

Part 21 (PAR)

Event # 52378

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City: CRANBERRY TOWNSHIP	Agreement State:	Yes	
County:	License #:		
State: PA			
NRC Notified by: JAMES GRESHAM		Notifications: BRICE BICKETT	R1DO
HQ Ops Officer: MARK ABRAMOVITZ		OMAR LOPEZ	R2DO
Emergency Class: NON EMERGENCY		PART 21/50.55 REACTORS	EMAIL
10 CFR Section:			
21.21(d)(3)(i) DEFECTS AND NONCOMPLIANCE			

PART 21 NOTIFICATION - CONTROL ROD GUIDE CARD EXCESSIVE WEAR

The following report is excerpted from Westinghouse fax LTR-NRC-16-74:

"Westinghouse nuclear steam supply system (NSSS) plants that are using iron nitride rod cluster control assemblies (RCCAs) in conjunction with Westinghouse 17x17 A or 17x17 AS style guide tubes (GTs), the GT guide card wear inspection guidance provided in Westinghouse report WCAP-17451-P, Revision 1, is not conservative.

"Based on the data, a determination was made as to whether an affected plant could exceed its permissible number of worn guide cards before completing its first guide card wear measurement (GCWM) inspection, the timing of which is based on recommendations documented in the WCAP. The concern associated with exceeding the permissible number of worn guide cards is that a rodlet might slip out of alignment with the GT guide card fingers and become stuck. For example, if an unsupported rodlet were to deflect as a result of applied lateral fluid forces during normal operation, it could get caught on the corner of a worn guide card finger and jam or buckle during rod motion (i.e., scram). Additionally, if a GT with an excessive number of worn guide cards experiences a seismic event or loss-of-coolant accident (LOCA), an unsupported rodlet might become plastically deformed, which could prevent a RCCA from scrambling properly. Should this affect multiple GT locations, it could prevent a plant from achieving reactor shutdown using only the RCCAs.

"Left uncorrected, the wear inspection guidelines in WCAP-17451-P, Revision 1, underestimate the 17x17 A and 17x17 AS style GT guide card wear attributed to the use of iron nitride RCCAs to the extent that, for the four plants listed, the WCAP recommended number of effective full-power years (EFPYs) until the first GCWM is performed may no longer have margin to safety. The guidelines presented in this WCAP do not result in a defect for the other plants to which the WCAP applies."

IE19
NRR

Affected reactors are: Catawba Units 1 and 2, McGuire Unit 2 , and Millstone Unit 3.



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LTR-NRC-16-74
November 18, 2016

Subject: Notification of the Potential Existence of Defects Pursuant to 10 CFR Part 21

The following information is provided pursuant to the requirements of 10 CFR Part 21 to report a defect that could lead to a substantial safety hazard. It has been discovered that for Westinghouse nuclear steam supply system (NSSS) plants that are using ion nitride rod cluster control assemblies (RCCAs) in conjunction with Westinghouse 17x17 A or 17x17 AS style guide tubes (GTs), the GT guide card wear inspection guidance provided in Westinghouse report WCAP-17451-P, Revision 1 is not conservative. Guide card wear measurement (GCWM) data recently obtained at Catawba Unit 2 during its fall 2016 outage shows that their GT guide cards were wearing more rapidly than the WCAP had predicted. Had Catawba Unit 2, or any of the other similarly affected plants listed in Section (vi), followed the WCAP guidance without taking corrective actions, this could potentially have led to a substantial safety hazard.

- (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 affected basic component is Westinghouse report WCAP-17541-P, Revision 1. This report provides GT guide card wear baseline inspection timeline guidance that is non-conservative for the four plants listed in Section (vi).

- (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.

Westinghouse has determined that there is no immediate nuclear safety concern associated with this defect. It is not immediate because the most limiting plants that were evaluated have at least two additional cycles of operation before their guide card wear could potentially create an unsafe condition. For the four plants listed in Section (vi), the Catawba Unit 2 GCWM data demonstrate that the inspection guidance documented in WCAP-17451-P, Revision 1 is potentially unsafe. The defect, as revealed by the data, is that the flow-induced wear that occurs between an ion nitride RCCA rodlet and its supporting 17x17 A or 17x17 AS style GT guide cards occurs at a more accelerated rate than was predicted by the WCAP.

Signs of accelerated guide card wear associated with ion nitride RCCAs at Catawba Unit 2 were first identified by reviewing video footage taken during foreign material exclusion (FME) inspections. Based on FME video footage review, Westinghouse recommended that Duke Energy take remedial actions and perform more detailed GCWM at Catawba Unit 2 during their fall 2016 outage, as well as at Catawba Unit 1 and McGuire Unit 2 at a later date. The GCWM data from the Catawba Unit 2 fall 2016 outage confirmed the earlier predictions about the expected maximum wear; however, the measurements revealed that the wear was more severe overall than had been anticipated. The accelerated wear signs that were observed could, over time, become a detriment to the ability of the guide cards to support and guide the RCCAs.

Based on the data, a determination was made as to whether an affected plant could exceed its permissible number of worn guide cards before completing its first GCWM inspection, the timing of which is based on recommendations documented in the WCAP. The concern associated with exceeding the permissible number of worn guide cards is that a rodlet might slip out of alignment with the GT guide card fingers and become stuck. For example, if an unsupported rodlet were to deflect as a result of applied lateral fluid forces during normal operation, it could get caught on the corner of a worn guide card finger and jam or buckle during rod motion (i.e., scram). Additionally, if a GT with an excessive number of worn guide cards experiences a seismic event or loss-of-coolant accident (LOCA), an unsupported rodlet might become plastically deformed, which could prevent a RCCA from scrambling properly. Should this affect multiple GT locations, it could prevent a plant from achieving reactor shutdown using only the RCCAs.

Left uncorrected, the wear inspection guidelines in WCAP-17451-P, Revision 1 underestimate the 17x17 A and 17x17 AS style GT guide card wear attributed to the use of ion nitride RCCAs to the extent that, for the four plants listed in Section (vi), the WCAP recommended number of effective full-power years (EFPYs) until the first GCWM is performed may no longer have margin to safety. The guidelines presented in this WCAP do not result in a defect for the other plants to which the WCAP applies.

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

The Westinghouse president was informed of this issue on November 18, 2016.

- (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 defect only affects U.S. Westinghouse NSSS plants which have 17x17 A or 17x17 AS style GTs and use ion nitride RCCAs. These plants are:

Catawba Units 1 and 2

McGuire Unit 2

Millstone Unit 3

Other Westinghouse NSSS plants that use ion nitride RCCAs in conjunction with 15x15 or 17x17 standard style GTs have not shown the same degree of accelerated wear.

- (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.

A Westinghouse communication will be supplied to affected licensees to inform them that this defect has been reported and to provide updated recommendations concerning future inspection guidance. The communication, to be issued by January 2017, will recommend that affected licensees perform GCWMs on a more accelerated schedule than presented in WCAP-17451-P, Revision 1.

Corrective actions were taken by Duke Energy coincident with the Catawba Unit 2 fall 2016 outage guide card exchange campaign. Based on the GCWM data, the most worn Catawba Unit 2 GTs were exchanged with less worn or unused GTs in order to prolong the functional lives of the GTs. As part of the 10 CFR Part 21 evaluation, Catawba Unit 2 was considered by Westinghouse to be one of the four plants impacted by the defect, despite the fact that Duke Energy had already taken corrective actions that eliminate the nuclear safety concern.

- (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.

Affected licensees were informed that this defect was being reported. As noted earlier, Westinghouse determined that there is no immediate nuclear safety concern associated with the defect and, therefore, there is time for additional GCWMs and corrective actions to be taken by the affected licensees. A Westinghouse communication will be issued to affected licensees to recommend that GCWMs be performed earlier than was recommended in WCAP-17451-P, Revision 1.

As noted previously, Westinghouse already provided updated guide card wear inspection recommendations to Duke Energy for their three plants affected by this defect.

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

N/A

Very truly yours,

A handwritten signature in cursive script, appearing to read "J. A. Gresham".

James A. Gresham, Secretary Westinghouse Safety
Review Committee

cc: E. Lenning (NRC MS O-11-F1)