PRIORITY 1
(ACCELERATED RIDS PROCESSING)

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9502020108 DOC.DATE: 95/01/10 NOTARIZED: NO DOCKET #
FACIL:50-316 Donald C. Cook Nuclear Power Plant, Unit 2, Indiana M 05000316
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RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 94-008-00:on 941211,4B feedwater heater extreme high level alarm received & turbine trip resulted.Cause related to configuration of alternate drain line.High-high level alarm switches repaired & tested.W/950110 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 5
TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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PRIORITY 1 DOCUMENT

Indiana Michigan
Power Company
Cook Nuclear Plant
One Cook Place
Bridgman, MI 49106
616 465 5901

INDIANA MICHIGAN POWER

January 10, 1995

United States Nuclear Regulatory Commission
Document Control Desk
Rockville, Maryland 20852

Operating Licenses DPR-74
Docket No. 50-316

Document Control Manager:

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

94-008-00

Sincerely,

A. A. Blind
Plant Manager

/sb
Attachment

c: J. B. Martin, Region III
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NRC FORM 366 (5-92)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
D. C. Cook Nuclear Plant - Unit 2	05000 316	1 OF 4

TITLE (4)
Rx Trip Caused by a Turbine Trip on High Moisture Separator Reheater Level

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
12	11	94	94	-- 008 --	00	01	10	95		05000
									FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)					
		20.402(b)		20.405(c)	X	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)	OTHER
		20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)
		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)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
G. A. Weber, Plant Engineering Superintendent	616/465-5901, X2511

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
BG	IB	LS	Magnetrol	N						

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On December 11, 1994, at 1705 hours with Unit 2 in Mode 1 at 19 percent Rated Thermal Power, Unit 2 received a turbine trip/reactor trip signal from a Main Turbine Moisture Separator High Level. At the time of the trip, the Control Room crew was attempting to transfer the Right Moisture Separator Reheater (MSR) drain from the Main Condenser to the 4B Feedwater Heater via the Right Moisture Separator Drain Tank (MSDT). Level alarms which normally precede the MSR high level trip signal did not actuate. The turbine trip signal caused the reactor trip.

Despite the efforts of a troubleshooting team assigned to determine the root cause of this event, the cause of the MSR high level trip signal could not be conclusively determined. Other than the failure of the Right MSDT level alarms to actuate, no system, control or procedural abnormalities were noted. An extreme high level was observed prior to the trip in the 4B heater, but is not unusual during startup and could not be established as the cause of the event.

After the reactor trip, all safety systems operated normally and the reactor stabilized in Mode 3. The Right MSDT high water level alarms were inspected, repaired, and tested. The reactor was returned to critical on December 12, 1994 at 2033 hours.

Conditions Prior to Occurrence:

Unit 2 in Mode 1 (Power Operations) at 19 percent Rated Thermal Power at the beginning of a Fuel Cycle.

Description of Event:

On December 11, 1994 Operations personnel were in the process of increasing reactor power level to 30 percent Rated Thermal Power following the plant startup after a refueling outage. With reactor power at 19 percent, they were attempting to transfer the Right Moisture Separator drain from the Main Condenser (EIIS/SG-COND) to the 4B Feedwater Heater (EIIS/SN-HX).

With the Right MSDT (EIIS/SN-TD) alternate drain valve to the Main Condenser open, the normal drain valve to the 4B Feedwater Heater valve was throttled opened to begin the transition to the "at power" drain lineup. The 4B Feedwater Heater drain was also aligned to the condenser via its alternate drain path at the time. At 1703 hours, the 4B Feedwater Heater extreme high level alarm (EIIS/SN-LA) was received. The extreme high level condition automatically closed the drain valve from the Right MSDT to the 4B Feedwater Heater. The MSDT alternate drain remained open and would normally have been expected to continue to carry the drain flow from the MSDT.

Two minutes after the receipt of the 4B Feedwater Heater extreme high level alarm, the turbine tripped on a Main Turbine Moisture Separator (MSR) High Level trip, indicating that the MSDT and the drain line from the MSR to the MSDT was flooded. With the reactor power greater than 10 percent of rated thermal power, the turbine trip initiated a reactor trip. All control rods fully inserted, both Motor Driven Auxiliary Feedwater Pumps started, and a feedwater isolation occurred; all as designed.

The level switch which senses MSR high level is located several feet above the Right MSDT high-high level setpoint. Before the water level reached the MSR high level trip setpoint, the MSDT high and high-high level alarms should have been received. Neither of these two alarms actuated.

A troubleshooting team was organized to investigate the cause of the event and the apparent failure of the MSDT high and high-high level alarms. The MSDT level control system was checked and found to be functioning normally. The MSDT alternate drain was tested and found unobstructed. The MSR high level trip switches and time delay logic were tested and found to be functioning properly. The MSR high level trip level sensing lines were blown down and found clear. The MSDT level indication was confirmed to be functioning properly, however, the level indication was not observed in the minutes prior to the trip.

The MSDT high and high-high alarm switches were checked and found to have failed due to corrosion of the switch linkage. The switches were subsequently repaired and retested satisfactorily.

The heater 4B level controls were checked and found to be functioning normally.

Description of Event: (cont'd)

On December 12, 1994 at 2033 hours, upon concluding the investigation and repairs to the MSDT level switches, the reactor was returned to critical. The MSR drain control system was monitored carefully during restart. The ensuing power ascension sequence was uneventful.

Cause of the Event:

The root cause of the MSR high level trip could not be conclusively determined. Despite having determined that the MSR level trip switches were functioning properly and the sensing lines were clear, a spurious actuation of the trip switch could not be completely ruled out. Similarly, despite testing the alternate drain line from the MSDT to the condenser and verifying that the line was capable of passing flow, it could not be completely ruled out that the line or one of the 3 valves in the line was not somehow obstructed during the minutes prior to the trip.

It was also theorized that the opening of the normal drain to the 4B heater may have caused a momentary interruption of flow to the alternate drain. This is supported in part by the subsequent receipt of the 4B heater extreme high level alarm, which is an indication that the 4B heater was receiving increased flow after the MSDT normal drain was opened. Upon receipt of the 4B heater extreme high level alarm, the MSDT normal drain valve reclosed. In order for this sequence to have led to the trip, the check valve in the MSDT alternate drain would have to have become somehow stuck in the closed position long enough to let the drain flow from the MSR to flood the MSDT and the associated drain line. Again, troubleshooting after the trip did not indicate a stuck valve or the presence of any obstruction in the MSDT alternate drain line.

The cause of the 4B heater extreme high was determined to be related to the configuration of its alternate drain line. The 4B heater alternate drain enters the condenser above the elevation of the heater itself. That, combined with the relatively low turbine stage pressures developed at low power, limits the capacity of the alternate drain during startup. As a result, receipt of the high and extreme high alarms is not considered an unusual response to conditions at the time of the trip.

The level transient, if in fact such a transient did occur, went undetected in the control room due to the failure of the MSDT high and high-high alarm switches. As previously noted, the cause of their failure was attributed to corrosion. This, in turn, was attributed to their exposure to high humidity during operation.

Analysis of Event:

This event is being reported per 10 CFR 50.73(a)(2)(iv) as an event that resulted in automatic actuation of Engineered Safety Features (ESF), including the Reactor Protection System (RPS).

Analysis of Event: (cont'd)

A reactor trip occurred when the turbine tripped above 10 percent Rated Thermal Power on a Main Turbine Moisture Separator High Level. All control rods fully inserted, both Motor Driven Auxiliary Feedwater Pumps started, and a feedwater isolation occurred; all as designed.

Normal offsite power was available, the emergency diesel generators were in standby, and no safety equipment was out of service prior to the trip. This event did not have any actual or potential adverse impact on the health and safety of the public.

Corrective Action:

The Right MSDT high and high-high level alarm switches were repaired and tested. The corresponding alarm switches for the Left MSDT were also inspected and verified to be functioning properly.

During normal power operation the level alarm switches are not periodically exercised. Corrosion buildup at the magnetic pickup mechanism, a result of their location in a humid environment, led to the failure of the switch. A Preventive Maintenance program has be established to ensure that these alarm switches are maintained functional.

The proper operation of the check valve upstream of the Right MSDT drain valve in the alternate drain path to the Main Condenser was verified.

A procedure change has been initiated to provide the operators with the means to effect a more stable transfer of the MSDT drain path from the Main Condenser to the 4A and 4B Feedwater Heaters.

Failed Component Identification:

Level Switches
Manufacturer, Magnetrol International
Model, 602-SP-X.

Previous Similar Events:

None