Part 21 (PAR) Event # 47818

Rep Org: ABB INC
Supplier: ABB INC
Notification Date / Time: 04/09/2012 17:06 (EDT)
Event Date / Time: 04/09/2012 (EDT)
Last Modification: 12/16/2016

Region: 1
City: FLORENCE
County:
State: SC
Docket #:
Agreement State: Yes
License #:

NRC Notified by: DAVID BROWN
HQ Ops Officer: CHARLES TEAL
Emergency Class: NON EMERGENCY
10 CFR Section:
21.21(d)(3)(i) DEFECTS AND NONCOMPLIANCE

Notifications:

BLAKE WELLING	R1DO
GERALD MCCOY	R2DO
DAVID HILLS	R3DO
VINCENT GADDY	R4DO
PART 21 GROUP	EMAIL

PART 21 REPORT - HK CIRCUIT BREAKER STUDS FAILED TO MEET SPECIFICATION

"This letter is submitted in accordance with 10 C.F.R. 21.21(d)(3)(ii) with respect to a failure to comply with the specifications associated with two studs P/N 163392A00 and 192247A00 used in medium voltage HK circuit breakers that may be subject to failure due to hydrogen embrittlement due to incorrect processing during plating. These studs were manufactured at the ABB Medium Voltage Service facility in Florence, SC from steel rod, heat treated in-house, and then sent to Surtronics for zinc plating with chromate treatment, including hydrogen embrittlement relief baking immediately following plating. A total of 51 pieces of P/N 163392A00 and 104 pieces of P/N 192247A00 were plated by Surtronics."

* * * UPDATE FROM DAVID BROWN VIA FAX AT 1309 EDT on 4/27/12 * * *

The vendor has notified the affected licensees, removed all remaining studs from inventory and will be auditing Surtronics established process during the next finishing production run.

The licensees affected include EFH/Luminant, Progress Energy and TVA.

Notified R1DO (Jackson), R2DO (Musser), R3DO (Lara) and R4DO (Proulx).

* * * UPDATE FROM DAVID BROWN TO DONG PARK VIA FAX AT 1318 EST on 12/16/16 * * *

"This [update] amends the previous 10CFR Part 21 Notification of 27 April 2012 that reported failed studs on 7.5 and 15 kV HK circuit breakers. This amendment is required to encompass a wider time period during which the stud (PIN: 163392A00) was sold for use in medium voltage HK circuit breakers. The previous report addressed orders between September 2011 and March 2012, but based upon a recent notification reported by TVA, our

IE19
NRR

notification should have extended further in the past. Further research indicates that a shift in plating vendors in November 2010 is the likely starting point for this issue."

Notified R1DO (Schroeder), R2DO (Michel), R3DO (Dickson), R4DO (Kellar), and Part 21 group via email.

****

2300 Mechanicsville Road
Florence, South Carolina 29501
(843) 413-4700 – Office Phone
(843) 413-4853 – Office Fax

ABB, Inc.

Fax

To: NRC Operations Center **From:** David Brown

Fax: (301) 816-5151 **Pages:** 3

Phone: (301) 816-5100 **Date:** 12/16/2016

Re: Amended 10 CFR Part 21 Notification

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

• **Comments:**

ABB Florence is issuing an amended 10 CFR Part 21 notification for a failure to comply. This notification is to expand the timeframe of concern of the 10 CFR Part 21 notification that was originally submitted in April of 2012. Two customers are affected by this 2016 notification (names included in attached) and they will be notified separately in accordance with their Purchase Orders. I will follow this fax up with a phone call to confirm receipt and an e-mail so as to provide a color copy of the imbedded photos.

Thank you,

david.c.brown@us.abb.com
(843) 413-4782 Work
(843) 496-8161 Cell

ABB

December 16, 2016

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001
FAX 301-816-5151

Subject: Amendment to Previous 10CFR Part 21 Notification of Deviation re. Breaker Studs

This letter amends the previous 10CFR Part 21 Notification of 27 April 2012 that reported failed studs on 7.5 and 15 kV HK circuit breakers. This amendment is required to encompass a wider time period during which the stud (P/N: 163392A00) was sold for use in medium voltage HK circuit breakers. The previous report addressed orders between September 2011 and March 2012, but based upon a recent notification reported by TVA, our notification should have extended further in the past. Further research indicates that a shift in plating vendors in November 2010 is the likely starting point for this issue.

1. Notifying individual: Andrew Wall, Vice President & General Manager, ABB (Electrification Products Medium Voltage Services US), 2300 Mechanicsville Road, Florence, SC 29501.

2. Identification of the Subject component: ABB P/N 163392A00 stud. This stud is used in truck assemblies for large frame (7.5 and 15 kV) HK circuit breakers and in TVA refurbishment kits. The 163392A00 stud is used to hold the puffer piston pivot bracket in place.

3. Nature of the deviation: One of seven refurbished HK circuit breakers provided to TVA was found to have a broken 163392A00 stud during a recent 5 year inspection PM. The breaker and stud were returned to ABB November 2, 2016. The damaged stud was delivered to a material analysis lab (Element Material Technology) for failure analysis. Element Material Technology provided a report of failure to ABB, indicating that hydrogen embrittlement is the likely cause of failure. Based on these results, it is believed that there was a failure to comply with the baking portion of the specification which sets forth certain baking parameters in order to protect the studs from hydrogen embrittlement.

4. The function of this stud is to hold the puffer piston pivot bracket in place and allow proper air flow direction. The safety related function of the puffer assembly is the creation of an airflow through the puffer nozzle when the circuit breaker is opened. The air flow is directed between the arcing contact and the stationary contact so as to propel the arc up into the arc chute assembly. Failure to provide proper air flow could cause damage to the arcing contact assembly. The failure of a proper airflow could cause damage to the contacts due to prolonged arcing and subsequent high resistance in the contact assembly, however the breaker will still operate. ABB's recommendation is to review the suspected parts during the next planned service interval.

ABB Inc.

2300 MECHANICSVILLE ROAD
FLORENCE, SC 29501 USA

MEDIUM VOLTAGE SERVICE

PHONE (843) 413-4727
FACSIMILE (843) 413-4853

ABB

5. Corrective actions taken during the initial 10CFR Part 21 Notification included:
    a. Notification of the potential existence of this deviation to affected customers. (Action complete)
    b. Review historical procurement and inspection records associated with the subject parts. Objective evidence from ABB inspections indicates all characteristics confirmed including hardness and dimensions, including verification of vendor finishing and E1 bake times. (Action complete)
    c. Removed all 163392A00 studs (quantity of 7) from inventory. Four of 7 provided to Element Materials Technology for material analysis and destructive testing. Their report indicated satisfactory material, hardness, tensile strength and grain structure. (Action complete)
    d. Notified Surtronics (the plating vendor) of discrepancy and completed a process audit to observe manufacturing, heat treating, and plating of this stud. (Action complete)
    e. Added a torque test to our receipt inspection process to ensure proper stress relief (i.e., post plating E1 bake). No failures observed since implementing this inspection requirement. (Action Complete)

6. Corrective actions taken for this 10CFR Part 21 Notification of 13 December 2016 include:
    a. Notification of the potential existence of this deviation to affected customers from November 2010 through September 2011. (Action to be complete by 12/22/2016)
        - EFH/Luminant
        - TVA

Because of the large variety of usages of the affected circuit breakers, ABB (Medium Voltage Service) cannot determine if the potential for a substantial safety hazard exists at any licensee's facility if premature failure of these studs occurs. Licensees are requested to evaluate the history of circuit breaker operating cycles to determine if the circuit breaker studs should be replaced immediately, or to perform the replacement at the next convenient maintenance opportunity.

Very truly yours,

Andrew Wall
VP & GM
Electrification Products Medium Voltage Services US

ABB Inc.
2300 MECHANICSVILLE ROAD
FLORENCE, SC 29501 USA
MEDIUM VOLTAGE SERVICE
PHONE (843) 413-4727
FACSIMILE (843) 413-4853