

Part 21 (PAR)

Event # 48223

Rep Org: WESTINGHOUSE ELECTRIC COMPANY	Notification Date / Time: 08/23/2012 09:21 (EDT)
Supplier: WESTINGHOUSE ELECTRIC COMPANY	Event Date / Time: 08/22/2012 (EDT)
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Region: 1	Docket #:
City: CRANBERRY TOWNSHIP	Agreement State: Yes
County:	License #:
State: PA	
NRC Notified by: JAMES GRESHAM	Notifications: MICHAEL HAY R4DO
HQ Ops Officer: DONG HWA PARK	PART 21 GROUP Email
Emergency Class: NON EMERGENCY	
10 CFR Section:	
21.21(d)(3)(i) DEFECTS AND NONCOMPLIANCE	

PART 21 - DEFECT DUE TO CHANGE IN MANUFACTURING PROCESS CAUSING RELAY FAILURE IN SAFETY RELATED SYSTEMS

The following is summary of the information received from the licensee:

"The basic component is an Eaton-Cutler Hammer Type ARD660UR DC relay that is commercially dedicated by Westinghouse for use in safety related systems at Palo Verde Units 1, 2 and 3. Except for the Palo Verde plants, Westinghouse is not aware of any other plant that uses this relay as a safety-related component in normally energized applications.

"The relay contacts failed to change state when required to do so during postulated events and/or surveillance testing. Westinghouse has identified the kick-out spring as a possible contributing factor for the relay failure due to stress corrosion cracking. Other anomalies such as relay core barrel tolerance and potential material deficiencies are currently under review. Based upon testing at APS, the relay failure rate is low and non-reproducible. This indicates that a combination of factors could be resulting in the failures with different causes for each failure. Results of testing do not identify a common cause for the failures. For ARD660UR relays used in normally de-energized applications, the kick-out spring will be compressed for only a short period of time and exposure to additional heat generated by intermittent coil energization will be minimal. For relays in normally de-energized applications, it is not expected that the force provided by the kick-out spring will decrease significantly over time and the contacts will change position when the relay coil is de-energized. Westinghouse has not received any reports to date of relay contacts failing to properly change position when the relay goes from a de-energized to an energized state. Because of the kick-out spring's limited exposure to compression and heat generated by the relay coil, it is expected that the springs will perform as intended in normally de-energized applications for the qualified life of the relay.

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"Identification of the firm constructing the facility or supplying the basic component which fails to comply or contain a defect.

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"Cranberry Township, Pennsylvania 16066"

* * * UPDATE AT 1445 EDT ON 04/08/13 FROM JAMES A. GRESHAM TO S. SANDIN * * *

The following update was received via fax and is summarized below:

"During the investigation into the cause of the ARD660UR relay sticking, many physical and performance aspects and components of the relay were analyzed, as well as the entire manufacturing process. This investigation uncovered several issues that contributed, or could contribute, to the failure of the relay to release when de-energized.

"Based on analysis by Westinghouse, with support from Eaton Corporation, it was determined that the primary cause of the relay failure was a change in the manufacturing process in the plastics molding operation of this relay. This manufacturing change caused the moving cores to adhere to the inner diameter of the relay coil spool when a relay was continuously energized during testing by Westinghouse for longer than 21 days. This change in the manufacturing process began in May 2008 and continued until it was terminated in December 2012. Relay coils manufactured during this time may develop an adhesive like residue in the relay coil spools when energized for an extended period of time. This residue was found on the moving cores of relays which stuck during testing at a Westinghouse facility and relays returned from the customer. This residue was determined to be the primary cause of the relay issue.

"Westinghouse shipped Palo Verde a total of 374 potentially affected Eaton-Cutler Hammer Type ARD660UR DC relays.

"As a result of the investigation, Westinghouse recommended several manufacturing process improvements that are designed to prevent the reoccurrence of the issue. Eaton has agreed to implement these improvements prior to restarting the manufacture of these relays. Westinghouse is revising its commercial grade dedication process for these relays. This action ensures that the commercial grade dedication criteria include replacing the relay kick-out spring in each relay and verifies other relay enhancements have been implemented before future relays are shipped to the customer as safety related components.

"Westinghouse recommends that each plant review the application requirements of each affected relay. If an ARD660UR relay is used in a normally energized application or is required to change state after being energized for at least 21 consecutive days and was manufactured between May 1, 2008 and December 31, 2012, Westinghouse recommends replacing the relay at the next convenient opportunity.

"If an ARD relay manufactured during the May 1, 2008 and December 31, 2012 time frame is successfully, periodically cycle tested, this relay may be less susceptible to sticking."

Notified R4DO (Deese) and NRR Part 21 Group via email.



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Our ref: LTR-NRC-12-59, Rev 2

April 8, 2013

Subject: Notification of a Defect Pursuant to 10CFR21

This revision is provided to update previous information reported as NRC Log No 2012-37-00 Event No. / Accession No. ML12243A187. This letter supersedes the previous revision of this letter. The information is being updated as a result of additional information obtained during the Westinghouse investigation and additional testing conducted.

The following information is provided pursuant to the requirements of 10CFR21 to report a defect. This issue concerns the failure of Eaton-Cutler Hammer Type ARD660UR DC relay contacts to change position when de-energized.

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

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

The basic component is an Eaton-Cutler Hammer Type ARD660UR DC relay that is commercially dedicated by Westinghouse for use in safety related systems at Palo Verde Units 1, 2 and 3. Except for the Palo Verde plants, Westinghouse is not aware of any other plant that uses this relay as a safety-related component in normally energized applications.

- (iii) Identification of the firm constructing the facility or 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.

During the investigation into the cause of the ARD660UR relay sticking, many physical and performance aspects and components of the relay were analyzed, as well as the entire manufacturing process. This investigation uncovered several issues that contributed, or could contribute, to the failure of the relay to release when de-energized.

Based on analysis by Westinghouse, with support from Eaton Corporation, it was determined that the primary cause of the relay failure was a change in the manufacturing process in the plastics molding operation of this relay. This manufacturing change caused the moving cores to adhere to the inner diameter of the relay coil spool when a relay was continuously energized during testing by Westinghouse for longer than 21 days. This change in the manufacturing process began in May 2008 and continued until it was terminated in December 2012. Relay coils manufactured during this time may develop an adhesive like residue in the relay coil spools when energized for an extended period of time. This residue was found on the moving cores of relays which stuck during testing at a Westinghouse facility and relays returned from the customer. This residue was determined to be the primary cause of the relay issue.

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

The Westinghouse president was informed of this issue August 22, 2012.

- (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.

Westinghouse shipped Palo Verde a total of 374 potentially affected Eaton-Cutler Hammer Type ARD660UR DC relays.

- (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.

As a result of the investigation, Westinghouse recommended several manufacturing process improvements that are designed to prevent the reoccurrence of this issue. Eaton has agreed to implement these improvements prior to restarting the manufacture of these relays. Westinghouse is revising its commercial grade dedication process for these relays. This action ensures that the commercial grade dedication criteria include replacing the relay kick-out spring in each relay and verifies other relay enhancements have been implemented before future relays are shipped to the customer as safety related components.

- (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.

Westinghouse recommends that each plant review the application requirements of each affected relay. If an ARD660UR relay is used in a normally energized application or is required to change state after being energized for at least 21 consecutive days and was manufactured between May 1, 2008 and December 31, 2012, Westinghouse recommends replacing the relay at the next convenient opportunity.

If an ARD relay manufactured during the May 1, 2008 and December 31, 2012 time frame is successfully, periodically cycle tested, this relay may be less susceptible to sticking.

In lieu of accelerated relay replacement, a utility may choose to develop a periodic cycling plan that confirms relay operability.

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

Not applicable.

Very truly yours,



James A. Gresham, Secretary
Westinghouse Safety Review Committee

cc: E. Lenning (NRC MSO-11-F1)