NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES 8/31/85

LICENSEE EVENT REPORT (LER)

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Catawba Nuclear Station, Unit 1	0 5 0 0 0 4 1 1 3	1 OF 0 1 5

TITLE (4) Engineered Safety Feature Actuation On Two Occasions While Opening Main Steam Isolation Valve Due To Unknown Cause And A Personnel Error

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)
										N/A	0 5 0 0 0
1 2	2 1	8 7	8 7	—	0 4 7	— 0 0	0 1	2 0	8 8		0 5 0 0 0

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 1 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		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 (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)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Julio G. Torre, Associate Engineer - Licensing	7 1 0 1 4 — 3 7 3 1 — 1 8 1 0 2 1 9

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	

SUPPLEMENTAL REPORT EXPECTED (14)

[X] YES (If yes, complete EXPECTED SUBMISSION DATE) [ ] NO

EXPECTED SUBMISSION DATE (15): MONTH 0 1 2 | DAY 2 1 8 | YEAR 8 8

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

On December 21, 1987, at 1516:58 hours while Unit 1 was in Mode 5 (Cold Shutdown), a Reactor Trip signal occurred due to Steam Generator (S/G) low low level. The trip signal was followed by a Feedwater Isolation signal due to Reactor Trip with temperature in the Reactor Coolant (NC) System below 564 degrees F. The Control Room Operators (CROs) were performing the Controlling Procedure for Unit Startup and were opening the S/G 1D Main Steam Isolation Valve (MSIV) when this incident occurred. On December 24, 1987 with the Unit in Mode 4 (Hot Shutdown), at 1321:21 hours, the CROs were again opening the MSIVs which had been closed to support Turbine trip testing. When the S/G 1D MSIV was opened, sufficient differential pressure existed to cause a high high level condition, which actuated a Feedwater Isolation/Turbine Trip signal. The root cause of the first part of the event remains unknown at this time. The second incident has been attributed to a personnel error. The Assistant Nuclear Control Operator did not follow an existing procedure to equalize pressure across the MSIVs after the Turbine Trip test. In both incidents, the CROs verified that the automatic actuations had occurred correctly and that S/G levels had stabilized. The Unit was then restored to its previous status. After the first incident, the S/G 1D MSIV bypass valve was cycled and appeared to be fully opening and closing correctly. Duke Power will continue to investigate the first part of the incident. A revision to this report may be issued if appropriate. The second incident was reviewed with all appropriate personnel.

The health and safety of the public were unaffected by this event.

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

BACKGROUND:

The Main Steam Isolation Valves (EIIS:V) (MSIVs) are designed to prevent Steam Generator (EIIS:SG) (S/G) blowdown in the event of a steam line break. This is achieved by closing the appropriate MSIV to isolate the S/G. The Main Steam Isolation Bypass Valve (MSIBVs) are located in the bypass line around the MSIVs. Their purposes are to allow equalizing steam pressure across the MSIVs prior to opening and to allow warmup of the Main Steam lines. The Main Steam lines are 34 inches in diameter while the bypass lines are 2 inches in diameter.

OP/1/A/6100/01, Controlling Procedure for Unit Startup, requires that the MSIVs be opened prior to exceeding 200 degrees F in the Reactor Coolant (EIIS:AB) (NC) System. At these conditions, there is expected to be zero steam pressure in the Main Steam lines and in the equalization header. Therefore, the differential pressure across the MSIVs is expected to be small. The MSIBVs are still utilized to equalize pressure across the MSIVs in this procedure since there is a potential for a vacuum to be present on either side of the MSIV. However, the steam pressure gauges in the Control Room range from 0 - 1300 psig, and the analog computer points are not expected to be accurate at negative pressures since this is outside the range of their calibration. For these reasons, the procedure does not specify how close the pressures on either side of the MSIV should be before the valve is opened. Prior to opening the MSIVs, the procedure requires that the Main Steam lines and equalization header be drained of any moisture. The steam line drain valves are opened prior to opening the MSIVs.

A more detailed procedure on equalizing steam pressure across the MSIVs is provided in OP/1/A/6250/06, Main Steam, Enclosure 4.5. This enclosure is intended for use at positive steam pressures which are not encountered in OP/1/A/6100/01 when opening MSIVs. The enclosure specifies that a maximum allowable differential pressure of 10 psid must be attained prior to opening the MSIVs.

DESCRIPTION OF INCIDENT:

On December 21, 1987, Operations personnel were performing OP/1/A/6100/01 after the End of Cycle 2 Refueling Outage. The Unit was in Mode 5, Cold Shutdown, at the time and was being prepared for heatup. At approximately 1444 hours, a Control Room Operator (CRO) opened all Steam Generator (S/G) Outlet Blowdown Orifice Bypass valves in order to ensure that the Main Steam lines were drained per OP/1/A/6100/01. At approximately 1458 hours, the CRO opened all four MSIBVs in order to equalize pressure across the MSIVs. The S/G 1A MSIV was opened at 1516:24 hours followed by the S/G 1B and 1C MSIVs at 1516:39 and 1516:52 hours, respectively. At 1516:56 hours, a CRO began opening the S/G 1D MSIV. A Lo Lo Level Reactor Trip alarm occurred at 1516:57:893 hours, for S/G 1D Level Channel 3. The S/G 1D MSIV fully open indication occurred at 1516:58 hours. At 1516:58:377 hours, the S/G 1D Channel 4 Lo Lo Level Reactor Trip alarm occurred, satisfying the logic for a Reactor Trip on 2 out of 4 Lo Lo Levels in one S/G. Reactor Trip Breaker (EIIS:BRK) 1B opened automatically at 1516:58:439 hours, followed by the 1A breaker at 1516:58:446 hours. A Feedwater Isolation signal was generated automatically due to the Reactor trip with temperature in the NC

System less than 564 Degrees F. At 1516:58:584 hours, the S/G 1D Channel 3 Lo Lo Level alarm cleared, followed by Level Channel 4 at 1516:58:613 hours. Both Reactor Trip Breakers were closed by the CRO at 1517:16 hours. At approximately 1518 hours, a CRO closed all MSIBVs. The Feedwater Isolation signal was manually reset, and the appropriate valves were realigned at approximately 1519 hours.

On December 24, 1987, Unit 1 was in Mode 4, Hot Shutdown. Operations personnel were supporting Performance personnel in testing the trip capability of the Main Turbine (EIIS:TRB). At approximately 1300 hours, the Assistant Nuclear Control Operator (ANCO) closed all MSIVs in order to allow the Turbine Stop Valves to be opened for the test. The Turbine trips were performed at approximately 1310 hours. After the test, the ANCO opened all MSIBVs in order to equalize pressure across the MSIVs. He did this without using a procedure. The MSIBV for S/G 1D started opening at 1321:21 hours and reached the fully open position at 1325:35 hours. At 1326:24 hours, the ANCO began opening the S/G 1D MSIV, and the valve reached the fully open position at 1326:26 hours. At the time, a differential pressure of 50-75 psid still existed across the MSIV. This caused a swell in S/G level when he opened the MSIV. At 1326:26:147 hours, a Turbine Trip/Feedwater Isolation signal was generated due to 2 out of 4 channels indicating high high level in S/G 1D. The signal cleared at 1326:27:047 hours. At approximately 1327 hours, the ANCO opened the remaining MSIVs and closed all of the MSIBVs at 1327:15 hours. The Feedwater Isolation signal was reset, and the appropriate valves were realigned at approximately 1329 hours.

CONCLUSION:

The root cause of the first part of the incident still remains unknown at this time. The narrow range level channel available on a chart recorder showed a small negative spike of approximately 5%, but it did not approach the low low level setpoint (approximately 17%). The channels that tripped were not being monitored by chart recorders. The chart recorder showing S/G 1D steam line pressure showed a pressure drop of approximately 20 psig. However, due to problems in resolving times on the chart, it is not certain at this time whether this drop is due to the MSIVs or the S/G Outlet Blowdown Orifice Bypass valves being opened. Duke Power will continue to investigate this incident and will document any new findings in a revision to this report if found to be appropriate.

The second part of the incident on December 24, 1987, has been attributed to a as personnel error. The ANCO did not use a procedure to open the MSIVs after the Turbine trip test. At the time of this incident, plant conditions were such that OP/1/A/6100/01 could no longer be used to open the MSIVs, and the ANCO did not remember to use enclosure 4.5 in OP/1/A/6250/06 until after the incident was over. The ANCO continued opening the MSIVs after opening the MSIBVs, even though the expected response had not yet been obtained. A 50-75 psid differential pressure still existed across the MSIV when the ANCO opened it.

There have been four previous incidents at Catawba Nuclear Station involving Engineered Safety Features actuations while opening MSIVs (see LER 414/87-14, LER 414/86-03, LER 414/86-26, and LER 413/86-35). None of these incidents were

attributed to a personnel error. LER 414/87-14 was the only one of these incidents to generate S/G low low level signals and was attributed to a malfunction of an Excess Flow Check Valve in the S/G level instrumentation. The cause of this previous event could not be determined. During an attempt to recreate the incident, a failure in the second channel could not be duplicated. Since there have been two similar events of unknown cause, this is considered to be a recurring event.

CORRECTIVE ACTION:

SUBSEQUENT

(1) In both cases, Control Room Operators verified that the automatic actuations had occurred correctly and that S/G levels had stabilized. The Unit was then restored to its previous status.

(2) After the December 21 occurrence, another Shift Supervisor dispatched a NEO to observe the S/G 1D MSIBV as it was cycled. The valve appeared to be fully opening and closing correctly.

(3) After the December 24 occurrence, another Shift Supervisor reviewed this incident with the ANCO.

(4) This incident was discussed with all Shift Supervisors.

PLANNED

(1) Duke Power will continue an investigation of this event. Any new findings will be documented in a revision to this report as it may be appropriate.

(2) An Operator Update will be issued to assure all licensed operators are aware of the procedure for equalizing pressure across MISVs with steam lines pressurized.

SAFETY ANALYSIS:

In the first part of the incident on December 21, 1987, the Reactor Trip Breakers opened as designed on low low level in S/G 1D. A Feedwater Isolation signal occurred due to the Reactor Trip signal concurrent with low Tave. All appropriate isolation valves closed as designed. Since the Unit was in Mode 5 at the time, S/G levels did not change when the Feedwater Isolation occurred. The Decay Heat Removal System was operable during this incident. Therefore, an adequate heat sink was available for the Reactor Coolant System at all times. Auxiliary Feedwater auto-start did not occur on S/G low low level due to the automatic start logic being defeated with the Unit in Mode 5.

During the second part of the incident on December 24, 1987, a high high level in S/G 1D caused a Turbine Trip/Feedwater Isolation signal to be generated. Since

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the Unit was in Mode 4 at the time, the Turbine was not on line when this occurred. Feedwater Isolation occurred as designed with all valves closing within their required times. S/G levels remained nearly constant after the Feedwater Isolation, and an adequate heat sink was available for the Reactor Coolant System at all times.

This event is reportable pursuant to 10 CFR 50.73, Section (a)(2)(iv).

The health and safety of the public were unaffected by this incident.

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January 20, 1988

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Catawba Nuclear Station, Unit 1
Docket No. 50-413
LER 413/87-47

Gentlemen:

Pursuant to 10 CFR 50.73 Section (a) (1) and (d), attached is Licensee Event Report 413/87-47 concerning two engineered safety feature actuations due to an unknown cause and a personnel error, respectively. This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Hal B. Tucker/sm

Hal B. Tucker

JGT/1254/sbn

Attachment

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