Exelon Nuclear

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February 20, 2012
TMI-12-019

10 CFR 50.73

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

THREE MILE ISLAND NUCLEAR STATION, UNIT 1 (TMI, Unit 1)
RENEWED OPERATING LICENSE NO. DPR-50
DOCKET NO. 50-289

SUBJECT: LICENSEE EVENT REPORT (LER) NO. 2011-002-00

Enclosed is Licensee Event Report (LER) No. 2011-002-00: "Remote Shutdown Relay 69X1RR Contact Failure." This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(i)(B).

There are no regulatory commitments contained in this LER.

Should you have any questions concerning this report, please contact David Atherholt, Manager TMI, Unit 1 Regulatory Assurance at (717) 948-8364.

Sincerely,

Mark Newcomer
Plant Manager, Three Mile Island Unit 1
Exelon Generation Co., LLC

RWL/mdf

Enclosure: Licensee Event Report 2011-002-00

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

IE22
NRR

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Three Mile Island, Unit 1	05000289	1 OF 4

4. TITLE: Remote Shutdown Relay 69X1RR Contact Failure

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	05000
12	22	2011	2011	- 002 -	00	02	20	2012	N/A	05000

9. OPERATING MODE

N

10. POWER LEVEL

100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☒ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Michael Fitzwater, TMI Unit 1 Regulatory Assurance Engineer	(717) 948-8228

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	BI	RLY	Gould Inc.	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

On 12/22/11, the Reactor Building Emergency Cooling Water pump discharge valve "B" (RR-V-1B) failed to open during performance of an Engineered Safeguards Actuation System (ESAS) quarterly surveillance test. RR-V-1B was declared inoperable placing TMI-1 in an unplanned 72-hour Limiting Condition for Operation (LCO). RR-V-1B was demonstrated to open and close via the control room console pushbutton. Troubleshooting determined a Remote Shutdown (RSD) transfer selector switch relay/contact was open. The open contact associated with the Remote Shutdown (RSD) transfer selector switch is in series with the ESAS signal to RR-V-1B. Intermittent contact make-up was determined to be the cause of the failure. The RSD transfer switch was cycled several times, and the manual portion of ESAS testing was repeated successfully. Administrative controls were applied to ensure the switch contact closed properly if the RSD transfer switch was manipulated pending replacement. The relay was replaced on 1/6/12. Based upon the failure analysis the relay/contact was considered inoperable at the plant start up (reactor criticality 11/24/11) to the date of discovery (12/22/11). This is reportable under 10 CFR 50.73 (a)(2)(i)(B), "a condition prohibited by Technical Specifications" due to exceeding the allowable outage time and changing plant mode without satisfying the minimum conditions for criticality.

A. EVENT DESCRIPTION

Plant Conditions before the event:

Babcock & Wilcox – Pressurized Water Reactor – 2568 MWth Core Power
Date/Time: December 22, 2011 / 14:24 hours
Power Level: 100% steady state power
Mode: Power Operations

There were no structures, systems, or components out of service that contributed to this event on the date of occurrence.

Event:
On 12/22/11 at 14:24, during the performance of quarterly Engineered Safeguards Actuation System (ESAS) surveillance ""B" Emergency Loading Sequence and HPI Logic Channel/Component Test", Reactor Building Emergency Cooling Water pump discharge valve "B" (RR-V-1B) failed to open, resulting in "B" Reactor Building Emergency Cooling Water Train being inoperable. The station entered a 72-hour Limiting Condition for Operation (LCO) in accordance with TMI, Unit 1 Technical Specifications 3.3.2, which states in part, "...Reactor Building Emergency Cooling Water ...components shall not be removed from service so that the affected system train is inoperable for more than 72 hours."

Following failure of RR-V-1B to stroke via ESAS signal, operators demonstrated that RR-V-1B would open and close via the control room console pushbutton. Troubleshooting determined that the Remote Shutdown (RSD) transfer selector switch relay/contact (69X1RR) was open. The function of the RSD transfer selector switch and associated relay (69X1RR) is to transfer control from the control room to the remote shutdown panel in the event that the control room is not habitable. The open contact was in series with the ESAS signal to RR-V-1B, preventing operation of the valve via ESAS signal. The RSD transfer selector switch was operated several times to cycle the relay contact. Subsequent electrical testing of the circuit was performed validating the contact was closed. Operators performed the manual portion of ESAS testing demonstrating the ability of RR-V-1B to open satisfactorily on an ESAS signal.

Controls were established for the RSD Selector Switch and associated relay (69X1RR) to ensure it was maintained in the operable configuration until its replacement on 01/06/12.

At 22:36 on 12/22/2011, RR-V-1B was declared operable and TMI-1 exited the 72-hour LCO time clock.

An extent of condition review was conducted that validated that there were no other failed open relay contacts associated with the remote shutdown panel. All ESAS/Heat Sink Protection System (HSPS) components that have remote shutdown contacts were tested satisfactorily following the last RSD panel relay manipulation.

The failed relay (69X1RR) was replaced on 01/06/12. The failure analysis was completed on 02/02/12 on the failed relay/contact and concluded that the cause was due to intermittent contact closure. A past

operability review was performed that identified surveillance procedure OP-TM-534-235, Remote Shutdown System Functional Test of RR-V-1B was last satisfactorily performed on 11/10/11 during refueling outage 1R19. This test cycled relay 69X1RR. Review of evidence determined that the subject contact on 69X1RR was not closing to its normally closed position once the RSD surveillance was completed. Based on this evidence, the operability of the 69X1RR relay from 11/10/11 to 12/22/11 was not supported.

This event is reportable for two conditions under 10 CFR 50.73(a)(2)(i)(B) "operation or condition which was prohibited by the plant's Technical Specifications".

The first condition is a change in plant mode that occurred when the reactor was taken critical on 11/24/11 without satisfying the Technical Specification minimum conditions for operation. Technical Specification 3.3.1 states "The reactor shall not be made critical unless the following conditions are met:". The following Technical Specification 3.3.1.5 states "Engineered Safeguards Valves and Interlocks Associated with the Systems in Specifications 3.3.1.1, 3.3.1.2, 3.3.1.3, 3.3.1.4 are OPERABLE. Specification 3.0.1 applies." Both Reactor Building Emergency Cooling Water pumps are to be operable per T.S. 3.3.1.4. Relay 69X1RR failed to provide a signal to Reactor Building Emergency Cooling Water pump discharge valve "B" (RR-V-1B) which is an Engineered Safeguards valve associated with the system in TS 3.3.1.4 that was inoperable. Thus, the mode change was in violation of the unit Technical Specifications.

The second condition is the plant had a period of maintenance outage time that exceeded the Technical Specification allowable outage time. Based on past operability review, the period of time for relay 69X1RR inoperability extended from 11/24/11 to 12/22/11 which is greater than the 72-hour allowable outage time provided in T.S. 3.3.2. The date of 11/24/11 began the period of inoperability based upon the time the reactor was taken critical.

The station is also evaluating the condition for reportability in accordance with 10 CFR 21 "Reporting of Defects and Noncompliance".

B. CAUSE OF EVENT

The cause of this event was due to intermittent contact closure of a remote shutdown panel relay (69X1RR) which prevented the Reactor Building Emergency Cooling Water pump discharge valve "B" (RR-V-1B) from opening upon receipt of an ESAS signal.

C. ANALYSIS / SAFETY SIGNIFICANCE

The safety significance of the failed remote shutdown relay contact was minimal for actual and potential conditions.

During the period of time from plant start-up (reactor criticality on 11/24/11) until the failed Remote Shutdown Relay contact was satisfactorily tested and verified to return RR-V-1B to operable status (on 12/22/11), no accidents or transients occurred. For twelve hours (12/19/11 - 12/20/11) while the plant was at full power, both the "A" train of the Reactor Building Spray (BS) system was not operable and the

"A" train of Reactor Building Emergency Cooling Water system was not operable but remained available (during surveillance testing). The ability to manually open RR-V-1B from the control room console was maintained at all times including when the "A" train of Reactor Building Emergency Cooling Water was not operable.

A risk evaluation was performed assuming the unavailability of the "A" train of Reactor Building Spray (BS) system, "A" train of Reactor Building Emergency Cooling Water (RR) system and, "B" train of Reactor Building Emergency Cooling Water system (RR). This configuration represents the most limiting case, since operator actions would likely result in restoring at least one train of Reactor Building Spray (BS) system or one train of Reactor Building Emergency Cooling Water system to service. The risk significance of this configuration results in a negligible risk increase.

D. CORRECTIVE ACTIONS

- The relay was replaced and retested satisfactorily.
- Verified that all Remote Shutdown Relay contacts supporting safety related circuits were tested satisfactorily since their last manipulation.
- The station is reviewing this event for 10 CFR Part 21 applicability.

E. PREVIOUS OCCURENCES

Industry and site OPEX search criteria used: Gould relay, J20A40, relay contact, contact seating yielded the following results.

- On 10/28/2009 when Clinton Power Station encountered problems during Emergency Diesel Generator operability surveillance testing when the diesel engine did not reach rated speed and voltage. This event was similar in that the same model relay contact failed due to light silver oxidation and minute surface contamination on the movable contact surfaces. The cause of this failure was not the same as the subject investigation.

- 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).