



Dresden Nuclear Power Station  
6500 North Dresden Road  
Morris, IL 60450  
815-942-2920 Telephone  
www.exeloncorp.com

10 CFR 50.73

SVPLTR # 15-0048

August 7, 2015

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Dresden Nuclear Power Station, Units 2 and 3  
Renewed Facility Operating License Nos. DPR-19 and DPR-25  
NRC Docket Nos. 50-237 and 50-249

Subject: Licensee Event Report 249/2014-001-02, Electromatic Relief Valve Failed to Actuate During Surveillance Testing

Licensee Event Report 237/2015-002-02, 2C ERV Failed to Actuate during Extent of Condition Testing

Enclosed are revised Licensee Event Reports 237/2015-002-02, "2C ERV Failed to Actuate during Extent of Condition Testing" and 249/2014-001-02, "Electromatic Relief Valve Failed to Actuate during Surveillance Testing." The enclosed reports are being revised to include the additional reporting criteria of 10 CFR 50.73(a)(2)(v)(D), "Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequence of an accident."

There are no regulatory commitments contained in this submittal.

Should you have any questions concerning this letter, please contact Mr. Bruce Franzen at (815) 416-2800.

Respectfully,

Shane M. Marik  
Site Vice President  
Dresden Nuclear Power Station

**Enclosures:** 1. Licensee Event Report 249/2014-001-02  
2. Licensee Event Report 237/2015-002-02

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

IE22  
NRC

**Enclosure 1**

**Licensee Event Report 249/2014-001-02**



**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](mailto: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> Dresden Nuclear Power Station, Unit 3	<b>2. DOCKET NUMBER</b> 05000249	<b>3. PAGE</b> 1 OF 3
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**4. TITLE**  
Electromatic Relief Valve Failed to Actuate during Surveillance Testing

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
11	06	2014	2014	- 001	- 02	08	07	15	FACILITY NAME	DOCKET NUMBER

<b>9. OPERATING MODE</b> 5	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>			
<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input 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"/> 50.73(a)(2)(x)
	<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"/> 73.71(a)(4)
	<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"/> 73.71(a)(5)
	<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"/> OTHER
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" 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 Bruce Franzen – Regulatory Assurance Manager	TELEPHONE NUMBER (Include Area Code) 815-416-2800
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	SB	RV	D243	Y					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b>	MONTH	DAY	YEAR

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

On November 6, 2014, with the reactor in mode 5, an electromatic relief valve (ERV) actuator failed to open during the performance of scheduled surveillance testing. The surveillance involves an operator manually actuating the ERV from the main control room with operators staged in the field. The operators in the field reported an audible click when the manual actuation was initiated. However, when the demand signal was given, the actuator plunger did not move and the valve did not open. The Apparent Cause of failure was determined to be that actuator design is susceptible to vibration induced wear in conjunction with the vibration particularly on the 'B' Main Steam Line near the 3E ERV.

Corrective actions include replacement of ERV actuators with a hardened design, future inspections of supporting structures, and identifying the source of elevated vibrations.

This failure has been determined to be of very low safety significance.

This event is being reported under 10 CFR 50.73(a)(2)(i)(B) "Any operation or condition which was prohibited by the plant's Technical Specifications," and under 10 CFR 50.73(a)(2)(v)(D), "Any event or condition that could have prevented the fulfilment of the safety function of structures or systems that are needed to mitigate the consequence 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.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Dresden Nuclear Power Station, Unit 3	05000249	2014	- 001	- 02	2 OF 3

**NARRATIVE**

**PLANT AND SYSTEM IDENTIFICATION**

Dresden Nuclear Power Station (DNPS), Unit 3, is a General Electric Company Boiling Water Reactor with a licensed maximum power level of 2957 megawatts thermal. The Energy Industry Identification System codes used in the text are identified as [XX].

**A. Plant Conditions Prior to Event:**

Unit: 03                      Event Date: 11-06-2014                      Event Time: 09:12 CST  
 Reactor Mode: 5            Mode Name: Refuel                                      Power Level: 000 percent

**B. Description of Event:**

On November 6, 2014, with the reactor in mode 5, Operations identified that an electromatic relief valve [RV] actuator failed to actuate during the performance of scheduled surveillance testing. The surveillance involves an operator manually actuating the ERV from the main control room with operators staged in the field. The operators in the field reported an audible click when the manual actuation was initiated. However, when the demand signal was given, the actuator plunger did not move and the valve did not open.

Exact valve failure time cannot be determined, however, based on actuator design vulnerability and the visual inspection and measurements of failure, it is estimated that the valve would not have been able to perform its function some time during the previous fuel cycle. Additionally, a review of the equipment history showed that there were occasions where, during surveillance testing, an additional ERV would have been inoperable. Having two of the five relief valves inoperable could challenge the ability of the ERVs to provide pressure control.

This event is being reported under 10 CFR 50.73(a)(2)(i)(B) "Any operation or condition which was prohibited by the plant's Technical Specifications," and under 10 CFR 50.73(a)(2)(v)(D), "Any event or condition that could have prevented the fulfilment of the safety function of structures or systems that are needed to mitigate the consequence of an accident as discussed in the Tech Spec basis."

Dresden Unit 3 has four main steam [SB] lines (MSL). Each main steam line has a different combination of ERVs, one Target Rock Relief valve [RV], and Safety Relief Valves [RV] (SRV). The 'A' MSL contains the Target Rock and two SRVs. The 'B' MSL contains two ERVs, the 3B and 3E, and two SRVs. The remaining MSLs each contain one ERV and two SRVs.

The ERV actuators are inspected each outage to perform proactive replacement of worn sub-components.

**C. Cause of Event:**

The Apparent Cause of failure was determined to be that actuator design is susceptible to vibration induced wear in conjunction with the vibration on the 'B' Main Steam Line near the 3E ERV. Of the

**LICENSEE EVENT REPORT (LER)  
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**NARRATIVE**

remaining ERVs, degradation was discovered on the 3B ERV which is located on the same Main Steam Line.

**D. Safety Analysis:**

The ERVs are used, in conjunction with Low Pressure Coolant Injection (LPCI) [BO], as a back-up to the High Pressure Coolant Injection (HPCI) [BJ] system during a small area break loss of coolant accident. The ERVs are used with the SRVs and Target Rock for overpressure protection during Anticipated Transient Without Scram (ATWS) scenarios. Based upon the Dresden PSA notebook, success criteria can be met with one valve failing to operate. Degradation occurred on the 3E and 3B ERV following guide post replacement during the previous outage. Expected mechanical wear occurred on the 3C and 3D ERVs over the previous two cycles when the previous guide post replacement had been performed. 3B ERV, though degraded, passed surveillance testing during D3R23.

As HPCI, the Isolation Condenser [BL], the remaining three ERVs, the Target Rock relief valve, and eight safety relief valves were available; this failure is of very low safety significance.

**E. Corrective Actions:**

- The failed ERV was replaced with a hardened design during the Refueling Outage.
- The remaining Unit 3 actuators were replaced with the hardened design.
- Unit 2 actuators are scheduled to be replaced during the upcoming refuel outage.
- Detailed inspections of the supporting structure for the 3B MSL.
- Further investigation into the source of the increased vibrations on the 3B MSL will be performed.
- The new actuators will be inspected for wear during the next Unit 3 refuel outage.

**Previous Occurrences:**

3E failed during logic testing during the 2012 refueling outage. Failure was attributed to inadequate tightening of hardware. Inadequate tensioning of hardware was not an attribute of the current failure mechanism.

**G. Component Failure Data:**

Manufacturer	Model	S/N	Type
Dresser Industries	1525VX-3-OS108	BK7082	Relief Valve

Enclosure 2

Licensee Event Report 237/2015-002-02



**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> Dresden Nuclear Power Station, Unit 2	<b>2. DOCKET NUMBER</b> 05000237	<b>3. PAGE</b> 1 OF 4
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**4. TITLE**  
2C ERV Failed to Actuate during Extent of Condition Testing

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
02	07	2015	2015	002	02	08	07	15	FACILITY NAME	DOCKET NUMBER

<b>9. OPERATING MODE</b> 4	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>			
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	<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)
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	<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"/> 50.73(a)(2)(x)
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	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" 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 Bruce Franzen – Regulatory Assurance Manager	TELEPHONE NUMBER (Include Area Code) 815-416-2800
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	SB	RV	D243	Y					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b>	MONTH	DAY	YEAR

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

On February 7, 2015, with the reactor in mode 4, an Electromatic Relief Valve (ERV) actuator failed to open during the performance of an extent of condition test. The testing involved an operator manually actuating the ERV from the main control room with operators and engineers staged in the field. However, when the demand signal was given, the 2C actuator plunger did not move and the valve did not open. The cause of this event was determined to be a lack of maintenance procedural guidance to align, determine excessive wear, and characterize wear of the ERV actuator sub-components.

Corrective actions involved replacement of all four ERVs with an upgraded design and the development of enhanced inspection/maintenance guidance.

This failure was determined to be of very low safety significance because the cause of the failure only existed on one ERV.

This event is being reported under 10 CFR 50.73(a)(2)(i)(B) "Any operation or condition which was prohibited by the plant's Technical Specifications," and under 10 CFR 50.73(a)(2)(v)(D), "Any event or condition that could have prevented the fulfilment of the safety function of structures or systems that are needed to mitigate the consequence of an accident."



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

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1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
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Dresden Nuclear Power Station, Unit 2	05000237	2015	- 002	- 02	2 OF 4

**NARRATIVE**

**PLANT AND SYSTEM IDENTIFICATION**

Dresden Nuclear Power Station (DNPS), Unit 2, is a General Electric Company Boiling Water Reactor with a licensed maximum power level of 2957 megawatts thermal. The Energy Industry Identification System codes used in the text are identified as [XX].

**A. Plant Conditions Prior to Event:**

Unit: 02                      Event Date: 02-07-2015                      Event Time: 12:29 CST  
 Reactor Mode: 4            Mode Name: Cold Shutdown                      Power Level: 000 percent

**B. Description of Event:**

On February 7, 2015, with the reactor in mode 4, an Electromatic Relief Valve (ERV) [RV] actuator failed to open during the performance of an extent of condition testing. The testing involved an operator manually actuating the ERV from the main control room with operators and engineers staged in the field. However, when the demand signal was given, the 2C actuator plunger did not move and the valve did not open.

Corrective actions involved replacement of all four Unit 2 ERVs with an upgraded design. This completes the replacement of all ERVs for Dresden Unit 2 and 3.

This failure has been determined to be of very low safety significance.

Based upon a review of relevant information (i.e., the probable cause of the failure), this event is being reported under 10 CFR 50.73(a)(2)(i)(B) "Any operation or condition which was prohibited by the plant's Technical Specifications."

Exact valve failure time cannot be determined, However, Based on the actuator design vulnerability and weakness in relief valve maintenance practices due to procedure deficiency, it is estimated that the valve would not have been able to perform its function some time during the previous fuel cycle. Additionally, a review of the equipment history showed that there were occasions where, during surveillance testing, an additional ERV would have been inoperable. Having two of the five relief valves inoperable could challenge the ability of the ERVs to provide pressure control. Therefore, this event is also being reported under 10 CFR 50.73(a)(2)(v)(D), "Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequence of an accident as discussed in the Tech Spec basis."

**C. Cause of Event:**

The failed ERV actuator sub-components were inspected in the field and immediately following removal. Based upon the in-field inspection, the 2C ERV actuator's binding point was identified to be at the top of the guide post below the top of the top guide post bushing. PowerLabs performed a failure



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analysis of the 2C ERV that confirmed that the binding point was located at the top of the spring guide post and near the top of the bushing. Additionally, the report identified some additional wear and an additional potential binding point on the plunger arm. PowerLabs was not able to replicate the failure, however, it was noted that the ERV appeared to have been shock loaded at some point during transportation.

The failure mode was evaluated to determine the failure mechanism of mechanical binding. The mechanical binding was determined to have been caused by preferential wear between the guide post and bushing due to an alignment issue. The 2C ERV actuator had measurable material loss on the bushing. The ERV actuator is normally open and de-energized. The bushings on the 2C were last replaced in 2005 per WO 636642. The wear due to actuation has been determined to be insignificant and is not related to the wear mechanism. The basis for the failure mechanism was determined by engineering inspection and a Powerlabs autopsy.

The preferential mechanical wear between ERV actuator sub components was determined to have been caused by the guide posts being in constant contact with the bushings during operation. The rigid guide post was noted to have been slightly angled away from the solenoid centerline, from the base of the post, with all base bolting completely intact and torqued, and interfering with the inside diameter of the bushing. These guide posts have sometimes been found slightly angled in previous WOs, requiring additional maintenance effort to bend the post into straight, concentric alignment with the bushing. Without this additional maintenance attention, the guide post and bushing would have had constant contact for the duration of cycle operation. The valve would have passed all as-left testing because the wear mechanism had not yet occurred.

The guide posts being in constant contact with the bushings during operation was determined to have been caused by the guide posts not having optimal alignment performed during maintenance. The only opportunities to inspect, repair if necessary, and verify that the guide posts are aligned with the bushings is during maintenance inspections performed during each refuel outage. During the inspection following the 2C failure, the posts were found to be in a non-optimal alignment. The posts were slightly angled away from the solenoid centerline, from the base of the post, with all base bolting completely intact and torqued, and interfering with the inside diameter of the bushing. Per vendor guidance, the posts should be aligned concentric with the bushings.

The guide posts not having optimal alignment performed during maintenance was determined to have been caused by a lack of procedural guidance to specify how to align the guide posts. The root cause of failure is that there is a lack of maintenance procedural guidance to align, determine excessive wear, and characterize wear of the ERV actuator sub-components.

**D. Safety Analysis:**

The ERVs are used, in conjunction with Low Pressure Coolant Injection (LPCI) [BO], as a back-up to the High Pressure Coolant Injection (HPCI) [BJ] system during a small area break loss of coolant accident. The ERVs are used with the SRVs and Target Rock for overpressure protection during Anticipated Transient Without Scram (ATWS) scenarios.

**LICENSEE EVENT REPORT (LER)  
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1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE		
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**NARRATIVE**

As HPCI, the Isolation Condenser [BL], the remaining three ERVs, the Target Rock relief valve, and eight safety relief valves were available; this failure is of very low safety significance.

**E. Corrective Actions:**

- Dresden replaced the four Unit 2 ERV actuators with an improved design
- Implement the procedure revision to provide specific guidance on how to align all components during re-assembly, provide specific component replacement guidance based on wear measured, and provide specific procedural guidance on how to characterize the wear observed on the ERV actuator sub-components.

**E. Previous Occurrences:**

A similar event occurred in 2003 where, during D3M10, 3E ERV differences were noted. An issue report noted that the multiple actuator differences (i.e., Post and Bushing) caused the post to be slightly below the top of the upper bracket bushing and slight wear allows the bracket to ride (hang up) on top of the spring post when attempting to actuate with slight finger pressure.

The actuator was found to be degraded, but it was verified to have performed its design function during a bench test. No failure was identified by the station, and the degraded sub-components were replaced as a conservative measure.

This event was determined to be similar to the 2C ERV failure, however, since a failure did not occur during the 2003 event, there was insufficient information obtained that could have reasonably been used to foresee the failure in February 2015.

**G. Component Failure Data:**

Manufacturer	Model	S/N	Type
Dresser Industries	1525VX-3-OS108	DA39300	Relief Valve