

Part 21 (PAR)

Event # 48660

Rep Org: MPR ASSOCIATES, INC ENGINEERS	Notification Date / Time: 01/09/2013 18:09 (EST)
Supplier: BASLER ELECTRIC	Event Date / Time: 10/27/2012 (EST)
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Region: 1	Docket #:
City: ALEXANDRIA	Agreement State: Yes
County:	License #:
State: VA	
NRC Notified by: PAUL DAMERELL	Notifications: CHRISTOPHER NEWPORT R1DO
HQ Ops Officer: BILL HUFFMAN	MARK FRANKE R2DO
Emergency Class: NON EMERGENCY	JOHN GIESSNER R3DO
10 CFR Section:	VINCENT GADDY R4DO
21.21(a)(2) INTERIM EVAL OF DEVIATION	PART 21 REACTORS GRP E-MAIL

PART 21 INTERIM REPORT ON THE FAILURE OF AN EMERGENCY DIESEL GENERATOR EXCITATION SYSTEM

The following report was received from MPR Associates via facsimile:

"MPR Associates (MPR) is investigating the failure of a replacement emergency diesel generator excitation system that MPR supplied to Cooper Nuclear Station. The root cause investigation is still in-process and will not be completed within 60 days of discovery as defined by 10 CFR Part 21.

"The 10 CFR Part 21 Interim Report [below] provides the information known at this time. An updated report will be provided once the root cause investigation is completed.

IDENTIFICATION OF THE BASIC COMPONENT THAT FAILED

"The basic component is a Basler Electric SBSR emergency diesel generator (EDG) excitation system that was supplied as a replacement system to Cooper Nuclear Station (CNS). The replacement system included design changes relative to the original CNS excitation system, which is also a Basler Electric SBSR design. The design changes included larger magnetic components, which were intended to allow for continuous operation of the new exciter at the EDG overload rating.

IDENTIFICATION OF THE SUPPLIER

"The excitation system was supplied by MPR Associates (headquarters in Alexandria, VA).

"Basler Electric (headquarters in Highland, IL) designed and fabricated the system under a commercial grade

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program certified to ISO 9001:2008. MPR Associates dedicated the commercial grade item for nuclear use under the MPR Nuclear QA Program, which complies with 10 CFR 50 Appendix B and ASME NQA-1.

NATURE OF THE FAILURE

"CNS installed the replacement excitation system in the Division 1 EDG system during refueling outage RE27. Prior to declaring the EDG operable, CNS manually terminated an EDG maintenance run due to erratic EDG reactive power indication, which was followed by a sudden drop of EDG reactive load and an indication of negative reactive power.

"Several rounds of troubleshooting and surveillance testing were performed unsuccessfully. The surveillance testing resulted in faults to ground and overheating and failure of components in the excitation system. Some of the failed equipment included the automatic voltage regulator (AVR), manual voltage control autotransformer (T60), rectifier power diode failure indication resistors and light-emitting diodes (LEDs), insulation on the control windings of two saturable transformers, and elements of the data acquisition equipment used to record data during the testing.

"The root cause of the failure has not yet been determined. However, on-site troubleshooting efforts at CNS by MPR and Basler Electric identified unexpected high voltages across the direct current (DC) control winding of the saturable transformers. These voltages are likely the cause of the failures experienced in-situ at CNS.

"Follow-up tests at Basler Electric on a similar replacement system designed for the Hatch Plant (but not yet installed in the plant) also identified higher than expected voltages across the DC control windings of the saturable transformers. MPR and Basler Electric recommended postponement of the Hatch Plant installation until the impact of this condition (i.e., the higher than expected voltages) is evaluated. Note that the testing on the Hatch replacement system to date did not result in failure of the system or abnormal function of components external to the saturable transformers.

NATURE OF THE FAILURE

"Testing of the replacement excitation system began on October 27, 2012. The maintenance run resulting in erratic EDG reactive power indication was performed on October 30, 2012. CNS, MPR, and Basler Electric discontinued troubleshooting efforts for the replacement excitation system on November 9, 2012.

"The replacement system was removed, and the original Basler Electric SBSR excitation system was re-installed. CNS declared the re-installed system operable on November 14, 2012.

"MPR formally documented the issue in the MPR corrective action program on November 13, 2012.

NUMBER AND LOCATION OF THE AFFECTED BASIC COMPONENTS

"Based on the information known to date, this 10 CFR Part 21 Interim Report affects the following SBSR type excitation systems that were dedicated and supplied by MPR.

Nuclear Plant Date	Equipment Provided	Items Supplied
Cooper Nuclear	2012	1 Systems (failed during installation)
Hatch	2012	5 Systems (not yet installed)

CORRECTIVE ACTION PLAN

"MPR is performing a failure analysis and root cause investigation to determine the extent of the condition, corrective actions, and actions to prevent recurrence. The root cause investigation is scheduled for completion by March 29, 2013.

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ADVICE GIVEN TO PURCHASERS OR LICENSEES

"There are numerous Basler Electric SBSR type excitation systems in service at multiple plants throughout the nuclear industry. In addition to CNS and Hatch, MPR has dedicated and supplied SBSR excitation systems to the Beaver Valley, Davis-Besse, and Robinson plants. Each system supplied is custom designed for the generator that it is slated to control. Basler Electric SBSR excitation systems have demonstrated reliable service for many years.

"The replacement SBSR excitation system supplied to CNS was not identical to the original system. Specifically, there were design differences in some of the components, including larger transformers, which were intended to allow for continuous operation of the new exciter at the EDG overload rating. Although it was not foreseen (and not revealed by factory acceptance testing), it seems that the design changes in the replacement system led to its maloperation and failure when it was initially installed at CNS. This faulty operation and failure were readily observed as part of normal EDG surveillance testing. Upon re-installation, the original SBSR excitation system functioned properly. Hence, it appears that:

- " - Differences between the replacement system and original system lead to the problem, and
- " - The problem is readily detectable in normal surveillance testing.

"For these reasons, SBSR excitation systems installed at plants that have shown reliable operation during surveillance testing are in a satisfactory state and condition. MPR has no evidence that the mechanism or conditions that led to the failure at CNS will lead to failures at other installations. Therefore, plants with SBSR excitation systems installed should continue to use them and conduct normal surveillance testing."



Date: January 9, 2013
From: Michael K. Dunkelberger
To: Document Control Desk
Company: Nuclear Regulatory Commission
Fax: 301-816-5151
Phone: N/A
Subject: Interim 10 CFR Part 21 Report Submittal
Total Pages: 6 pages including this cover sheet

Message:

The purpose of this fax is to submit an Interim Report in accordance with the requirements of 10 CFR Part 21.

The details regarding this submittal are provided in the pages attached.



January 9, 2013
RPT-0315-0062-2109 Revision 0

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Interim Report in Accordance with 10 CFR Part 21

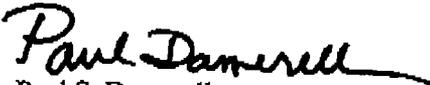
Dear Sir or Madam:

MPR Associates (MPR) is investigating the failure of a replacement emergency diesel generator excitation system that MPR supplied to Cooper Nuclear Station. The root cause investigation is still in-process and will not be completed within 60 days of discovery as defined by 10 CFR Part 21.

The attached 10 CFR Part 21 Interim Report provides the information known at this time. An updated report will be provided once the root cause investigation is completed.

If you have any questions, please contact the undersigned.

Sincerely,


Paul S. Damerell
Principal Officer

Attachment



Attachment to
MPR Letter dated
January 9, 2013
RPT-0315-0062-2109 Revision 0

10 CFR Part 21 Interim Report on Replacement EDG Excitation System Failure at Cooper Nuclear Station

Listed below is the information as known at the time of this interim report. Updated information will be provided once the root cause investigation is completed. The root cause investigation is scheduled for completion by March 29, 2013.

1. Reporting Individual

Paul Damerell, Principal Officer
MPR Associates, Inc.
320 King Street
Alexandria, VA 22314

2. Identification of the Basic Component that Failed

The basic component is a Basler Electric SBSR emergency diesel generator (EDG) excitation system that was supplied as a replacement system to Cooper Nuclear Station (CNS).

The replacement system included design changes relative to the original CNS excitation system, which is also a Basler Electric SBSR design. The design changes included larger magnetic components, which were intended to allow for continuous operation of the new exciter at the EDG overload rating.

3. Identification of the Supplier

The excitation system was supplied by MPR Associates (headquarters in Alexandria, VA).

Basler Electric (headquarters in Highland, IL) designed and fabricated the system under a commercial grade program certified to ISO 9001:2008. MPR Associates dedicated the commercial grade item for nuclear use under the MPR Nuclear QA Program, which complies with 10 CFR 50 Appendix B (Reference 1) and ASME NQA-1 (Reference 2).

4. Nature of the Failure

CNS installed the replacement excitation system in the Division 1 EDG system during refueling outage RE27. Prior to declaring the EDG operable, CNS manually terminated an EDG maintenance run due to erratic EDG reactive power indication, which was followed by a sudden drop of EDG reactive load and an indication of negative reactive power.

Several rounds of troubleshooting and surveillance testing were performed unsuccessfully. The surveillance testing resulted in faults to ground and overheating and failure of components in the excitation system. Some of the failed equipment included the automatic voltage regulator (AVR), manual voltage control autotransformer (T60), rectifier power diode failure indication resistors and light-emitting diodes (LEDs), insulation on the control windings of two saturable transformers, and elements of the data acquisition equipment used to record data during the testing.

The root cause of the failure has not yet been determined. However, on-site troubleshooting efforts at CNS by MPR and Basler Electric identified unexpected high voltages across the direct current (DC) control winding of the saturable transformers. These voltages are likely the cause of the failures experienced in-situ at CNS.

Follow-up tests at Basler Electric on a similar replacement system designed for the Hatch Plant (but not yet installed in the plant) also identified higher than expected voltages across the DC control windings of the saturable transformers. MPR and Basler Electric recommended postponement of the Hatch Plant installation until the impact of this condition (i.e., the higher than expected voltages) is evaluated. Note that the testing on the Hatch replacement system to date did not result in failure of the system or abnormal function of components external to the saturable transformers.

5. Date of the Failure

Testing of the replacement excitation system began on October 27, 2012. The maintenance run resulting in erratic EDG reactive power indication was performed on October 30, 2012. CNS, MPR, and Basler Electric discontinued troubleshooting efforts for the replacement excitation system on November 9, 2012.

The replacement system was removed, and the original Basler Electric SBSR excitation system was re-installed. CNS declared the re-installed system operable on November 14, 2012.

MPR formally documented the issue in the MPR corrective action program on November 13, 2012.

6. Number and Location of the Affected Basic Components

Based on the information known to date, this 10 CFR Part 21 Interim Report affects the following SBSR type excitation systems that were dedicated and supplied by MPR.

Nuclear Plant	Date Equipment Provided	Items Supplied
Cooper Nuclear	2012	1 system (failed during installation)
Hatch	2012	5 systems (not yet installed)

7. Corrective Action Plan

MPR is performing a failure analysis and root cause investigation to determine the extent of the condition, corrective actions, and actions to prevent recurrence. The root cause investigation is scheduled for completion by March 29, 2013.

8. Advice Given to Purchasers or Licensees

There are numerous Basler Electric SBSR type excitation systems in service at multiple plants throughout the nuclear industry. In addition to CNS and Hatch, MPR has dedicated and supplied SBSR excitation systems to the Beaver Valley, Davis-Besse, and Robinson plants. Each system supplied is custom designed for the generator that it is slated to control. Basler Electric SBSR excitation systems have demonstrated reliable service for many years.

The replacement SBSR excitation system supplied to CNS was not identical to the original system. Specifically, there were design differences in some of the components, including larger transformers, which were intended to allow for continuous operation of the new exciter at the EDG overload rating. Although it was not foreseen (and not revealed by factory acceptance testing), it seems that the design changes in the replacement system led to its maloperation and failure when it was initially installed at CNS. This faulty operation and failure were readily observed as part of normal EDG surveillance testing. Upon re-installation, the original SBSR excitation system functioned properly. Hence, it appears that:

- Differences between the replacement system and original system lead to the problem, and
- The problem is readily detectable in normal surveillance testing.

For these reasons, SBSR excitation systems installed at plants that have shown reliable operation during surveillance testing are in a satisfactory state and condition. MPR has no evidence that the mechanism or conditions that led to the failure at CNS will lead to failures at other installations. Therefore, plants with SBSR excitation systems installed should continue to use them and conduct normal surveillance testing.

9. References

1. 10 CFR 50 Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants.
2. ASME NQA-1, Quality Assurance Requirements for Nuclear Facility Applications, 2008 Edition with 2009 Addenda.

QA Approval: Michael K. Dunkelberger
Michael K. Dunkelberger, QA Manager

Date: January 9, 2013

Final Approval: Paul S. Damerell
Paul S. Damerell, Principal Officer

Date: January 9, 2013