

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) D. C. COOK UNIT 1	DOCKET NUMBER (2) 0   5   0   0   0   3   1   5	PAGE (3) 1 OF 0   4
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TITLE (4)  
TURBINE DRIVEN AUXILIARY FEED PUMP GOVERNOR VALVE POSITIONING

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES		DOCKET NUMBER(S)
0	8	18	8	4	8	4	8	4	D. C. COOK UNIT 2		0   5   0   0   0   3   1   6
0	8	18	8	4	8	4	0	1			0   5   0   0   0   3   1   6

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)

OPERATING MODE (9) 1	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10) 1   0   0	20.405(a)(1)(i)	50.38(c)(1)	50.73(a)(2)(v)	73.71(c)
	20.405(a)(1)(ii)	50.38(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
	20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
	20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME K. R. BAKER, OPERATIONS SUPERINTENDENT	TELEPHONE NUMBER
	AREA CODE 6   1   6   4   6   5   -   5   9   0   1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUF. TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUF. TURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)       NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces i.e. approximately fifteen single-space typewritten lines) (16)

DURING THE PERFORMANC OF AN NRC AUDIT ON THE INSERVICE TEST PROGRAM THE INSPECTORS RAISED A QUESTION ABOUT THE ABILITY OF THE TURBINE DRIVEN AUXILIARY FEED PUMPS (TDAFP) TO MEET THEIR SAFETY FUNCTION. THE INSPECTOR'S CONCERN WAS DUE TO THE PROCEDURAL STEP THAT POSITIONED THE TDAFP COVERNOR SETTING TO APPROXIMATELY 50 PERCENT. THIS SETTING DOES NOT ALLOW AS MUCH STEAM TO THE TDAFP AS IS REQUIRED TO MEET THE TECHNICAL SPECIFICATION REQUIREMENT OF 1285 PSIG DISCHARGE PRESSURE AT 700 GPM FLOW.

ON AUGUST 18, 1984 AT 1244 HOURS AFTER SUBSEQUENT TESTING AND ANALYSIS IT WAS DETERMINED THE TDAFP'S COULD NOT MEET THE DISCHARGE PRESSURE AND FLOW REQUIRED WITH THEIR GOVERNOR SETTINGS AT 50 PERCENT.

PROCEDURE CHANGE SHEETS WERE WRITTEN TO BOTH THE UNIT 1 AND UNIT 2 SURVEILLANCE TEST PROCEDURES TO CHANGE THE FINAL POSITION OF THE GOVERNOR SETTING. UNIT 1 WAS CHANGED TO 85 PERCENT SETTING AND UNIT 2 TO 90 PERCENT SETTING WHICH CORRESPONDS TO THE GOVERNOR SETTINGS RE-QUIRED TO MEET THE TECHNICAL SPECIFICATION DISCHARGE PRESSURE AND FLOW FOR EACH PUMP.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

ON AUGUST 8, 1984 TWO NRC INSPECTORS WERE OBSERVING THE PERFORMANCE OF THE SURVEILLANCE TEST PROCEDURE FOR THE UNIT 1 TURBINE DRIVEN AUXILIARY FEED PUMP (TDAFP) AS PART OF AN AUDIT ON THE PLANT'S IN-SERVICE TESTING (IST) PROGRAM. DURING THE PERFORMANCE OF THIS TEST THE INSPECTORS OBSERVED THAT THE TEST PROCEDURE REQUIRED THE GOVERNOR VALVE (SCV) BE POSITIONED TO A 50% SETTING UPON THE COMPLETION OF THE TEST WHILE A VALVE SETTING OF 85 PERCENT WAS NEEDED TO MEET THE TECHNICAL SPECIFICATION REQUIRED DISCHARGE PRESSURE AND FLOW.

THE QUESTION OF WHETHER THE TDAFP COULD MEET ITS SAFETY FUNCTION WITH A 50 PERCENT GOVERNOR SETTING WAS RAISED AND LISTED AS AN OPEN ITEM BY THE INSPECTORS DURING AN INTERIM EXIT INTERVIEW HELD ON AUGUST 10, 1984.

TO DETERMINE THE VALIDITY OF THE INSPECTORS QUESTION A TEST WAS RUN ON UNIT 2 ON AUGUST 10, 1984, WITH THE GOVERNOR VALVE LEFT "AS IS" FROM THE PREVIOUS SURVILLANCE TEST AND THE DATA OBTAINED. IMMEDIATELY AFTER OBTAINING THE DATA FOR THE 50 PERCENT GOVERNOR SETTING THE NORMAL SURVEILLANCE TEST TO PROVE OPERABILITY WAS PERFORMED. TO OBTAIN THE TECHNICAL SPECIFICATION REQUIRED DISCHARGE PRESSURE AND FLOW AS CALLED FOR BY THE SURVEILLANCE TEST PROCEDURE THE GOVERNOR SETTING HAD TO BE 90 PERCENT. FOLLOWING THE COMPLETION OF DATA GATHERING BUT PRIOR TO SECURING THE TDAFP A PROCEDURAL CHANGE SHEET (PCS) WAS WRITTEN TO THE SURVEILLANCE TEST PROCEDURE TO CHANGE THE "AS LEFT" GOVERNOR SETTING FROM 50 PERCENT TO 90 PERCENT.

SIMILAR TESTING ON UNIT 1 TO GATHER DATA WITH THE GOVERNOR VALVE LEFT "AS IS" FROM THE PREVIOUS SURVEILLANCE TEST WAS PERFORMED ON AUGUST 11, 1984. THIS TESTING WAS DELAYED FROM AUGUST 10 DUE TO A UNIT START UP BEING UNDERWAY. THE GOVERNOR SETTING WAS FOUND TO BE 68 PERCENT AND THE DATA OBTAINED. AS WITH UNIT 2 THE SURVEILLANCE TEST FOR THE UNIT 1 TDAFP WAS RUN IMMEDIATELY AFTER OBTAINING THE "AS IS" DATA. TO OBTAIN THE TECHNICAL SPECIFICATION REQUIRED DISCHARGE PRESSURE AND FLOW AS CALLED FOR BY THE SURVEILLANCE THE GOVERNOR VALVE SETTING HAD TO BE 85 PERCENT. A PROCEDURE CHANGE SHEET WAS WRITTEN TO THE UNIT 1 SURVEILLANCE TEST PROCEDURE TO CHANGE THE "AS LEFT" GOVERNOR VALVE SETTING FROM 50 PERCENT TO 85 PERCENT.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

AFTER CHANGING THE GOVERNOR VALVE SETTINGS, THE CONCERN WAS RAISED THAT WITH THE GOVERNOR SETTINGS THIS HIGH, AN AUTO START SIGNAL ON THE TURBINE WOULD CAUSE THE PUMP TO TRIP ON OVERSPEED. TO DETERMINE THE VALIDITY OF THIS CONCERN, EACH OF THE TDAFP'S WERE STARTED FROM THE CONTROL ROOM WITH A FLOWPATH THROUGH THE TEST VALVE BEING THE ONLY SPECIAL CONDITION ESTABLISHED THAT WOULD DIFFER FROM THOSE THAT WOULD EXIST IF AN AUTO START SIGNAL WAS RECEIVED BY THE PUMP. BOTH TESTS WERE PERFORMED ON AUGUST 18, 1984.

FROM THIS DATA IT WAS DETERMINED THAT THE PUMPS WOULD NOT TRIP ON OVERSPEED AND NO CHANGES TO THE PROCEDURES WERE MADE.

AFTER PROVIDING THE DATA FROM ALL THE TESTS, BOTH THAT OBTAINED ON AUGUST 10 AND 11 AND ON AUGUST 18, TO CORPORATE ENGINEERING AN ANALYSIS OF THE OPERABILITY OF THE TDAFP'S WAS MADE. AT 1244 HOURS ON AUGUST 18, 1984, THE PLANT WAS NOTIFIED THAT THE PRELIMINARY RESULTS OF THE ANALYSIS SHOWED THAT THE TDAFP'S WERE INOPERABLE WITH A GOVERNOR SETTING OF 50%. THE SENIOR RESIDENT INSPECTOR WAS NOTIFIED WITHIN A FEW MINUTES OF THE DETERMINATION AND A "RED PHONE" CALL WAS PLACED AT 1336 OR 52 MINUTES AFTER THE DETERMINATION. THIS REPORT WAS MADE PURSUANT TO THE REQUIREMENTS OF 10 CFR 50.73 (a)(2)(ii)(b), IN THAT THE PLANT HAD BEEN IN A CONDITION THAT WAS OUTSIDE THE DESIGN BASIS OF THE PLANT.

A REVIEW OF PAST REVISIONS OF THE SURVEILLANCE TEST PROCEDURE WAS INCONCLUSIVE IN DETERMINING THE REASON FOR THE PROCEDURAL ERROR WHICH REQUIRED THE GOVERNOR TO BE LEFT AT 50 PERCENT. UP THROUGH REVISION 3, DATED 03-29-77, OF THE TDAFP SURVEILLANCE TEST PROCEDURE (OHP 4030.STP.017), NO SPECIFIC INSTRUCTION WAS GIVEN TO THE OPERATOR AS TO THE FINAL SETTING OF THE GOVERNOR. THE PROCEDURE CALLED FOR THE PUMP TO BE SECURED USING THE TRIP AND THROTTLE VALVE AND IMPLIES THE GOVERNOR WOULD STILL BE SET TO THE SETTING NECESSARY TO OBTAIN THE TECHNICAL SPECIFICATION REQUIRED DISCHARGE PRESSURE AND FLOW.

IN REVISION 4, DATED 8-08-78, THE INSTRUCTION TO REDUCE THE TURBINE SPEED (REDUCE THE GOVERNOR SETTING) TO MAINTAIN A DISCHARGE PRESSURE APPROXIMATELY 50 PSIG ABOVE MAIN FEED PUMP DISCHARGE PRESSURE WAS ADDED. THIS WOULD CAUSE THE GOVERNOR TO BE SET LESS THAN THAT REQUIRED TO MEET THE TECHNICAL SPECIFICATION REQUIRED DISCHARGE PRESSURE AND FLOW. NO REASON COULD BE DETERMINED AS TO WHY THIS CHANGE WAS MADE.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104  
EXPIRES: 8/31/85

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

IN REVISION 5, DATED 10-18-78, THE INSTRUCTION REMAINED THE SAME AS REVISION 4 BUT A PROCEDURAL CHANGE SHEET (TP-17) WAS WRITTEN ON 4-30-80 THAT REQUIRED THE GOVERNOR VALVE BE STROKED AFTER SECURING THE PUMP AND THEN SET THE GOVERNOR TO APPROXIMATELY 50 PERCENT. THIS CHANGE IS BELIEVED TO HAVE BEEN MADE AS A RESPONSE TO A CONCERN OF THE TDAFP MANUFACTURER THAT TURBINES WITH WOODWARD PGPL GOVERNORS MAY OVERSHOOT TO TRIP SPEED IF STARTED WITHIN 30 MINUTES OF SHUTDOWN DUE TO ENTRAPPED OIL UNDER THE WOODWARD'S SPEED SETTING PISTON. TO PREVENT THIS TP-17 WAS WRITTEN TO EXERCISE THE VALVE AND THE 50 PERCENT SETTING WAS APPROXIMATELY THE SAME AS THAT REQUIRED TO DEVELOP 50 PSIG ABOVE MAIN FEED PUMP DISCHARGE PRESSURE AS REQUIRED BY REVISION 4 AND 5.

THIS INSTRUCTION HAS REMAINED BASICALLY THE SAME THROUGH THE CURRENT REVISION OF UNIT 1'S SURVEILLANCE TEST PROCEDURE. THE UNIT 1 PROCEDURE WAS A SHARED PROCEDURE WITH UNIT 2 UNTIL 1980 WHEN THEY WERE SPLIT INTO UNIT SPECIFIC PROCEDURES WITHOUT SIGNIFICANT CHANGE. THE PROCEDURES HAVE REMAINED BASICALLY THE SAME THROUGHOUT CURRENT REVISIONS. BOTH PROCEDURES HAVE BEEN CHANGED, VIA THE PCS'S REFERENCED TO EARLIER, TO CHANGE THE AS LEFT GOVERNOR SETTING.

THE DETAILS OF THE REVIEW FINDINGS ARE ATTACHED. BASED ON THESE FINDINGS IT IS BELIEVED THAT SETTING THE GOVERNOR TO 50%, WITH THE ATTENDANT REDUCTION IN DELIVERABLE FLOW FROM THE TDAFP TO THE STEAM GENERATORS, DID NOT ADVERSELY IMPACT PUBLIC HEALTH AND SAFETY.



AMERICAN ELECTRIC POWER SERVICE CORPORATION



DATE: September 13, 1984

SUBJECT: DONALD C. COOK NUCLEAR PLANT UNIT NOS. 1 AND 2  
SAFETY EVALUATION FOR REDUCED TURBINE DRIVEN AUXILIARY  
FEEDWATER PUMP FLOW

FROM: D. A. Medek

TO: W. G. Smith, Jr. - Bridgman

While performing an audit of the Donald C. Cook Nuclear Plant In-Service Testing (IST) Program, the NRC questioned the ability of the Turbine Driven Auxiliary Feedwater Pump (TDAFP) to fulfill its design functions with the associated governor valve set to 50%. This letter provides the AEPSC Nuclear Safety & Licensing Section's (NS&L's) review findings with regard to this issue.

As explained herein, the effective reduction in TDAFP flow is believed to be enveloped by the D. C. Cook Plant licensing basis safety analyses for three postulated events, i.e., steam line break, loss of normal feedwater, and station blackout. Additionally, although the reduced TDAFP flow is not enveloped by the D. C. Cook Plant main feedwater line break licensing basis safety analysis, it is believed that with limited operator actions the response of the D. C. Cook Plant during this postulated event would be bounded by the Tennessee Valley Authority's (TVA's) Sequoyah Nuclear Plant Final Safety Analysis Report (FSAR). Based on these findings it is believed that setting the governor valve to 50%, with the attendant reduction in deliverable flow from the TDAFP to the steam generators, did not adversely impact public health and safety.

The details of the review findings follow:

Steam Line Break

The break of a steam line results in a sharp reduction in steam generator steam inventory. The secondary side pressure decrease which accompanies this loss of inventory gives rise to an energy demand which in turn reduces Reactor Coolant System (RCS) temperature and pressure. With a negative moderator temperature coefficient, the reduction in RCS temperature and pressure causes a reactivity insertion which could lead to criticality and core damage under pessimistic circumstances.

Steam line break analyses for the D. C. Cook Plant Unit 1 are presented in Section 14.2.5 and Appendix C to Chapter 14 of the Updated FSAR; similar analyses for Unit 2 are presented in Section 14.2.5 and Appendices B and C to Chapter 14 of the Updated FSAR. These analyses indicate that for even large breaks with rapid emptying of the pressurizer, the minimum capability for

injection of high concentration boric acid (corresponding to the most restrictive single failure in the centrifugal charging system) is adequate to control the return to power and to ultimately shut down the reactor.

For the steam line break accident, maximum delivery of auxiliary feedwater flow is conservative because it would effectively maximize the RCS cooldown and the subsequent return to power. Therefore, setting the governor to 50%, with the resultant reduction in TDAFP flow delivery to the steam generators, should not adversely affect the results of the existing analyses.

#### Loss of Normal Feedwater/Station Blackout

Loss of normal feedwater analyses for the D. C. Cook Plant are presented in Section 14.1.9 and Appendix C to Chapter 14 of the Updated FSAR (Unit 1 and Unit 2); station blackout analyses are presented in Section 14.1.12 and Appendix C to Chapter 14 of the Updated FSAR (Unit 1 and Unit 2).

The postulated loss of normal feedwater (due to pump failures, valve malfunctions, etc.), and the loss of all AC power to the station auxiliaries, may result in reduced secondary side capability to remove the heat generated from the reactor core. For the loss of normal feedwater event, an alternative supply of feedwater must be supplied to the unit before the core residual heat leads to primary system water relief from the pressurizer. For the case of station blackout, natural circulation flow in the RCS following RCP coastdown, in conjunction with auxiliary feedwater supply to the steam generators, provides sufficient heat removal capability to preclude core damage.

The existing Updated FSAR analyses for these events indicate that the auxiliary feedwater flow delivered to two steam generators by one Motor Driven Auxiliary Feedwater Pump (MDAFP) is sufficient to provide the required heat removal capability. Therefore, since no credit has been taken in the analyses for the TDAFP flow, setting the governor valve to 50% should have no effect on the analyses.

#### Feedwater Line Break

The postulated feedwater line break event is not a part of the D. C. Cook Plant Unit 1 design basis, but has been analyzed for Unit 2 with a minimum auxiliary feedwater flow rate assumption. The Unit 2 analysis is presented in Section 14.2.8 of the Updated FSAR.

NS&L has been advised by Westinghouse Electric Corporation (W) that the current assumptions include a single failure assumption of one MDAFP, leaving the other MDAFP and the TDAFP to provide auxiliary feedwater flow to the steam generators. Therefore, setting the governor valve to 50% would reduce the auxiliary feedwater flow rate below that which is assumed in the FSAR.

W has noted, however, that other nuclear facilities of similar design and licensed in the same time frame as the D. C. Cook Plant, i.e., Sequoyah Nuclear Plant and Salem Nuclear Plant, assume that no auxiliary feedwater flow is delivered to the intact steam generators prior to operator action at ten minutes. At that time, the operator would be expected to isolate auxiliary feedwater to the faulted steam generator and to ensure that auxiliary feedwater was being delivered to the intact steam generators. With an assumption of ten minutes operator action time to restore the TDAFP governor, W believes that the feedwater line break would be bounded by the results provided in the Sequoyah Nuclear Plant FSAR. Therefore, the consequences presented in the FSAR would remain valid.

W has also noted that the evaluation for Unit 2 is also applicable to Unit 1, although the feedwater line break is not a part of the Unit 1 licensing basis. The only difference noted by W is that the required operator actions would include isolation of the faulted steam generator from the intact steam generators. This would be required for Unit 1 since the steam line isolation logic requires a high steam flow signal coincident with the low steam pressure signal. Steam line isolation is needed to assure a sufficient steam supply pressure to the TDAFP in order to maintain its function.

Based on the above it is believed that setting the governor valve to 50%, with the attendant reduction in deliverable flow from the TDAFP to the steam generators, did not adversely impact public health and safety.

*David A. Medek*

David A. Medek

Approved:

*J. G. Feinstein*  
J. G. Feinstein, Manager  
Nuclear Safety & Licensing Section

DAM/th

cc: M. P. Alexich  
S. H. Steinhart  
B. A. Svensson - Bridgman



**INDIANA & MICHIGAN ELECTRIC COMPANY**

DONALD C. COOK NUCLEAR PLANT  
P.O. Box 458, Bridgman, Michigan 49106  
(616) 465-5901

September 17, 1984

United States Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555

Operating License DPR-58  
Docket No. 50-315

Document Control Manager:

In accordance with the criteria established by 10CFR50.73  
entitled Licensee Event Reporting System, the following  
report/s are being submitted:

RO 84-019-0

Sincerely,

*E L Townley*

FOR W.G. Smith, Jr.  
Plant Manager

/cbm

Attachment

cc: John E. Dolan  
J.G. Keppler, RO:III  
M.P. Alexich  
R.F. Kroeger  
H. Brugger  
E.R. Swanson, RO:III  
R.C. Callen, MPSC  
G. Charnoff, Esq.  
J.M. Hennigan  
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