



May 20, 2015

10 CFR 50.73

SVP-15-041

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

Quad Cities Nuclear Power Station, Unit 1  
Renewed Facility Operating License No. DPR-29  
NRC Docket No. 50-254

**Subject:** Licensee Event Report 254/2015-004-00, "Automatic Depressurization System Trip Logic Failure"

Enclosed is Licensee Event Report (LER) 254/2015-004-00, "Automatic Depressurization System Trip Logic Failure," for Quad Cities Nuclear Power Station, Unit 1.

This report is submitted in accordance with 10 CFR 50.73 (a)(2)(v)(D) which requires the reporting of any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident; and 10 CFR 50.73 (a)(2)(vii)(D) which requires the reporting of any event where a single cause or condition caused two independent channels to become inoperable in a single system designed to mitigate the consequences of an accident.

There are no regulatory commitments contained in this letter.

Should you have any questions concerning this report, please contact Mr. W. J. Beck at (309) 227-2800.

Respectfully,

A handwritten signature in black ink, appearing to read "Scott Darin".

Scott Darin  
Site Vice President  
Quad Cities Nuclear Power Station

cc: Regional Administrator – NRC Region III  
NRC Senior Resident Inspector – Quad Cities Nuclear Power Station

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NRK



**LICENSEE EVENT REPORT (LER)**

(See Page 2 for required number of digits/characters for each block)

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 FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@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.

<b>1. FACILITY NAME</b> Quad Cities Nuclear Power Station Unit 1	<b>2. DOCKET NUMBER</b> 05000254	<b>3. PAGE</b> 1 OF 4
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**4. TITLE**  
Automatic Depressurization System Trip Logic 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
03	21	2015	2015	004	00	05	20	2015	N/A	N/A
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A

**9. OPERATING MODE** 4

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

<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input checked="" type="checkbox"/> 50.73(a)(2)(vii)
<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
<b>10. POWER LEVEL</b> 000	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)

Specify in Abstract below or in NRC Form 366A

**12. LICENSEE CONTACT FOR THIS LER**

LICENSEE CONTACT Tom Petersen – Regulatory Assurance	TELEPHONE NUMBER (Include Area Code) (309) 227-2825
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**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
E	SB	RLY	G080	Y					

**14. SUPPLEMENTAL REPORT EXPECTED**  YES (If yes, complete 15. EXPECTED SUBMISSION DATE)  NO

**15. EXPECTED SUBMISSION DATE**

MONTH	DAY	YEAR
N/A	N/A	N/A

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

On 03/21/15, at 0800, with Unit 1 shutdown for refuel outage Q1R23, the Unit 1 Off-Line Automatic Blowdown Logic Test was being performed when two Electromatic Relief Valves (ERVs) failed to actuate since the 'A' trip logic for the automatic function of the Automatic Depressurization System (ADS) did not energize.

Maintenance burnished the 'A' trip logic relay contacts and the 'B' trip logic relay contacts. The as-found data on the 'B' trip logic of ADS was lost during this troubleshooting, and it is unknown if the 'B' trip logic of the automatic function would have functioned. Once the relay contacts were burnished, the continuity was checked and found acceptable.

The apparent cause for the loss of the 'A' trip logic system was due to relay contact oxidation buildup. The oxidation buildup was due to inadequate preventative maintenance instructions.

The immediate corrective action consisted of burnishing the relay contacts. Future corrective actions include updating the preventative maintenance procedure and replacing the two relays on the 'A' trip logic system that had the oxidation buildup.

This report is submitted in accordance with 10 CFR 50.73 (a)(2)(v)(D) which requires the reporting of any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident; and 10 CFR 50.73 (a)(2)(vii)(D) which requires the reporting of any event where a single cause or condition caused two independent channels to become inoperable in a single system designed to mitigate the consequences of an accident.



**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

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 FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@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.

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**NARRATIVE**

**PLANT AND SYSTEM IDENTIFICATION**

General Electric - Boiling Water Reactor, 2957 Megawatts Thermal Rated Core Power

Energy Industry Identification System (EIIIS) codes are identified in the text as [XX].

**EVENT IDENTIFICATION**

Automatic Depressurization System 'A' Trip Logic Failed for Two Electromatic Relief Valves and 'B' Trip Logic As-Found Data was Lost

**A. CONDITION PRIOR TO EVENT**

Unit: 1	Event Date: March 21, 2015	Event Time: 0800 hours
Reactor Mode: 4	Mode Name: Cold Shutdown	Power Level: 0%

**B. DESCRIPTION OF EVENT**

On March 21, 2015, at 0800 hours, during the performance of the Unit 1 Off-Line Automatic Blowdown Logic Test by Operations, two Electromatic Relief Valves (ERVs) [RV], 1-0203-3B and 1-0203-3D, failed to actuate since the 'A' trip logic for the automatic function of the Automatic Depressurization System (ADS) [SB] did not energize. A troubleshooting package was created for maintenance to burnish the 'A' trip logic relay [RLY] contacts and the 'B' trip logic relay contacts due to oxidation buildup. The oxidation found on the contacts exceeded expected conditions. The 'A' trip logic relay contacts and the 'B' trip logic relay contacts were burnished. The continuity on the relays was verified to be less than one ohm, and the relays functioned as designed. This work was completed on March 22, 2015, at 0630 hours.

Based on the 'B' trip logic contacts being burnished from the troubleshooting work package, it is unknown if the 'B' trip logic of the automatic function of ADS for the two ERVs that failed to actuate from the 'A' trip logic would have functioned since the as-found data was lost from maintenance being performed. The associated investigation of this event addressed the as-found data that was lost from maintenance being performed.

The two ERVs would have opened on a manual signal or via a signal from the pressure controllers [PC] as these two functions of ADS had already been tested earlier in the test procedure. The manual and relief valve functions of ADS remained functional. Associated ERVs, 1-0203-3B and 1-0203-3D, were last successfully tested for this function during the previous refueling outage.

This report is submitted in accordance with 10 CFR 50.73 (a)(2)(v)(D) which requires the reporting of any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident; and 10 CFR 50.73 (a)(2)(vii)(D) which requires the reporting of any event where a single cause or condition caused two independent channels to become inoperable in a single system designed to mitigate the consequences of an accident.

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**NARRATIVE**

**C. CAUSE OF EVENT**

The apparent cause of the Unit 1 ADS 'A' trip logic failing for the two ERVs was oxidation buildup on the associated relay contacts. The oxidation buildup was due to the preventative maintenance (PM) for inspecting HFA relays had insufficient instructions for visually inspecting relay contacts for oxidation and burnishing the relay contact if oxidation is found.

**D. SAFETY ANALYSIS**

**System Design**

Per the Updated Final Safety Analysis Report (UFSAR) 6.3.3.1.4, "The ADS is designed to depressurize the reactor to permit either the LPCI or core spray subsystem to cool the reactor core during a small break LOCA; this size break would result in a loss of coolant without a significant pressure reduction, so neither system alone could provide adequate core cooling. When the ADS is actuated, the critical flow of steam through the relief valves results in a maximum energy removal rate with a corresponding minimum mass loss. Thus, the specific internal energy of the saturated fluid in the system is rapidly decreased, which causes a pressure reduction. Some steam and two-phase cooling would occur during the blowdown phase. Moreover, since the ADS does not provide coolant makeup to the reactor, the ADS is considered only in conjunction with the LPCI or core spray subsystems as a backup to the HPCI." Pressure relief of the reactor vessel may be accomplished manually by the operator or without operator action by the automatic depressurization circuitry.

**Safety Impact**

The safety impact of this condition was low. The two ADS valves would have been declared inoperable per Technical Specification 3.5.1 had the unit been in Modes 1 or 2; however, the unit was already shutdown and in Mode 4. Surveillance Requirement (SR) 3.5.1.9 to verify ADS actuates on an actual or simulated automatic initiation signal was not met since the two ADS valves did not actuate when a simulated automatic initiation signal was given.

Per UFSAR 6.3.3.1.4, Automatic Depressurization Subsystem, "All five available ADS valves were assumed operable in the LOCA analysis. One ADS valve from the five valves modeled in the LOCA analyses was assumed to fail for the single failure evaluation resulting in the operation of four valves being credited." Based on the ADS system design and accident/transient analysis, 4 of 5 ADS valves are required to perform the required safety function.

With two ADS valves failing to properly actuate during testing, these two ADS valves may not have been capable of performing their required ADS function in the as-found condition, therefore there was a potential for a loss of ADS safety function due to this condition.

**Risk Insights**

Since ADS was not required to be operable or available at the time of discovery, this condition did not create any actual plant or safety consequences. The unit was not in an accident or transient condition requiring the use of ADS during this period of time.

From a Probabilistic Risk Assessment (PRA) perspective, the following conditions are credited: The emergency operating procedures require the operators to inhibit the automatic function of ADS. Three ADS valves are sufficient to depressurize the reactor vessel if the main condenser is unavailable. Two ADS valves are sufficient to depressurize the reactor vessel if the main condenser is available. This indicates the loss of the automatic function for two ADS valves is not risk significant.

Although two ADS valves may not have performed the automatic function of ADS, the three remaining ADS valves would have provided sufficient capacity to depressurize the reactor vessel in an accident or transient condition when used in conjunction with PRA assumed available equipment.

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**NARRATIVE**

An assessment of this event on the Plant PRA was performed which concluded the impact on risk was not significant.

**E. CORRECTIVE ACTIONS**

Immediate:

1. Electrical Maintenance burnished the associated ADS relay contacts. The continuity on the relays was verified to be less than one ohm, and the relays functioned as designed.

Follow-up:

1. The associated PM instructions will be revised to include visually inspecting the relay contacts for oxidation and burnish the contacts if necessary.
2. The two relays that failed to energize will be replaced in the next refueling outage for that unit.

**F. PREVIOUS OCCURRENCES**

The station events database, LERs, and INPO Consolidated Event System (ICES) were reviewed for similar events at the Quad Cities Nuclear Power Station. This event was attributed to oxidation buildup on the relay contacts for the 'A' trip logic system due to inadequate preventative maintenance instructions. Based on the cause of this event and the associated corrective actions, the events listed below, although similar in topic, are not considered significant station experiences that would have directly contributed to preventing this event.

- Station Issue Report (IR) 1486872, "Q1R22 PSU – As Found Condition Bus 2201-32 Relay 287-107B" (03/13/2013) – During the HFA relay inspection PM of the Unit 1 ADS HFA relays, relay 1-0287-107B had burn marks on the first and fourth contacts from the left. All of the contacts on relay 1-0287-107B indicated wear and oxidation. The apparent cause of the burn marks and dirty contacts was age related degradation. This previous issue, although similar to this LER event also identified oxidation, but the oxidation was identified before the relay failed to actuate. This is not considered a significant station experience that would have directly contributed to preventing the event of this current LER since this prior ADS relay oxidation issue was identified prior to a failure to actuate the relay, and was an isolated occurrence.
- LERs – A review of LERs at Quad Cities Nuclear Power Station over the past 10 years did not identify any similar events.

**G. COMPONENT FAILURE DATA**

Failed Equipment: ADS HFA Relays (1-0287-106A, 1-0287-106B, 1-0287-107A & 1-0287-107B)  
 Component Manufacturer: General Electric  
 Component Model Number: 12HFA151A2H  
 Component Part Number: N/A

This event has been reported to ICES as Failure Report No. 316233.