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October 19, 1992  
C311-92-2133

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

Dear Sir:

Subject: Three Mile Island Nuclear Station Unit I, (TMI-1)  
Operating License No. DPR-50  
Docket No. 50-289  
LER 92-002-00

This letter transmits Licensee Event Report (LER) No. 92-002-00 concerning a Turbine/Reactor trip caused by a trip of the "A" side Circulating Water Pumps. Public health and safety were unaffected.

This LER is being submitted pursuant to 10 CFR 50.73, using the required NRC forms (attached). NRC Form 366 contains an abstract which provides a brief description of the event. For a complete understanding of the event, refer to the text of the report provided on Form 366A.

Sincerely,

T. G. Broughton  
Vice President & Director, TMI-1

WGH

Attachment

cc: Administrator, Region I  
TMI Senior Resident Inspector  
TMI-1 Senior Project Manager

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## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1): THREE MILE ISLAND, UNIT 1 DOCKET NUMBER (2): 0500021891 OF 05

TITLE (4): REACTOR TRIP FOLLOWING THE LOSS OF THE 'A' SIDE CIRC WATER PUMPS AS A RESULT OF AN INADEQUATE REVIEW FOR REMOVAL OF THE CIRC WATER PUMP TRIP

EVENT DATE (5): 091892 LER NUMBER (6): 00200101992 REPORT DATE (7): 091892 OTHER FACILITIES INVOLVED (8):

OPERATING MODE (9): THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 50.72(b)(2)(ii). (Check one or more of the following) (11):  
POWER LEVEL (10): 100  
20.402(b) 20.406(a) 80.73(a)(2)(iv) 73.71(b)  
20.406(a)(1)(i) 80.36(a)(1) 80.73(a)(2)(v) 73.71(c)  
20.406(a)(1)(ii) 80.36(a)(2) 80.73(a)(2)(vi) OTHER (Specify in Abstract below and in Te 1, NRC Form 365A)  
20.406(a)(1)(iii) 80.73(a)(2)(ii) 80.73(a)(2)(vii)(A)  
20.406(a)(1)(iv) 80.73(a)(2)(iii) 80.73(a)(2)(viii)(B)  
80.73(a)(2)(ix)LICENSEE CONTACT FOR THIS LER (12): NAME: W.G. HEYSEK, TMI-1 LICENSING ENGINEER TELEPHONE NUMBER: 717948-8191  
AREA CODECOMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13):  
CAUSE SYSTEM COMPONENT MANUFAC TURE REPORTABLE TO NRCDS CAUSE SYSTEM COMPONENT MANUFAC TURE REPORTABLE TO NRCDSSUPPLEMENTAL REPORT EXPECTED (14): YES (If yes, complete EXPECTED SUBMISSION DATE) NO  
EXPECTED SUBMISSION DATE (15): MONTH DAY YEAR

ABSTRACT (Limit to 1400 spaces or approximately fifteen single-space typewritten lines) (16)

On September 18, 1992 TMI-1 was operating at 100% power. Plant operations and maintenance personnel were in the process of disabling the circulating water (CW) pump trip on high (nominal 42 psig) condenser inlet water box pressure. The basis for removing this trip feature was documented in an Engineering Evaluation which concluded that the automatic trip feature was no longer required. As a result of the current experience with Asiatic clamshell blockage in the main condenser [KE/COND] and the gradual increase in the inlet water box pressure, the CW trip removal was a recognized priority. During the sequence to disable this trip feature, the trip actuated causing the shutdown of three of six CW pumps [KE/P] and the subsequent turbine trip on low vacuum and anticipatory reactor trip.

The root cause was an inadequate review that failed to select the task's least risk solution prior to performing the evolution. Procedures will be revised to provide additional guidance for evolutions of this type and the lessons learned are being widely disseminated. The need to seek the most risk free sequence was addressed with personnel directly involved in the review and performance of the task.

The event was reported per 10CFR50.72(b)(2)(ii).

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)  THREE MILE ISLAND, UNIT 1	DOCKET NUMBER (2)  0 5 0 0 0 2 8 9 9 2	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
			— 0 0 2	— 0 0	0 2	OF	0 5

TEXT (If more space is required, use additional NRC Form 366A's) (7)

REACTOR TRIP FOLLOWING THE LOSS OF THE 'A' SIDE CIRCULATING WATER PUMPS  
AS A RESULT OF AN INADEQUATE REVIEW FOR REMOVAL OF THE CIRC WATER TRIPI. PLANT OPERATING CONDITIONS BEFORE THE EVENT

The plant was operating at 100% power prior to the event.

II. STATUS OF STRUCTURES, COMPONENTS OR SYSTEMS THAT WERE INOPERABLE AT THE START OF THE EVENT AND THAT CONTRIBUTED TO THE EVENT.

No systems, structures or components were out of service that contributed to this event.

III. EVENT DESCRIPTION

The reactor was operating at 100% power on September 18, 1992. Action was being taken to defeat the circulating water (CW) pump trip on high condenser inlet water box pressure. Engineering Evaluation Request (EER) 92-0374 had approved the removal of this original design feature based on the current design of the main condenser [KE/COND] and CW system. A gradual increase in inlet water box pressure was being caused by Asiatic clamshells restricting flow through the main condenser. Because there was no recent calibration data on the pressure switches [KE/PS], the nominal trip setpoint of 42 psig represented an unknown margin to the actual trip setpoint. There was a desire to remove the feature to eliminate the ongoing concern caused by the increasing water box inlet pressure. The trip removal was discussed by key plant management at the 0630 and 1600 meetings during the week preceding the EER approval. The discussions focused on the mechanical design features of the condenser and on the engineering necessary to approve removal of the trip feature; it did not focus on the sequence to remove the trip feature.

The Plant Operations Director discussed the sequence issue on Thursday, performed a walkdown simulating the sequence on Friday morning and solicited additional technical input or concerns from attendees of the 1600 Friday meeting prior to taking action. At approximately 1715, an I&C technician and the Plant Operations Director proceeded to the 'A' side circulating water box pressure switch [KE/PS] manifold. The common drain on the 'A' side pressure switch header was opened in a slow and deliberate manner in the sequence discussed during briefings conducted individually by the Plant Operations Director with the I&C Technician, Control Room Operators (CRO's) and Shift Supervisor. Once the drain valve on the common header was opened to allow a pressure reduction in the header, the cap on an in-line 'T' connection was loosened to aid in a controlled depressurization. At approximately 1732, an announcement which was made over the radio by the CRO instructed participating personnel to stop the sequence. The cap was re-tightened and the drain valve closed.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.6 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (F530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)	PAGE (3)
		YEAR SEQUENTIAL NUMBER REVISION NUMBER	
THREE MILE ISLAND, UNIT 1	G 5 0 0 0 2 8 9 9 2	— 0 0 2 — 0 0	0 3 OF 0 5

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

The CW pumps on the 'A' side tripped at 1733 due to an unanticipated pressure surge in the line affecting the three pressure switches being removed from service. Within 20 seconds, main condenser vacuum degraded sufficiently to cause a turbine trip which in turn caused an anticipatory reactor trip. The post trip response was normal with no compounding problems or errors.

The following detail was developed and/or concluded using root cause and HPES interview techniques:

Removal of the pressure switches from service was considered within the skill level of the I&C technician performing the task and no procedure other than Administrative Procedure (AP) 1002 "Switching and Tagging" was necessary for performing this evolution. Following successful isolation/drainage, the switches were to be tagged out per AP 1002. The EER considered the preferred method for removal of the trip feature to be mechanical isolation of the pressure switches. However, the EER did not specify a detailed sequence for the trip feature removal. Significant resources were expended on analyzing the mechanical design considerations to justify the appropriateness of removal of the trip feature. Limited time was devoted to understanding the removal sequence. At the time, given the expected simplicity of the task, the extent of the consideration given to the sequence was believed to be appropriate. The effort devoted to the detailed removal process was led by the Plant Operations Director with input from Maintenance, Plant Engineering, Shift Operations personnel and Operations Engineering. The sequence selected was not the optimum solution in that it did not afford maximum plant protection during removal of the trip feature.

Several options were considered for the removal sequence. They included: opening electrical breakers, pulling fuses, lifting leads, isolating and venting individual switches and opening the drain on the common header and then isolating the switches. An important consideration in the method selected was past operational experience. In November 1991, this task was accomplished in a similar manner with condenser inlet pressure at 39 psig (the cap on the tee was not loosened; however, this is not considered technically significant). This successful experience weighed heavily in the selection of the method chosen. The method chosen was straightforward and thought to pose no anticipated problems.

The root cause of the event was a review which was inadequate to select the least risk solution. The chosen solution did not protect from a possible simultaneous challenge to all three (3) pressure switches in the two-out-of-three logic for initiating the trip function. In retrospect, the option of isolating one switch at a time was the better choice given the criteria in the EER. Further, opening of the electrical breakers is a valid sequence successfully performed by Maintenance in the past. The contingency to reduce plant power to the 50% level was considered in the event of the loss of the circulating water pumps. However, the risk of



LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (F-330), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (4)

PAGE (3)

THREE MILE ISLAND, UNIT 1

0600028992-002-0004 OF 05

TEXT (If more space is required, use additional NRC Form 306A's) (17)

forced shutdown resulting from the down power maneuver was considered higher than the risk of isolating the pressure switches. Therefore, a power reduction was not initiated.

The method chosen for the trip isolation lacked the benefit of a multi-disciplinary review in a common forum which may have reached a different consensus on the least risk solution. All parties involved in the review process believed that the chosen solution should have been successful and a trip was not anticipated. The line pressure surge, thought to be the cause, remains unexplained. However, it has been surmised that an air pocket formed in the sensing line during a condenser outage prior to this event and affected pressure response. The desire to remove the trip feature prior to the weekend was included in the evaluation of the event, with the conclusion that the involved parties did not feel that scheduler pressure contributed to the failure to obtain an adequate review of the significance of removal.

IV. COMPONENT FAILURE DATA

No component failure data is applicable.

V. AUTOMATIC OR MANUAL INITIATED SAFETY SYSTEM RESPONSES

The reactor protection system functioned as designed. There were no other safety system actuations.

VI. ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT

The post trip response was normal and Control Room staff performance was excellent. There were no resultant safety consequences from the reactor trip. All systems functioned as designed.

VII. PREVIOUS EVENTS OF A SIMILAR NATURE

No previous events were of a similar nature.

VIII. CORRECTIVE ACTION PLANNED

1. Plant procedures will be strengthened to provide additional guidance for review of evolutions which can induce plant transients.
2. The Plant Review Group Chairman will widely disseminate the lessons learned on this event to the appropriate site personnel.
3. The Director of Operations and Maintenance will review this event with the Plant Operations Director, the Plant Engineering Director and the Plant Materiel Director. This review will include the importance of ensuring complete evaluation of evolutions which can induce plant transients.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-30), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (6)

PAGE (3)

THREE MILE ISLAND, UNIT 1

0 6 0 0 0 2 8 9 9 2 - 0 0 2 - 0 0 0 5 OF 0 5

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

considering contingencies, establishing plant conditions and selecting the alternative which minimizes risk. It will also include discussion of the role of management in ensuring that proper staff input is obtained and that management performs its approval and monitoring role.

4. The Plant Operations Director, the Plant Engineering Director and the Plant Materiel Director will ensure that this event is reviewed by personnel within their respective departments.

\* The Energy Industry Identification System (EIIS), System Identification (SI) and Component Function Identification (CFI) Codes are included in brackets, "[SI/CFI]", where applicable, as required by 10 CFR 50.73(b)(2)(ii)(F).