

Part 21 (PAR)

Event # 48223

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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 - STRESS CORROSION CRACKING 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.

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

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a defect.

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Our ref: LTR-NRC-12-59, Rev 1

August 23, 2012

Subject: Notification of a Defect Pursuant to 10CFR21

This revision is provided as a result of further discussion with Arizona Public Service (APS) about results of additional on-site testing and additional technical information provided by them.

The following information is provided pursuant to the requirements to 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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Manager, Regulatory Compliance
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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.

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.

- (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 120 of the subject Eaton-Cutler Hammer Type ARD660UR DC relays. These relays were procured via five (5) separate purchase orders, dated between December 11, 2008 and July 1, 2009. In addition, 242 relays were provided via nine (9) separate purchase orders between October 29, 2009 and January 10, 2012. Some of these relays are installed in systems where relay failure could result in one or both trains of safety related functions being unable to fulfill their safety-related design function.

- (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.

Westinghouse Nuclear Parts Operations (NPO) has been working with Palo Verde and Eaton-Cutler Hammer to identify and correct the cause of these relay failures. Westinghouse NPO 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 before future batches of relays are shipped to the customer as safety-related components.

Westinghouse expects to receive a batch of 1000 kick-out springs with the required cadmium plating from a known vendor the week of August 20, 2012. Replacement springs will be made available to Palo Verde on an expedited basis.

Additional corrective actions may be implemented upon completion of the root cause analysis (RCA).

- (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 has been in discussions with Eaton-Cutler Hammer and Palo Verde personnel regarding this issue.

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

Not applicable.

Very truly yours,



J. A. Gresham, Secretary
Westinghouse Safety Review Committee

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