

Part 21 (PAR)

Event # 48996

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| Rep Org: CURTISS WRIGHT FLOW CONTROL CO. | Notification Date / Time: 05/03/2013 09:25 (EDT) |
| Supplier: CURTISS WRIGHT FLOW CONTROL CO. | Event Date / Time: 05/03/2013 (EDT) |
| | Last Modification: 05/03/2013 |
| Region: 1 | Docket #: |
| City: EAST FARMINGTON | Agreement State: Yes |
| County: | License #: |
| State: NY | |
| NRC Notified by: JOHN DEBONIS | Notifications: GORDON HUNEGS R1DO |
| HQ Ops Officer: CHARLES TEAL | PART 21 GROUP EMAIL |
| Emergency Class: NON EMERGENCY | ERIC DUNCAN R3DO |
| 10 CFR Section: | |
| 21.21(a)(2) INTERIM EVAL OF DEVIATION | |

INTERIM PART 21 REPORT OF POTENTIAL DEFECT IN A RELIEF VALVE BELLOWS

The following was excerpted from a fax:

(ii) Identification of the basic component supplied for such facility or such activity within the United States which may fail to comply or contains a potential defect.

Target Rock P/N: 303480-1, Bellows, Manufactured by Target Rock.

(iii) Identification of the firm supplying the basic component which fails to comply or contains a defect.

Target Rock, Business Unit of Curtiss-Wright Flow Control Corporation
1966E Broadhollow Road
East Farmingdale, NY 11735

(iv) Nature of the defect or failure to comply and the safety hazard which is created or could be created by such defect or failure to comply.

During as-found steam testing on March 5, 2013 of a Pilgrim Main Steam Safety Relief Valve (MS-SRV) (TR Model 09J-001, valve assembly S/N 5, pilot assembly S/N 23, bellows PIN 303480-1 S/N 607) a loud pop was heard and as-found testing was secured. Subsequently, the pilot assembly was removed from the valve assembly and subjected to a leak test and would not hold pressure. The pilot assembly was disassembled and a visual inspection of the P/N 303480-1 bellows convolutions revealed a through wall failure in one of the convolutions. It is noted the steam testing was performed at an offsite test facility and the valve did not fail installed in the plant.

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The bellows acts as a pressure sensor responsible for initiating the opening of the MS-SRV at set pressure. Failure of the bellows does not directly impact the integrity of the Reactor Coolant System (RCS) pressure boundary, which is maintained by the bonnet assembly that surrounds it, but does impair the ability of the MS-SRV to provide over-pressure protection of the RCS. This technology has an extensive history of reliability in nuclear power systems and has been used in Commercial Nuclear Power Plants (NPPs) since the 1970s. This is the first reported incident regarding a thru wall bellows failure.

Target Rock initiated a comprehensive root cause evaluation pursuing several areas of investigation. In parallel, Entergy is conducting an independent investigation and we are cooperating with them. A complete review of our paperwork confirms all manufacturing procedures and processes were performed in accordance with all specified requirements. This includes:

- Raw material analysis
- Dimensional inspections
- Cleaning
- Heat Treatment
- Manufacturing processes
- Testing
- Review of design stresses

Preliminary metallurgical analysis of the failed bellows indicates cracks forming in an inter-granular manner as would be expected from Inter Granular Stress Corrosion Cracks (IGSCC) originating at pit like location on the interior pressurized surface. The source of this cracking is the focus of on going investigations. Target Rock has also visually inspected two other bellows of the same part number, one manufactured from the same material lot and another manufactured from an earlier material lot. Both of these bellows were installed in valves steam tested at Target Rock. One of these valves bellows was also full flow tested at Wyle Labs. Neither of these additional bellows contained pit-like locations and may indicate this potential failure mechanism is an isolated incident. However, to date, neither Target Rock nor Pilgrim can draw final conclusions with the information collected and analyzed.

The mode of failure has not been determined; however, in order to address the potential for a common mode failure, Target Rock is continuing metallurgical testing of the failed bellows and the two other bellows with the same part number. Based on these results, it is likely we will need to evaluate bellows that have been installed in other NPP as they become available.

(v) The date on which the information of such defect or failure to comply was obtained.

The as-found steam test and identification of the potential defect occurred on March 5, 2013.

(vi) In the case of a basic component which contains a defect or fails to comply, the number and location of these components in use at, supplied for, being supplied for, or may be supplied for, manufactured, or being manufactured for one or more facilities or activities subject to the regulations in this part.

The following plants are running with bellows P/N 303480-1 installed: Limerick 1 & 2, Pilgrim, and J.A. Fitzpatrick.

(vii) The corrective action which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been or will be taken to complete the action.

The root cause of the potential defect is not yet known as of the date of this report. Therefore, no specific corrective actions have been initiated. Target Rock Corrective Action Request CAR 13-013 will document the corrective actions when they are determined. This determination will be based on further mechanical and material evaluations. TR anticipates completing these evaluations within 45 days; however, in the event the evaluations are not completed, TR will forward another interim report within 45 days.

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(viii) Any advice related to the defect or failure to comply about the facility, activity, or basic component that has been, is being, or will be given to purchasers or licensees.

Target Rock will recommend that the end user perform a detailed visual inspection of the interior convolutions of installed bellows P/N 303480-1 at the next opportunity to determine if any areas of pitting or cracking exist on the interior walls of the bellows. This is a difficult inspection to perform due to the following: internal geometry of the convolutions, a trained inspector is required and specific inspection technology is needed to yield reliable results.



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NID#13243
May 3, 2013

**Attn: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-001**

Subject: 10 CFR Part 21 Interim Report
Notification of a Potential Defect, Bellows Failure

Dear Sir or Madam:

This letter provides interim notification of a potential defect in a relief valve bellows manufactured and supplied by Target Rock (TR). The evaluation for a potential defect is underway but could not be completed within (60) sixty days of discovery. The information required for this notification is provided below:

(i) Name and address of the individual or individuals informing the Commission.

William Brunet
Director of Quality Assurance

James White
General Manager

Target Rock, Business Unit of Curtiss-Wright Flow Control Corporation
1966E Broadhollow Road
East Farmingdale, NY 11735

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(iii) Identification of the firm supplying the basic component which fails to comply or contains a defect.

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(iv) Nature of the defect or failure to comply and the safety hazard which is created or could be created by such defect or failure to comply.

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The bellows acts as a pressure sensor responsible for initiating the opening of the MS-SRV at set pressure. Failure of the bellows does not directly impact the integrity of the Reactor Coolant System (RCS) pressure boundary, which is maintained by the bonnet assembly that surrounds it, but does impair the ability of the MS-SRV to provide over-pressure protection of the RCS. This technology has an extensive history of reliability in nuclear power systems and has been used in Commercial Nuclear Power Plants (NPPs) since the 1970s. This is the first reported incident regarding a thru wall bellows failure.

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The mode of failure has not been determined; however, in order to address the potential for a common mode failure, Target Rock is continuing metallurgical testing of the failed bellows and the two other bellows with the same part number. Based on these results, it is likely we will need to evaluate bellows that have been installed in other NPP as they become available.

(v) The date on which the information of such defect or failure to comply was obtained.

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(vi) *In the case of a basic component which contains a defect or fails to comply, the number and location of these components in use at, supplied for, being supplied for, or may be supplied for, manufactured, or being manufactured for one or more facilities or activities subject to the regulations in this part.*

The following plants are running with bellows P/N 303480-1 installed:

| Plant | Total Valves Installed | Operating Pressure (psig) | Nameplate Set Pressures (psig) | Remarks |
|----------------------|-------------------------------|----------------------------------|---------------------------------------|---|
| Limerick Units 1 & 2 | 28 | 1040 | 1170, 1180, 1190 | 3-Stage MS-SRVs with bellows installed 1999 |
| Pilgrim | 4 | 1035 | 1155 | 3-Stage MS-SRVs with bellows installed 2011 |
| J. A. FitzPatrick | 3 | 1050 | 1145 | 3-Stage MS-SRVs with bellows installed 2011 |

(vii) *The corrective action which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been or will be taken to complete the action.*

The root cause of the potential defect is not yet known as of the date of this report. Therefore, no specific corrective actions have been initiated. Target Rock Corrective Action Request CAR 13-013 will document the corrective actions when they are determined. This determination will be based on further mechanical and material evaluations. TR anticipates completing these evaluations within 45 days; however, in the event the evaluations are not completed, TR will forward another interim report within 45 days.



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(ix) In the case of an early site permit, the entities to whom an early site permit was transferred.

Not applicable.

Should you have any questions regarding this matter, please contact Steven Pauly, Vice President Energy Products at (631) 293-3800, ext. 4640.

Very Truly Yours,

A handwritten signature in black ink, appearing to read "James White".

James White
General Manager
Target Rock, Business Unit of Curtiss-Wright Flow Control Corporation

cc: Michael Cinque
William Brunet
Steve Pauly
Alex DiMeo
John DeBonis
Ed Bradshaw