-4079  
Date : June 01, 2000  
Subject : Donald C. Cook - Clarification of 40% Design Margin  
Ref 1) : CN-CRA-99-111-R0, "D. C. Cook Units 1 and 2 (AEP/AMP) - Evaluation of Input Changes to the TMD Steam Generator Enclosure Subcompartment Model", 11/19/99.  
2) : CN-CRA-99-081-R0, "D. C. Cook Units 1 and 2 (AEP/AMP) - Evaluation of Input Changes to the TMD Loop Subcompartment Model", 10/15/99.  
3) : CN-CRA-00-010-R0, "D. C. Cook Units 1 and 2 (AEP/AMP) - Evaluation of Input Changes to the TMD Reactor Cavity Subcompartment Model", 02/09/00.  
4) : CN-CRA-99-094-R0, "D. C. Cook Units 1 and 2 (AEP/AMP) - Evaluation of Input Changes to the TMD Fan/Accumulator Subcompartment Model", 10/28/99.  
5) : CN-CRA-99-123-R0, "D. C. Cook Units 1 and 2 (AEP/AMP) - Evaluation of Input Changes to the TMD Pressurizer Enclosure Subcompartment Model", 01/14/00.  
6) : CN-COA-88-005-R0, "AEP/AMP Thot Reduction Program - Subcompartment Evaluation", 8/3/88.  
7) : LTR-CRA-00-94, "Donald C. Cook - Reactor Cavity & Loop Subcompartment - Pressure Time Histories", 4/27/00, (AEP-00-139).  
8) : NUREG-0800 Rev.2 July 1981, Section 6.2.1.1.b.

To: D. E. Peck

cc: E. C. Arnold  
W. R. Rice

Over the last year, Westinghouse reanalyzed the steam generator enclosure, reactor cavity, loop subcompartment, pressurizer doghouse, and fan accumulator room to include the effects of as-built plant data on the TMD results. Reference 1 through 5 are the calculations that document these analyses.

Reference 6 documents the evaluation conducted as part of the 1988 Thot Reduction Program.

Reference 7 supplied additional clarification input for the Reactor Cavity & Loop Subcompartment Analyses. This reference also discussed the 40 % design margin of Reference 8, for example, the following is taken directly from Reference 7.

"Research by both AEP and Westinghouse, as part of the review of Condition Reports 99-02649 and 99-2650, determined that there was not a sound basis for all of the input used in the subcompartment analyses. In these instances, the data was recreated. However, the balance of the input, for which adequate documentation existed, was not recreated. This input could be based upon design information, or it could be current, but the status was not verified. The latest subcompartment re-analysis utilized this hybrid set of information. Since it has not been confirmed that all of the TMD input data is as-built information, it is Westinghouse's interpretation that the 40% margin is required. It is also the

opinion of Westinghouse that this can be relaxed once all data is verified as being as-built."

The purpose of this letter is to clarify further the 40% margin statement of Reference 7.

If the plant specific data supplied by AEP, and used for the steam generator enclosure, reactor cavity, loop subcompartment, pressurizer doghouse, and fan accumulator room subcompartment analyses, are as-built information, then it is Westinghouse's opinion that the 40% margin is not required for application in the evaluation of the structural capability of these subcompartments.

As long as the as-built information supplied by AEP is correct, and considering the inherent analysis conservatisms, the actual accident subcompartment pressurization will not exceed the calculated values.

Please formally transmit this information to AEP.

Should you have any questions, please contact the undersigned.



L. C. Smith

Containment and Radiological Analysis

Reviewed by:



J. A. Kolano

Containment and Radiological Analysis

**From:** Geoffrey Grant, C3  
**To:** jed2 J Oyer, R3  
**Date:** Thu, Aug 3, 2000 3:36 PM  
**Subject:** DPV

FYI - attached is the e-mail I sent Ross on 7/25 to give him an update - I also had left a voice mail to the same effect - I assumed if he had questions or wanted to discuss further, he would contact me. However, I'll search him out and talk with him.

**CC:** jlc1