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August 6, 1991
C311-91-2084

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

Dear Sir:

Subject: Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
LER 91-001-00

Attached is Licensee Event Report (LER) No. 91-001-00 which concerns the failure to meet the operability requirements of Technical Specification 3.5.1.1 due to the inoperability of degraded grid voltage relays 27-1 and 27-3. Public health and safety were unaffected.

This event was considered reportable pursuant to 10 CFR 50.73. The attached abstract provides a brief description of the event. For a detailed understanding of the event, refer to the text of the report.

Sincerely,

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

RDW

Attachment

cc: R. Hernan - Senior Project Manager
T. Martin - Regional Administrator
F. Young - NRC Sr Resident Inspector TMI

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)										DOCKET NUMBER (2)										PAGE (3)																																							
THREE MILE ISLAND, UNIT 1										050002491										OF 01																																							
TITLE (4)																																																											
INOPERABILITY OF DEGRADED GRID VOLTAGE RELAYS RESULTING FROM REINSTALLATION OF A 4160V BREAKER																																																											
EVENT DATE (5)										LER NUMBER (6)										REPORT DATE (7)										OTHER FACILITIES INVOLVED (8)																													
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POWER LEVEL (10)										20.402(a)																				20.405(a)										50.73(a)(2)(i)										73.71(b)									
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LICENSEE CONTACT FOR THIS LER (12)																																																											
NAME															TELEPHONE NUMBER																																												
R. D. Wells, TMI-1 Licensing Engineer															717 948-1860																																												
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (15)																																																											
<p>At 2011 hours on July 7, 1991, following the completion of Preventive Maintenance, breaker 1SA-D2 was reinstalled. During this process, the breaker shifted causing damage to the external resistor on relays 27-1 and 27-3 which was immediately detected by the personnel who had installed the breaker. These relays are two (2) of the three (3) degraded grid voltage relays on the 1D 4160V Engineered Safeguards (ES) Bus. TMI-1 Technical Specification (Tech. Spec.) Table 3.5-1 item C.5.a. requires two channels (relays) to be operable, with a minimum degree of redundancy of one. Failing to satisfy these conditions places the unit into Tech. Spec. Limiting Condition for Operation (LCO) 3.5.1.1, which states that Tech Spec 3.0.1 applies. Tech. Spec. 3.0.1 requires that action shall be initiated, within one (1) hour, to shutdown the plant in a controlled manner. However, it was not known at the time of the event whether relays 27-1 and 27-3 were inoperable. At 2335 hours, relay 27-3 was repaired. Subsequent testing, at 2355 hours, determined that relays 27-1 and 27-3 had been inoperable at the time of the event (i.e., 2011 hours). Therefore, the required actions per Tech. Spec. 3.0.1 had applied. This event is reportable per 10 CFR 50.73 (a)(2)(i)(B). Relay 27-1 was repaired at 0005 hours on July 8, 1991. Root cause of this event is attributable to the physical configuration of the switchgear cubicle and a lack of adequate caution by personnel reinstalling the breaker. An engineering evaluation of this event is being performed to determine the appropriate changes in order to minimize the potential for future occurrence of this type event. Additionally, this event will be reviewed with appropriate Operations and Maintenance personnel.</p>																																																											

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

FACILITY NAME (1)	DICTIONARY NUMBER (2)	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
THREE MILE ISLAND, UNIT 1	05000289	91	001	0002	OF	05

TEXT (if more space is required, use additional NRC Form 365A s/ (17))

LER 91-001
INOPERABILITY OF DEGRADED GRID VOLTAGE RELAYS RESULTING
FROM REINSTALLATION OF A 4160 VOLT BREAKER

I. Plant Operating Conditions Before the Event

TMI-1 was operating at approximately 93% power. The plant was controlled by the Integrated Control System, which was in full automatic.

II. Status of Structures, Components, or Systems that were inoperable at the start of the event and that contributed to the event

4160V switchgear breaker 1SA-D2 (EB/BKR)* was out of service for Preventive Maintenance (PM).

III. Event Description

At 2011 hours on July 7, 1991, following the completion of a PM, breaker 1SA-D2 was being returned to its switchgear cubicle. During this process, the breaker shifted causing mechanical damage to the external resistor on relays 27-1 and 27-3 (EB/RLY). The damage to the relays was immediately detected by the personnel who had installed the breaker. These relays are two (2) of the three (3) degraded grid voltage relays on the 1D 4160V Engineered Safeguards (ES) Bus (i.e., the "A" train of the Engineered Safeguards electrical distribution system). These relays are mounted on the breaker door and monitor the 1D bus voltage.

TMI-1 Technical Specification (Tech. Spec.) Table 3.5-1, "Instruments Operating Conditions," item C.5.a., "Degraded Grid Voltage Relays," requires two channels (relays) to be operable, with a minimum degree of redundancy of one. Failing to satisfy these conditions places the unit into Tech. Spec. Limiting Condition for Operation (LCO) 3.5.1.1 that states Tech Spec 3.0.1 applies. Tech. Spec. 3.0.1 requires that, within one (1) hour, action shall be initiated to shutdown the plant in a controlled manner.

Operations personnel were aware of the above Tech. Spec. requirements; however, it was not known at the time of the event (i.e., 2011 hours) whether relays 27-1 and 27-3 were inoperable. Since it was not immediately known what effect the damaged resistors would have on operability of the relays, electrical schematics and the vendor manual were reviewed. Based on this review it was concluded, that the resistors were part of the relay test circuit, and would not affect operability of the relays. This determination was made by plant personnel at the time of the event due to a misinterpretation of vendor drawings. Personnel from the Plant Engineering, Technical Functions, and Lebanon Relay Departments were subsequently consulted to determine positively the status of these relays.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104

EXPIRES 2/21/85

FACILITY NAME (1) THREE MILE ISLAND, UNIT 1	DUCKET NUMBER (2) 0 5 0 0 0 2 8 P	LER NUMBER (6)			PAGE (3) OF 0 5
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
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TEXT (If more space is required, use additional NRC Form 3054's) (17)

III. Event Description (Cont'd.)

At approximately 2300 hours the TMI-1 system engineer arrived onsite. The team then assembled onsite could not conclusively determine the operability of the affected relays without testing. A course of action was established to replace the external resistors and determine the operability status of the relays with a damaged (i.e., open) external resistor.

At approximately 2335 hours, the external resistor for relay 27-3 was replaced and the relay was tested satisfactorily. At this point, relays 27-2 and 27-3 were operable which satisfied the conditions of Tech. Spec. Table 3.5-1 item C.5.a.

Next, at approximately 2355 hours, a loss of 4160V bus voltage to the 27-1 relay was simulated by opening bus voltage input test switches to the 27-1 relay with the open external resistor still in place. Relay 27-1 failed to operate while performing this test.

Based on the results of the above tests on relay 27-1, it was determined at 2355 hours on July 7, 1991, relays 27-1 and 27-3 had been inoperable due to the mechanical impact that initiated this event at 2011 hours. Since the plant was at this time in compliance with Tech. Spec. Table 3.5-1, operations personnel determined that it was unnecessary to initiate shutdown actions since the plant was no longer in a condition where a shutdown was required by the Tech. Specs.

At 0005 hours on July 8, 1991, the resistor on the 27-1 relay was replaced and tested satisfactory. Lebanon Relay commenced performing calibration checks and determined that the "as found" setpoint values for relays 27-1 and 27-3 were within acceptable limits.

At 0745 hours on July 8, 1991, a Plant Review Group (PRG) meeting was held to review this event. Based on the above event description, the PRG concluded that Tech Spec 3.0.1. had been applicable during the period the unit was in a condition that did not meet the operability requirements of Tech. Spec. 3.5.1.1 (i.e., 2011 hours to 2335 hours on July 7, 1991) due to the inoperability of relays 27-1 and 27-3. Meanwhile, pending the results of the test of relay 27-1, it had been the judgement of plant personnel when this event was initiated that the relays were operable and that only a test circuit was affected. This judgement, as previously noted, was based on a misinterpretation of the vendor drawings.

Supplement 1 to NUREG 1022, "Licensee Event Report System," states that entry into Tech. Spec. 3.0.1 is reportable per 10 CFR 50.73, even if conditions are corrected within the one (1) hour to initiate shutdown, since the plant is operating with a "condition prohibited by the plant's Tech. Specs." Therefore, this event is reportable pursuant to 10 CFR 50.73 (a)(2)(i)(B) due to the existence of a condition prohibited by TMI-1 Tech. Spec. LCO 3.5.1.1.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

FACILITY NAME (1)	BUCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
THREE MILE ISLAND, UNIT 1	0 5 0 0 0 2 8 9	9 1	0 0 1	0 0 0 4	OF	0 5	

TEXT (If more space is required, use additional NRC Form 300A's) (17)

III. Event Description (Cont'd.)

Also the PRG noted that the plant initiated actions per Tech. Spec. 3.0.1 would have required NRC notification per 50.72(b)(1)(i)(A) (i.e., initiation of plant shutdown required by Tech. Specs.). Although no plant shutdown was initiated, the NRC Operations Center was notified of this event via the ENS phone at 1140 hours on July 8, 1991.

IV. Root Cause of the Event

Installation of the switchgear breaker requires personnel to use caution due to the small clearance between the door-mounted relays and the path for returning the breaker to its cubicle. Additionally, it was determined that the "radius" of rotation of the resistors described by the movement of the door as it rotates on its hinges, potentially interferes with the installation path of the "racking in" operation. Thus, the root cause of this event is attributable to the physical configuration of the switchgear cubicle and the lack of adequate caution by the personnel reinstalling breaker 1SA-D2.

V. Component Failure Data

Relays 27-1 and 27-3 are type 27 high accuracy undervoltage relays manufactured by ASEA Brown Boveri, Protective Relay Division (model # ITE 27N).

VI. Automatic or Manually Initiated Safety System Responses

None, since the relays remained in the untripped state.

VII. Assessment of the Safety Consequences and Implications of the Event

Relays 27-1 and 27-3 are two (2) of the three (3) degraded grid voltage relays on the 1D 4160V ES bus ("A" train of the ES electrical distribution system). Three additional loss of voltage relays, 27-4 through 27-6, also exist on the "A" train ES system. The "B" train was unaffected by this event. Loss of voltage or degraded voltage is sensed by two out of three relays. If either a degraded voltage condition or loss of the 4160V bus voltage occurs, the diesel generator unit will be automatically connected to its bus.

If a degraded voltage condition occurred while relays 27-1 and 27-3 were inoperable, these relays would not have completed the logic necessary for the associated diesel generator start and load shedding. However, the "A" train loss of voltage relays and the entire "B" train ES electrical distribution system were operable during this event. Therefore, the "A" train would have functioned properly on a loss of voltage condition, and the "B" train would have functioned properly for either a degraded voltage or loss of voltage condition. This event did not adversely affected public health and safety.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 6-31-86

FACILITY NAME (1)

LICENSEE NUMBER (2)

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THREE MILE ISLAND, UNIT 1

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TEXT (If more space is required, use additional NRC Form 365 (a) (17))

VIII. Previous Events of a Similar Nature

None.

IX. Corrective Actions Planned

An engineering evaluation of this event is being performed to determine the appropriate changes in order to minimize the potential for future occurrence of this type event. Additionally, this event will be reviewed with appropriate Operations and Maintenance personnel concerning the methodology for installing the switchgear breakers.

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