

## ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

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 FACIL:50-315 Donald C. Cook Nuclear Power Plant, Unit 1, Indiana & 05000315  
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SUBJECT: LER 89-001-00:on 890116, wrong control switch operated due to  
 personnel error resulted in reactor trip.

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	NRR/DEST/MTB 9H	1 1	NRR/DEST/PSB 8D	1 1
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## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) D. C. Cook Nuclear Plant - Unit One										DOCKET NUMBER (2) 0   5   0   0   0   3   1   5   1					PAGE (3) 1 OF 0   6										
TITLE (4) Wrong Control Switch Operated Due to Personnel Error Resulted in Reactor Trip																									
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	1	1	6	8	9	8	9	0	0	1	0	0	0	2	1	5	8	9	0	5	0	0	0	0	0
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)																							
POWER LEVEL (10)		20.402(b) <input checked="" type="checkbox"/> 20.405(c) <input checked="" type="checkbox"/> 50.73(a)(2)(iv) <input type="checkbox"/> 73.71(b) <input type="checkbox"/>																							
0   7   1		20.405(a)(1)(i) <input type="checkbox"/> 50.36(c)(1) <input type="checkbox"/> 50.73(a)(2)(v) <input type="checkbox"/> 73.71(c) <input type="checkbox"/>																							
		20.405(a)(1)(ii) <input type="checkbox"/> 50.36(c)(2) <input type="checkbox"/> 50.73(a)(2)(vii) <input type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A) <input type="checkbox"/>																							
		20.405(a)(1)(iii) <input type="checkbox"/> 50.73(a)(2)(i) <input type="checkbox"/> 50.73(a)(2)(viii)(A) <input type="checkbox"/>																							
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LICENSEE CONTACT FOR THIS LER (12)																									
NAME K. R. Baker, Operations Superintendent										TELEPHONE NUMBER 6   1   6   4   6   5   -   5   9   0   1   1															
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs						
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)			MONTH	DAY	YEAR										
YES (If yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO <input type="checkbox"/>																									

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

On 01/16/89 the Plant Heating Boiler (PHB) was being operated for testing purposes after maintenance. The Unit Supervisor gave instructions to a Reactor Operator (RO) for placing auxiliary steam load on the PHB. These instructions included opening the steam supply to the start-up air ejectors if the normal steam loads were not enough.

After placing the normal steam loads on the PHB, the RO identified the control switch for the steam supply to the start-up air ejectors. A few minutes later the Control Room was notified that the PHB needed more load. The RO proceeded to open the steam supply to the start-up air ejectors, but he erroneously operated the control switch for the condenser air off-takes to the start-up air ejectors due to inadequate self checking. This caused a rapid decrease in condenser vacuum which resulted in a unit trip.

Preventive action will include operator training to emphasize the importance of self checking. The labeling of the involved control switches will be enhanced for human factor concerns. Appropriate administrative action was taken with the involved operator.

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## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
D. C. Cook Nuclear Plant - Unit One	0 5 0 0 0 3 1 5	8 9	- 0 0 1	- 0 0	0 2	OF	0 6

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

Conditions Prior to Occurrence

Unit One in Mode 1 (71 percent reactor thermal power).  
Unit Two in Mode 6 (refueling).

Description of Event

On 01/16/89 the Plant Heating Boiler (PHB) (EIIS/SA-BLR) was being operated for testing purposes after maintenance. To accommodate load testing, the Unit Supervisor (Senior Licensed Operator) gave instructions to one of the Reactor Operators (RO) (Licensed Operator) for aligning the 150 psig auxiliary steam header (EIIS/SA) to the PHB. The RO was also given instructions to open the 150 psig motor operated auxiliary steam supply valve (EIIS/SA-ISV) to the start-up air ejectors (EIIS/SG-EJR) if the PHB testing required more load. The Unit Supervisor stressed that the motor operated condenser air off-takes (EIIS/SG-ISV) to the start-up air ejectors were not to be operated. (See simplified drawing, page 6 of 6.)

The RO correctly aligned the 150 psig auxiliary steam header to the PHB. The RO then reviewed the panel (EIIS/SA-PL) with the start-up air ejector controls and located the control switch (EIIS/SA-HS) for steam to the start-up air ejectors and recognized that it was a pull to stop control switch. The RO's plan was to open the valve while watching the 150 psig auxiliary steam header pressure and stop the valve travel as needed to maintain header pressure.

The Control Room was later notified that more load was needed on the PHB. The RO established communication with the boiler room and relayed that he was going to open the steam supply valve to the start-up air ejectors. The RO then mistakenly operated the control switch for the condenser air off-takes to the start-up air ejectors, resulting in an open signal. In order to increase the steam flow slowly, the RO pulled on the control switch to stop the valve travel. When the switch would not pull out, the RO began to realize his error. Within a few seconds from going to open on the switch, the main condenser low vacuum alarm (EIIS/SG-PA) setpoint of 24.3" Hg was reached. The RO attempted to close the air off-takes, but the valves must travel full open before they will close. The Unit Supervisor opened the steam supply to the start-up air ejectors in an attempt to stop the vacuum decrease, but the low condenser vacuum turbine trip (EIIS/TA-94) setpoint of 21.7" Hg was reached and the turbine (EIIS/TA-TRB) tripped, which caused a reactor (EIIS/AC-RCT) trip as designed.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
D. C. Cook Nuclear Plant - Unit One	0 5 0 0 0 3 1 5	8 9	- 0 0 1	- 0 0	0 3	OF	0 6

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

Following the trip sequence [opening of the reactor trip breakers (EIIS/JE-BKR), turbine (EIIS/TA-TRB) trip, insertion of the reactor control rods (EIIS/AA-ROD), feedwater isolation (EIIS/BA-P)], Operations personnel immediately implemented the Emergency Procedure 1-OHP 4023.E-0 to verify proper response of the automatic protection system (EIIS/JC) and to assess plant conditions for initiating appropriate recovery actions. There was no automatic or manual actuation of the Safety Injection System (EIIS/BQ).

During the plant trip response the only problem noted with safety related equipment was in relation to a motor operated auxiliary feedwater isolation valve (EIIS/BA-ISV). Auxiliary feedwater motor operated isolation valve 1-FMO-221 from the turbine driven auxiliary feedwater pump (TDAFP) (EIIS/BA-P) moved in the close direction as indicated by the position indication lights, but failed to reach the proper intermediate position after receipt of a flow retention signal. The flow retention signal is generated upon a high auxiliary feedwater flow condition and acts to prevent pump runout by throttling the auxiliary feedwater isolation valves. The valves to the other three steam generators (EIIS/AB-SG) operated properly and no problems were encountered with the TDAFP. Attempts to close 1-FMO-221 were not successful until after the TDAFP was shutdown.

Cause of Event

The root cause of the event was personnel error by failure to perform self checking prior to operating what was thought to be the control switch for steam to the start-up air ejectors.

Other factors such as training, procedures, job briefing, work pace and labeling were reviewed; but no significant contributing factors were identified. Of these factors, labeling was the only one which may have had some effect. The correct switch was labeled as follows:

STM TO START-UP  
AIR EJECTORS  
1-SMO-400

The incorrectly operated switch was labeled as follows:

START-UP  
EJECTORS

The RO properly identified the correct switch a few minutes prior to the event, but apparently just quickly read the label prior to actually operating the incorrect control switch. If the label on the incorrect switch had included the words "AIR TO", possibly the RO would have caught his mistake.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
D. C. Cook Nuclear Plant - Unit One	0 5 0 0 0 3 1 5	8 9	- 0 0 1	- 0 0	0 4	OF	0 6

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

Analysis of Event

This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv) as an event that resulted in an unplanned automatic actuation of an Engineered Safety Feature including the Reactor Protection System.

The automatic protection system responses, including reactor trip and its associated actuations, were verified to have functioned properly as a result of the engineered safety features actuation. Based on the above, it is concluded that the event did not constitute an unreviewed safety question as defined in 10 CFR 50.59(a)(2) nor did it adversely impact the health and safety of the public.

Corrective Actions

Immediate corrective action involved Operations personnel implementing plant procedures to verify proper response of the automatic protection system and to assess plant conditions for initiation of appropriate recovery actions.

Action taken or to be taken to prevent recurrence of operating the wrong control switch.

1. A case study on this event, with emphasis on the need for effective self checking will be developed for the licensed operator requalification program and replacement class.
2. The labeling for the start-up air ejector steam and air valves will be reviewed and changed for human factor concerns.
3. Appropriate administrative action was taken with the involved RO.

The investigation concerning the 1-FMO-221 problem determined that the closing torque switch was set based on test conditions of 350 gpm flow, through the valve and a low downstream pressure. Under normal post trip conditions the flow is expected to be less than 350 gpm through each of the four valves and the higher downstream pressure is not expected to have a significant effect due to the balanced plug design of the valves. It is suspected that for an unknown reason, 1-FMO-221 lagged behind the other three valves after receiving the flow retention signal. This condition would have resulted in greater than 350 gpm flow through 1-FMO-221. Due to the higher than normal flow through the valve, the torque required to close the valve was higher than the torque switch setpoint.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
D. C. Cook Nuclear Plant - Unit One	0 5 0 0 0 3 1 5 8 9	—	0 0 1	—	0 0	0 5	OF 0 6

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

The closing torque switches on the auxiliary feedwater isolation valves were purposely set toward the low end of the allowable torque band as a good engineering practice. In recognition of the fact that system parameter variations could require a higher closing torque than earlier expected, a higher closing torque switch setting was determined to be appropriate. The closing torque switch setting of all four TDAFP auxiliary feedwater valves was increased to a higher setting which is still well within the design limits of the valve. After the torque switch settings were changed, a test flow of 400 gpm was established through 1-FMO-221 and the valve was successfully stroked from full open to full closed.

We believe that the higher closing torque switch settings are acceptable to allow proper operation of the flow retention function. Although it is possible that a valve could not be fully closed under extremely high flow conditions during post trip recovery actions, a reduction in the TDAFP speed by the operator would reduce the flow and allow closure of the valve. As discussed between members of the plant staff and NRC Region III staff members on 01/17/89, further testing will be done on the TDAFP auxiliary feedwater isolation valves after the Unit One shutdown for the next refueling outage (scheduled for 03/11/89). We will apprise the NRC Region III staff of any significant findings from this further testing, including an update of this LER, should that be warranted.

Failed Component Identification

None

Previous Similar Events

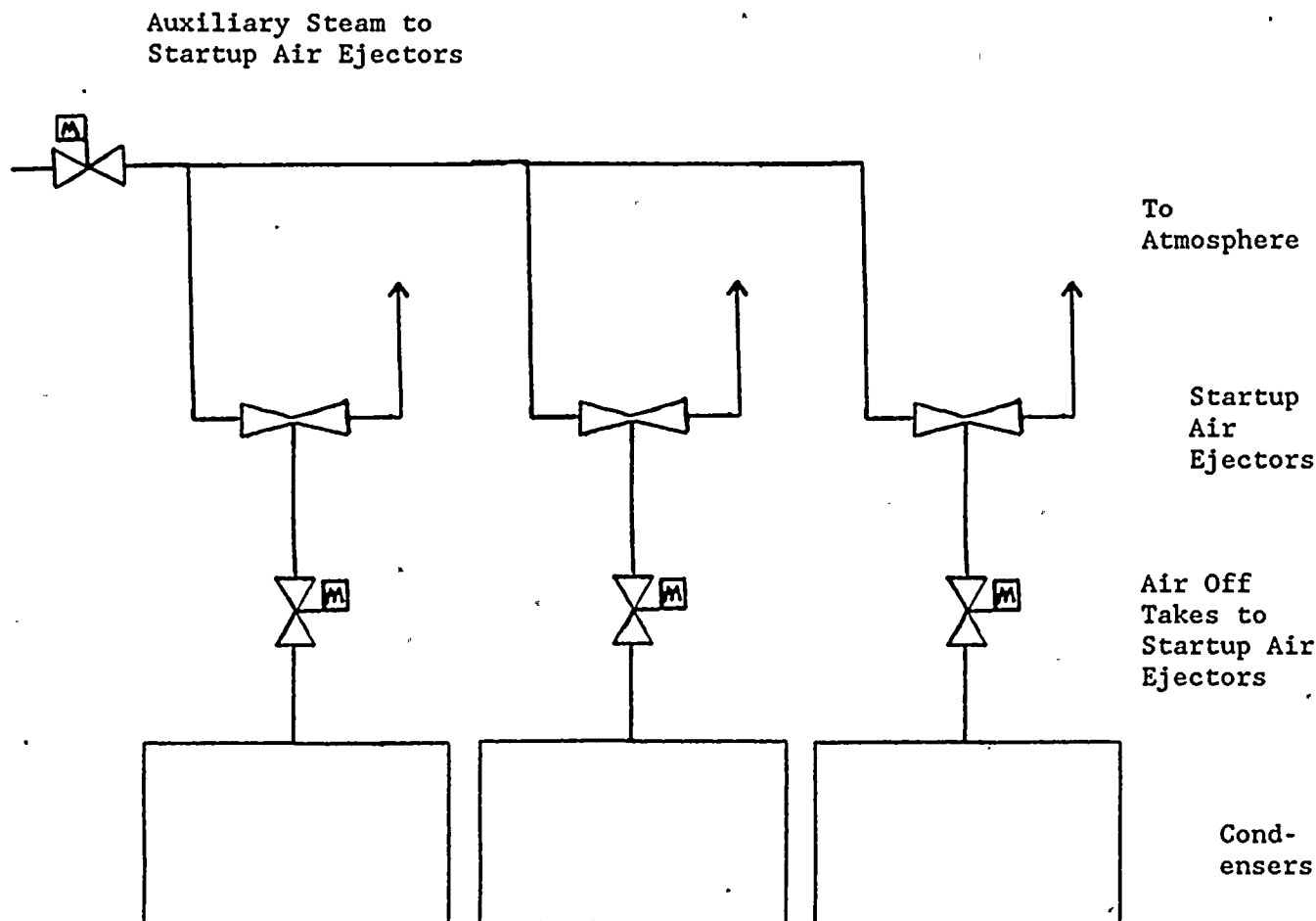
There were no previous similar events identified which involved improper operation of the start-up air ejector controls resulting in a loss of vacuum.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  D. C. Cook Nuclear Plant - Unit One	DOCKET NUMBER (2)  0 5 0 0 0 3 1 5	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8 9	- 0 0 1	- 0 0	0 5	OF	0 6

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

## DIAGRAM OF STARTUP AIR EJECTOR ARRANGEMENT



NOTE: The three condenser air off take motor operated valves are operated from one control switch in the Control Room. The control scheme for the air off takes is such that, once given a signal to open, they must travel full open before it is possible to close them.

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February 15, 1989

United States Nuclear Regulatory Commission  
Document Control Desk  
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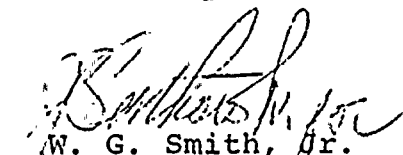
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Docket No. 50-315

Document Control Manager:

In accordance with the criteria established by 10 CFR 50.73  
entitled Licensee Event Reporting System, the following  
report is being submitted:

89-001-00

Sincerely,

  
W. G. Smith, Jr.  
Plant Manager

WGS:clw

Attachment

cc: D. H. Williams, Jr.  
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11