

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) THREE MILE ISLAND, UNIT I	DOCKET NUMBER (2) 05000289	PAGE (3) 1 OF 04
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TITLE (4)
INADVERTENT PARTIAL ESAS ACTUATION

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)
06	03	84	84	002	000	07	03	84			05000

OPERATING MODE (9) N

POWER LEVEL (10) 01010

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)

20.402(b)	<input type="checkbox"/>	20.406(e)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)	<input type="checkbox"/>	73.71(b)	<input type="checkbox"/>
20.406(a)(1)(i)	<input type="checkbox"/>	50.36(e)(1)	<input type="checkbox"/>	50.73(a)(2)(v)	<input type="checkbox"/>	73.71(e)	<input type="checkbox"/>
20.406(a)(1)(ii)	<input type="checkbox"/>	50.36(e)(2)	<input type="checkbox"/>	50.73(a)(2)(vi)	<input type="checkbox"/>	OTHER (Specify in Abstract below and in Text, NRC Form 365A)	
20.406(a)(1)(iii)	<input type="checkbox"/>	50.73(a)(2)(i)	<input type="checkbox"/>	50.73(a)(2)(vii)(A)	<input type="checkbox"/>		
20.406(a)(1)(iv)	<input type="checkbox"/>	50.73(a)(2)(ii)	<input type="checkbox"/>	50.73(a)(2)(vii)(B)	<input type="checkbox"/>		
20.406(a)(1)(v)	<input type="checkbox"/>	50.73(a)(2)(iii)	<input type="checkbox"/>	50.73(a)(2)(ix)	<input type="checkbox"/>		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
M. R. KNIGHT, TMI-1 SENIOR LICENSING ENGINEER	AREA CODE 717 948-8554

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS
B	J E	R L Y	C 360	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15)

MONTH	DAY	YEAR

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

At approximately 11:55 A.M. on June 3, 1984, a partial ESAS Actuation occurred. This was the result of failures of the ESAS Relays in conjunction with maintenance testing. These and subsequent relay failures have been experienced since May when all ESAS relay coils were replaced. These coils were replaced to fulfill a commitment in LER 83-024/99X where the cause of earlier failures was suspected to be an end of coil life condition. Two coil failures since June 3, 1984 have involved the same two relays. On June 30, 1984 another partial ESAS Actuation occurred which involved a relay whose coil was replaced on June 4, 1984.

The cause of these relay failures is attributed to binding of the XKPM-10 magnet kit and the armature rod of the relay catching on the molded epoxy coil lip resulting in overheating and burnout of the coil.

Investigations continue and corrective action will be taken based on these findings. A new step in the procedure will be added to the Corrective Maintenance Procedure to help prevent future ESAS Actuations during maintenance. Alternatives to the Clark relays are being evaluated.

Relay failures of this type result in inadvertent safety actuations. Public health and safety were not affected.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

FACILITY NAME (1) THREE MILE ISLAND, UNIT I	DOCKET NUMBER (2) 0500028984	LER NUMBER (6)			PAGE (3)	
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

INADVERTENT PARTIAL ESAS ACUTATION (EVENT DATE 06/03/84)I. PLANT OPERATING CONDITIONS BEFORE THE EVENT:

TMI-1 was in long term cold shutdown. RCS pressure was 210 PSIG with RCS temperature 121 Degrees F. The "B" Decay Heat Removal System was in operation and MU-P1B was running supplying seal injection and RCS makeup.

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

ESAS Actuation relays 63Z2D/RB2A and 63Z1B/RC2B were in the de-energized (tripped) state due to relay coil failures.

III. EVENT DESCRIPTION:

On June 3, 1984 at approximately 11:55 A.M., an electrician troubleshooting a separate indication problem intentionally tripped channels RB1A and RB1B (one channel in ES "A" and one channel in ES "B") unaware that two relays had failed (63Z2D/RB2A and 63Z1B/RC2B), one each in channels 2A and 2B. With these relays de-energized and channels 1A and 1B intentionally tripped, the 2 out of 3 logic matrix was satisfied and a partial inadvertent actuation occurred. The following components actuated:

- a). "B" Emergency Diesel started
- b). CA-V189 Closed
- c). MU-V18 Closed
- d). SF-P1B Tripped
- e). DH-V5B Opened

Operations personnel returned the actuated components to the required position for the current plant conditions. Relay coils for the two failed relays were replaced and the relays were successfully tested per approved procedure.

Although a Corrective Maintenance Procedure had been used for troubleshooting and the technician should have checked the Actuation Cabinet status lights, there was no specific sign-off step in the procedure to require that the technician verify Actuation Cabinet status light indication prior to intentionally tripping an ES channel. If the technician had checked these indicating lights, this partial ESAS actuation might have been avoided. Therefore, to a certain extent, personnel error and procedure defect contributed to this event even though the root cause was equipment malfunction due to a (Design, Manufacturing, Construction, etc.) inadequacy.

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

On June 4, 1984 while repairing the two relays 63Z1B/RC2B and 63Z2D/RB2A, another relay, 62X2B/RC1A, was found to be not completely pulled in and it was repaired also by replacement of the relay coil.

On June 7, 1984 operations personnel noted that the Actuation Cabinet status light for relay 63Z2D/RB2A was off (relay de-energized). Further assessment of the cause for the relay failures determined the cause for relay failure to be binding of the XKPM-10 magnet kit and the armature rod of the relay catching on the molded epoxy coil lip. This prevented the relay from completely pulling in and due to increased current flow, the relay coil overheated and de-energized. The 63Z2D/RB2A relay was repaired by installing a new XKPM-10 magnet kit and a new relay coil. This relay was successfully tested and has functioned normally to date.

On June 30, 1984 operations personnel were performing a test of the ESAS actuation logic unrelated to the relay failure. ESAS A and B were to be intentionally tripped and then reset (removed from Bypass and then placed back in Bypass). Although it was not observed at the time, relay 62X2B/RC1A had either failed earlier or after it was tripped and reset, it did not completely pull in and failed as a result of the coil overheating during the test. Therefore, when ES channel RC2A was tripped, the ESAS auto actuation logic (2 out of 3) was satisfied and Decay Heat Closed Cooling Water Pump DC-P1A started automatically. This time a new TB113-61 relay coil and XKPM-10 magnet kit were both installed on relay 62X2B/RC1A. It was successfully tested and returned to service.

IV. COMPONENT FAILURE DATA:

Clark (GTE Sylvania/Challenger Electrical Controls) PM 7305 AC Relays:

- a). 63Z2D/RB2A - Relay Model #X5U12-5 with TB113-3 relay coil and modified XKPM-10 magnet kit.
- b). 63Z1B/RC2B - Relay Model #X5U14-11 with TB113-61 relay coil and modified XKPM-10 magnet kit.
- c). 62X2B/RC1A - Relay Model #X5U12-11 with TB113-61 relay coil and modified XKPM-10 magnet kit.

V. AUTOMATIC OR MANUALLY INITIATED SAFETY SYSTEM RESPONSE:

These partial inadvertent automatic ESAS Actuations indicate that the system operates as intended when the 2 out of 3 logic matrix is satisfied.

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TEXT (If more space is required, use additional NRC Form 388A's) (17)

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

A modification (undercutting of the magnet assembly armature rod) was previously implemented to correct failure of the relays to drop out. The modification apparently corrected the previous failure mode. The modification may have introduced a new problem where the relay does not pick up causing the coil to overheat and fail. The failure now occurs in the tripped rather than untripped state.

The current coil failure mode places the system in a one-out-of-two condition rather than two-out-of-three condition and can cause an inadvertent ESAS actuation rather than preventing an actuation.

VII. PREVIOUS EVENTS OF A SIMILAR NATURE:

Events of a similar nature were previously reported by LER 83-024/99X-0. A possible cause for failure listed in that LER was coil end-of-life. A commitment to replace the ESAS AC relay coils was completed in May of this year. However, it appears that coil end-of-life was probably not the reason for relay failure, since the new coils have already experienced some failures.

VIII. CORRECTIVE ACTIONS PLANNED:

The 63Z1B/RC2B relay was checked for possible binding and the relay was cleaned and a new relay coil was installed. The 63Z2D/RB2A relay was equipped with a new XKPM-10 magnet kit and a new relay coil. Both relays were successfully tested and no evidence of binding was noted after repair.

The Corrective Maintenance ESAS troubleshooting procedure will be revised to include a sign-off step requiring the checking of ESAS Actuation Cabinet indication prior to tripping or removing a channel from service. This should prevent future inadvertent actuations similar to the one which occurred on June 3, 1984.

In addition, investigations will continue to ascertain the reason for relay failure and corrective action will be taken based upon those findings. Engineering is also evaluating alternatives to the Clark relays.



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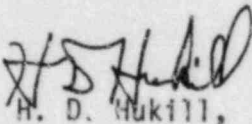
Dear Sir:

Three Mile Island Nuclear Station, Unit I, (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
LER 84-002-0

This letter transmits Licensee Event Report (LER) No. 84-002-0 which deals with inadvertant partial ESAS actuations. Public health and safety were unaffected.

This LER is being submitted prusuant 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 which appears on Form 366A.

Sincerely,


H. D. Hukill,
Director, TMI-1

HDH/MRK/mle

Enclosure

cc: Dr. T. E. Murley, Region I, Regional Administrator
R. Conte, Senior Resident Inspector
J. Van Vliet, Project Manager

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