

September 18, 2014

Mr. Jay Gardiner, Manager, Quality Programs and Code
Curtiss-Wright Flow Control Company
Electro-Mechanical Division
1000 Wright Way
Cheswick, PA 15024

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION REPORT
NO. 99901383/2014-201 AND NOTICE OF NONCONFORMANCE

Dear Mr. Gardiner:

On June 23-25, 2014, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Curtiss-Wright Flow Control Company – Electro-Mechanical Division (EMD) facility in Cheswick, PA. The purpose of this limited-scope routine inspection was to assess EMD's compliance with selected portions of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

This technically focused inspection specifically evaluated EMD's implementation of quality activities associated with the design and fabrication of reactor coolant pumps for the Westinghouse Electric Company AP1000 reactor design. The enclosed report presents the results of the inspection. This NRC inspection report does not constitute an NRC endorsement of EMD's overall quality assurance (QA) program. During this inspection, the NRC inspection team looked at design and fabrication activities associated with inspections, tests, analyses, and acceptance criteria (ITAAC) from Revision 19 of the approved certified AP1000 design control document. Specifically, these activities were associated with the future closure of ITAAC 2.1.02.02a, 2.1.02.03a, 2.1.02.04a, 2.1.02.05a.ii, 2.1.02.08b, and 2.1.02.08c. The NRC inspection team did not identify any findings associated with the ITAAC contained in Section (4) of the attachment to this report.

During this inspection, the NRC inspection team found that the implementation of EMD's QA program failed to meet certain NRC requirements imposed on you by your customers. Specifically, the NRC inspection team determined that EMD was not fully implementing its QA program with respect to management oversight and implementation of corrective actions. The specific finding and references to the requirements are identified in the enclosures to this letter. In response to the enclosed notice of nonconformance (NON), EMD should document the results of the extent of condition review for these findings and determine if there are any effects on other safety-related components.

Please provide a written explanation or statement within 30 days of this letter in accordance with the instructions specified in the enclosed NON. The agency will consider extending the response time if you show good cause for us to do so.

In accordance with 10 CFR 2.390, "Agency Rules of Practice and Procedure," a copy of this letter, its enclosure(s), and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Documents Access and Management System), accessible at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response, (if applicable), should not include any personal privacy, proprietary, or Safeguards Information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material is withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Sincerely,

/RA/

Edward H. Roach, Chief
Mechanical Vendor Inspection Branch
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Docket No.: 99901383

Enclosures:

1. Notice of Nonconformance
2. Inspection Report No. 99901383/2014-201
and Attachment

In accordance with 10 CFR 2.390, "Agency Rules of Practice and Procedure," a copy of this letter, its enclosure(s), and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Documents Access and Management System), accessible at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response, (if applicable), should not include any personal privacy, proprietary, or Safeguards Information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material is withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Sincerely,

/RA/

Edward H. Roach, Chief
 Mechanical Vendor Inspection Branch
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Docket No.: 99901383

Enclosures:

1. Notice of Nonconformance
2. Inspection Report No. 99901383/2014-201
and Attachment

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NRO-002

OFFICE	NRO/DCIP/MVIB	NRO/DCIP/MVIB	NRO/DCIP	NRO/DCIP/MVIB
NAME	BClarke	YDiaz-Castillo	TFrye	ERoach
DATE	9/17/2014	9/17/2014	9/18/2014	9/18/2014

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NOTICE OF NONCONFORMANCE

Curtiss-Wright Flow Control Company
Electro-Mechanical Division
1000 Wright Way
Cheswick, PA 15024
Docket No. 99901383

Based on the results of a U.S. Nuclear Regulatory Commission (NRC) inspection conducted at the Curtiss-Wright Flow Control Company – Electro-Mechanical Division (EMD) facility in Cheswick, PA, on June 23, 2014, through June 25, 2014, certain activities were not conducted in accordance with NRC requirements which were contractually imposed on EMD by its customers or NRC licensees:

- A. Criterion XVI, "Corrective Action," of Appendix B, "Quality Assurance Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," states that "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken shall be documented and reported to appropriate levels of management."

Contrary to the above, as of June 25, 2014, EMD failed to perform effectiveness reviews (EFR) for significant conditions adverse to quality as required by EMD's corrective action program and failed to ensure that conditions adverse to quality were promptly identified and corrected.

Specifically,

1. The EMD corrective action program requires the performance of an EFR for significant conditions adverse to quality to document the appropriateness of root causes and corrective actions to prevent recurrence. Of the 17 significant conditions adverse to quality inspected, the NRC inspection team identified 7 for which no EFR was performed.
2. EMD did not take actions that were timely or adequate to correct conditions adverse to quality as described below:
 - Corrective actions taken in response to NRC finding, NON 99901383/2009-201-03, related to the design review of action item chit forms were closed on March 26, 2010. The NRC inspection team verified that the action item chit forms have been reviewed, however, the NRC inspection team identified that the first annual self-assessment EMD committed to perform in response to the NRC finding was not completed until September 2011 and that no annual self-assessment has been performed since.

Enclosure

- Out of the 38 inspected Corrective Action Requests (CARs), 9 were at least 7 days past the EMD assigned due date without justification. Of those, 7 were at least 30 days past the assigned due date without justification.
- The corrective actions taken in response to CAR No. 2013-00175, which was closed on March 6, 2014, have not been effectively implemented. The NRC inspection team identified several corrective actions that had not been verified by the lead responder and confirmed that IDPQ17 had not been revised to include guidance identifying a timeframe for verification of corrective actions.

This issue has been identified as Nonconformance 99901383/2014-201-01.

Please provide a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with a copy to the Chief, Mechanical Vendor Inspection Branch, Division of Construction and Operational Programs, Office of New Reactors, within 30 days of the date of the letter transmitting this notice of nonconformance. This reply should be clearly marked as a "Reply to a Notice of Nonconformance" and should include for each noncompliance: (1) the reason for the noncompliance, or if contested, the basis for disputing the noncompliance, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid noncompliances, and (4) the date when your corrective action will be completed. Where good cause is shown, consideration will be given to extending the response time.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Documents Access Management System), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>, to the extent possible, it should not include any personal privacy, proprietary, or Safeguards Information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Dated this 18th day of September 2014.

**U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NEW REACTORS
DIVISION OF CONSTRUCTION INSPECTION AND OPERATIONAL PROGRAMS
VENDOR INSPECTION REPORT**

Docket No.: 99901383

Report No.: 99901383/2014-201

Vendor: Curtiss-Wright Flow Control Company
Electro-Mechanical Division
1000 Wright Way
Cheswick, PA 15024

Vendor Contact: Mr. Jay Gardiner
Manager, Quality Programs and Code
E-mail: JGardiner@curtisswright.com
Phone: 724-275-5235

Nuclear Industry Activity: Curtiss-Wright Flow Control Company – Electro-Mechanical Division (EMD) is under contract to Westinghouse Electric Company (WEC) to design, manufacture, inspect, test, and deliver the Reactor Coolant Pumps (RCPs) for the WEC AP1000 reactor design.

Inspection Dates: June 23-25, 2014

Inspectors: Brent Clarke NRO/DCIP/MVIB Team Leader
Edward Roach NRO/DCIP/MVIB Branch Chief
Yamir Diaz-Castillo NRO/DCIP/MVIB
Qin Liwei NNSA (China) Observer

Approved by: Edward H. Roach, Chief
Mechanical Vendor Inspection Branch
Division of Construction Inspection
and Operational Programs
Office of New Reactors

EXECUTIVE SUMMARY

Curtiss-Wright Flow Control Company
Electro-Mechanical Division
99901383/2014-201

The U.S. Nuclear Regulatory Commission (NRC) staff conducted a vendor inspection at the Curtiss-Wright Flow Control Company – Electro-Mechanical Division (EMD) facility to verify that it had implemented an adequate quality assurance (QA) program that complies with the requirements of Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,” to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, “Domestic Licensing of Production and Utilization Facilities.” The NRC inspection team conducted the inspection from June 23 - 25, 2014. The last NRC inspection at EMD occurred October 19-23, 2009.

This limited-scope inspection specifically evaluated EMD’s implementation of quality activities associated with designing and manufacturing the Reactor Coolant Pumps (RCPs) for the WEC AP1000 reactor design. These RCPs are being fabricated for the Vogtle Electric Generating Plant (VEGP), Units 3 and 4 and Virgil C. Summer Generating Station, Units 2 and 3. Because of an ongoing re-design of the RCP lower thrust bearing and lower flywheel, this was a limited scope inspection that concentrated on organization, the QA program, nonconforming materials, parts and components, corrective actions, and limited portions of design control.

Appendix B to 10 CFR Part 50 was the basis for the NRC inspection. The NRC inspection team used Inspection Procedure (IP) 43002, “Routine Inspections of Nuclear Vendors,” to guide the inspection.

The information below summarizes the results of this inspection.

Corrective Action

The NRC inspection team issued Nonconformance 99901383/2014-201-01 in association with EMD’s failure to implement the regulatory requirements of Criterion XVI, “Corrective Action,” of Appendix B to 10 CFR Part 50. Nonconformance 99901383/2014-201-01 cites EMD for failing to ensure that significant conditions adverse to quality and conditions adverse to quality were promptly identified and corrected, failing to ensure that significant conditions adverse to quality were corrected to preclude repetition, and failing to perform effectiveness reviews (EFR) for significant conditions adverse to quality as required by EMD’s corrective action program.

Other Inspection Areas

The NRC inspection team determined that EMD is implementing its programs for nonconforming materials, parts or components, design control and the quality assurance program in accordance with the applicable regulatory requirements of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and activities observed, the NRC inspection team also determined that EMD is implementing its policies and procedures associated with these programs. No findings of significance were identified.

REPORT DETAILS

1. Organization

a. Inspection Scope

The NRC inspection team conducted a review of EMD's policies and implementing procedures that govern the EMD organization to verify compliance with the requirements of Criterion I, "Organization," of Appendix B "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities."

The NRC inspection team reviewed the organizational structure, functional relationships, and interviewed various staff members to determine that the QA organization had the independence, authority, and organizational freedom to identify problems, recommend solutions, and verify implementation of corrective actions. The NRC inspection team also verified that a stop work procedure was in place and staff was aware of the process and also felt they had the ability to stop work if a quality or safety issue was identified. The NRC inspection team performed a walk down of the fabrication facilities and interviewed several EMD personnel at random to ensure that personnel were aware of processes for identifying quality issues. The NRC inspection team discussed the organization with CW-EMD's management and selected technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team determined that EMD is implementing its quality assurance organization in accordance with the regulatory requirements of Criterion I of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that EMD is implementing its policies and procedures associated with the roles and responsibilities of the quality assurance organization. No findings of significance were identified.

2. Quality Assurance Program

a. Inspection Scope

The NRC inspection team conducted a review of EMD's policies and implementing procedures that govern the quality assurance program to verify compliance with the requirements of Criterion II, "Quality Assurance Program," of Appendix B to 10 CFR Part 50.

The NRC inspection team reviewed procedures and conducted interviews to verify that EMD implemented an adequate program to identify the components covered by the quality assurance program and provide control over those activities affecting the quality of the identified components. The NRC inspection team noted that EMD has two over-

arching quality assurance programs: A Quality Assurance Program Manual (QAPM) for Construction of Class 1, 2, 3 Components, Parts, NS Supports, and Supply of Material in Accordance with ASME Section III, Division 1 Requirements, Revision 7 and a Quality Program Manual (QPM) for Appendix B to 10 CFR Part 50 and International Organization for Standardization (ISO) 9001.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team determined that EMD is implementing its quality assurance program in accordance with the regulatory requirements of Criterion II of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that EMD is implementing its policies and procedures associated with the quality assurance program. No findings of significance were identified.

3. Design Control

a. Inspection Scope

The NRC inspection team conducted a limited review of EMD's policies and implementing procedures that govern design control to verify compliance with the requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50.

The NRC inspection team reviewed AP1000 RCP purchase orders and design specifications and interviewed EMD personnel to verify that the re-designed AP1000 RCP's have an expectation of performing their required safety functions and meeting established Inspections, Tests, Analysis and Acceptance Criteria (ITAAC) requirements.

The attachment to this report lists the documents reviewed by the NRC inspection team and the relevant ITAAC.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team determined for those limited areas inspected, EMD is implementing its design control program in accordance with the regulatory requirements of Criterion III of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that EMD is implementing its policies and procedures associated with the design control program. No findings of significance were identified.

4. Nonconforming Materials, Parts, or Components

a. Inspection Scope

The NRC inspection team reviewed EMD's policies and implementing procedures that govern the control of nonconformances to verify compliance with the requirements of Criterion XV, "Nonconforming Materials, Parts, or Components," of Appendix B to 10 CFR Part 50.

The NRC inspection team verified that EMD implemented an adequate program to assess and control nonconforming items, including appropriate identification, documentation, segregation, evaluation, and disposition of these items and that, when appropriate, technical justification was properly documented. The EMD program requires a Material Review Report (MRR) for all nonconformances. For nonconformances that can be corrected during the manufacturing process, an Error Correction Tag is generated. The NRC inspection team also verified that EMD's nonconformance process provides guidance to evaluate nonconformances for reporting under EMD's 10 CFR Part 21 program. The nonconformance process is also linked to EMD's corrective action program.

The NRC inspection team walked down EMD's assembly floor and verified that nonconforming materials were properly identified, marked, and segregated. The NRC inspection team verified that, for the sample MRRs reviewed, EMD had (1) dispositioned identified MRRs in accordance with EMD's approved procedures, (2) presented an appropriate technical justification for each disposition, (3) taken adequate action in regard to the MRR, and (4) verified if an evaluation under EMD's 10 CFR Part 21 program was applicable.

The NRC inspection team discussed the nonconformance program with EMD's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team determined that EMD is implementing its nonconforming materials, parts or components program in accordance with the regulatory requirements of Criterion XV of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that EMD is implementing its policies and procedures associated with the nonconforming materials, parts or components program. No findings of significance were identified.

5. Corrective Action

a. Inspection Scope

The NRC inspection team reviewed EMD's policies and implementing procedures that govern the corrective action program to verify compliance with the requirements of Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. The NRC inspection team also discussed the corrective action program with EMD's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

b.1 Corrective Action Associated with Violation 99901383/2009-201-01

Following an October, 2009 inspection, the NRC issued Violation 99901383/2009-201-01 for EMD's failure to provide procedural guidance for: 1) evaluating deviations and failures to comply associated with substantial safety hazards within 60 days of discovery; 2) submitting an interim report to the NRC if an evaluation of an identified deviation or failure to comply cannot be completed within 60 days of discovery; 3) notifying the EMD responsible officer within five days when it is determined that a defect that could cause a substantial safety hazard exists; 4) notifying the affected purchasers or licensees if EMD does not have the capability to perform the evaluation to determine if a defect exists; and 5) notifying the NRC of defects and failures to comply (i.e., initial and written notification). In addition, EMD failed to make an interim report regarding a Part 21 evaluation that was ongoing for more than 60 days after discovery.

In its response to the NRC, EMD stated that Interdepartmental Procedure IDPQ02, "Identification and Reporting of Conditions Adverse to Safety Per 10CFR21," was revised to address each of the areas identified in the Violation. In addition, the response also stated that EMD provided classroom training on 10 CFR Part 21 requirements to 183 engineers, professionals, and managers from July to September 2009 to ensure personnel understood the specific 10 CFR Part 21 requirements. With regards to EMD's failure to make an interim report regarding a 10 CFR Part 21 evaluation that was ongoing for more than 60 days after discovery, EMD stated that although the evaluation was completed by design engineering within the 60-day requirement and the evaluation determined that the reported concern was in compliance with contractual design requirements, the Part 21 report remained open, at the originator's request for further analysis. Subsequently, the engineering analysis group reviewed the structural and stress analyses and concurred with design engineering's disposition, but this additional verification process caused the report to exceed the 60-day reporting requirement.

The NRC inspection team reviewed the documentation that provided the objective evidence for the completion of the corrective actions. The NRC inspection team confirmed that EMD revised IDPQ02 and provided the associated training to address Violation 99901383/2009-201-01. The NRC inspection team determined that EMD's corrective actions were adequate to address the identified finding. Based on its review, the NRC inspection team closed Violation 99901383/2009-201-01.

b.2 Corrective Action Associated with Nonconformance 99901383/2009-201-01

The NRC also issued Nonconformance 9990183/2009-201-02 for EMD's failure to include 1) references to the design bases (NCA-2140, Design Bases) or 2) reference to other appropriate documents which specify any additional operating requirements (NCA-3252(a)(6)) for the external heat exchanger design in Curtiss Wright-EMD Design Specification DS10031, "AP1000 Reactor Coolant Pump External Heat Exchanger Design Specification," Revision 0.

In its response to the NRC, EMD stated that Design Specification (DS) 10031 was revised to add reference to the AP1000 Reactor Coolant Pump (RCP) Design Specification and to applicable EMD analyses/calculation reports that addressed the absence of references to design bases for the operating requirements. In addition, the response stated that Interdepartmental Procedure IDPE21, "Design and Equipment Specifications," and the attachment, "Guide to Specification Contents for Commercial Nuclear Equipment," were revised to state that references to design bases and operability requirements must be included in a design specification, and that EMD will provide procedural training in accordance with the quality program.

The NRC inspection team reviewed the documentation that provided the objective evidence for the completion of the corrective actions. The NRC inspection team confirmed that EMD revised DS 10031, IDPE21, and the attachment and provided the associated training to address Nonconformance 99901383/2009-201-02. The NRC inspection team determined that EMD's corrective actions were adequate to address the identified finding. Based on its review, the NRC inspection team closed Nonconformance 99901383/2009-201-02.

b.3 Corrective Action Associated with Nonconformance 99901383/2009/201-01

The NRC also issued Nonconformance 99901383/2009-201-03 for EMD's failure to document that applicable design reviews had been performed since they had not been signed and dated by the chairperson or lead engineer for a sample of 121 design review action item chit forms, related to the AP1000 reactor coolant pump (RCP) flywheel and AP1000 RCP pressure boundary components and seismic analysis design reports.

In its response to the NRC, EMD stated that all AP1000 Design Review chits were reviewed to ensure that both the Lead Engineer and Design Review Chairman signed each as required per Interdepartmental Procedure IDPE22, "Checking Design Calculations and Design Verification." In addition, the response also stated that responsible personnel would be retrained on the requirements of IDPE22 to ensure strict compliance with procedural requirements. Further, the response stated that an annual self-assessment will be conducted to verify that strict adherence to the procedure is being maintained including signature requirements. EMD closed the corrective action on March 26, 2010.

During review of the documentation that provided the objective evidence for the completion of the corrective action, the NRC inspection team noted that the annual self-assessment that EMD committed to perform to verify that strict adherence to the procedure was being maintained was performed in September 2011, 18 months after the corrective action was closed, and had not been performed since. The NRC inspection

team identified this issue as an example of Nonconformance 99901383/2014-201-01 for EMD's failure to ensure that conditions adverse to quality are promptly identified and corrected.

b.4 Implementation of EMD's Corrective Action Program

During review of a sample of Corrective Action Requests (CARs), the NRC inspection team noted that several CARs opened in response to significant conditions adverse to quality were at least 30 days past the due date. The NRC inspection team identified this issue as another example of Nonconformance 99901383/2014-201-01 for EMD's failure to ensure that conditions adverse to quality are promptly identified and corrected.

The NRC inspection team identified that EMD's corrective action program failed to preclude repetition of an issue that had been previously identified, corrected, and closed as stated in CAR No. 2013-00175. CAR No. 2013-00175 was opened in response to an audit performed by a customer of EMD to address timely verifications of corrections actions by the lead responder and to include guidance in IDPQ17, "Correction Action Request Procedure," Revision 14, dated July 22, 2013, to identify a timeframe for verification of corrective actions by the lead responder. At the time of the inspection, the NRC inspection team noted several corrective actions that had not been verified by the lead responder and confirmed that IDPQ17 had not been revised to include guidance identifying a timeframe for verification of corrective actions. The NRC inspection team identified this issue as an example of Nonconformance 99901383/2014-201-01 for EMD's failure to ensure that significant conditions adverse to quality were corrected to preclude repetition.

EMD's corrective action program requires the performance of an Effectiveness Review (EFR) for significant conditions adverse to quality. EFRs are performed to analyze and document the appropriateness of the root causes and their associated corrective actions to prevent recurrence. The NRC inspection team identified several CARs opened in response to significant conditions adverse to quality for which no effectiveness review had been performed as required. The NRC inspection team identified this issue as an example of Nonconformance 99901383/2014-201-01 for EMD's failure to perform EFRs for significant conditions adverse to quality as required by EMD's corrective action program.

c. Conclusion

The NRC inspection team issued Nonconformance 99901383/2014-201-01 in association with EMD's failure to implement the regulatory requirements of Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. Nonconformance 99901383/2014-201-01 cites EMD for failing to ensure that significant conditions adverse to quality and conditions adverse to quality are promptly identified and corrected, failing to ensure that conditions adverse to quality were corrected to preclude repetition, and failing to perform effectiveness reviews (EFR) for significant conditions adverse to quality as required by EMD's corrective action program.

12. Entrance and Exit Meetings

On June 23, 2014, the NRC inspection team discussed the scope of the inspection with Mr. Stewart Shannon, Director, Quality Assurance, and other members of EMD's management

and technical staff. On June 25, 2014, the NRC inspection team presented the inspection results and observations during an exit meeting with Mr. Brian Eckels, General Manager, Defense Business, and other members of EMD's management and technical staff. The attachment to this report lists the attendees of the entrance and exit meetings, as well as those individuals whom the NRC inspection team interviewed.

ATTACHMENT

1. ENTRANCE AND EXIT MEETING ATTENDEES

Name	Title	Affiliation	Entrance	Exit	Interviewed
Brian Eckels	General Manager Defense Business	EMD		X	
A. Thomas Frost	Director, AP1000 Operations	EMD	X	X	
Keith Hensler	Director, Business Development	EMD	X	X	
Randy Jacob	Project Manager	EMD		X	
Jay Gardiner	Manager, Quality Programs and Code	EMD	X	X	
Richard Kuchravy	Director, Power Business Segment	EMD		X	
Stewart A. Shannon	Director, Quality Assurance	EMD	X	X	
Thommy Santiago	Senior Quality Engineer	EMD	X	X	X
Mike Sherwin	Manager, Supplier Quality	EMD	X	X	X
Anthony Bolyen	Manager, Quality Assurance	EMD	X	X	X
Chris T. Farr	Director, Engineering Process and Resources	EMD	X	X	X
John Tessaro	Chief Engineer	EMD		X	
Holly L. Walton	Director, Project and Materials Management	EMD	X	X	
Matthew G. Kotch	Quality Control Manager	EMD	X	X	
Lauren Blake	Continuous Improvement Engineer	EMD		X	X
Francis Alim	Continuous Improvement Engineer	EMD		X	
Brian F. Sakowski	Supplier Quality Engineer	EMD	X	X	X
Shawn Cross	Director of Operations	EMD	X		
Debby Gibb	Manager, Planning	EMD	X		
Rebecca Houston	Manager, Project Control	EMD	X		

Name	Title	Affiliation	Entrance	Exit	Interviewed
Mary K. Workoff	Director, Defense Business Segment	EMD	X		
Randy Swanson	Human Resources	EMD	X		
Allen Hribar	Engineer	EMD	X		
Yvonne Rupert	Senior Controller	EMD	X		
William West	Sourcing Manager	EMD	X		
Timothy W. Dunn	Senior Principal Engineer	EMD			X
Arthur Douglas	Facilities Engineer	EMD			X
Diane Smarslok	Corrective Action Request Evaluator	EMD			X
Paul Beer	Engineering Manager	EMD			X
Mathew Mentecky	Contract Administrator	EMD			
Dave Hobbins	Manager, Dynamics and Hydraulics	EMD			X
John Duke	Principal Quality Engineer	WEC	X	X	X
Korey L. Hosack	(via teleconference)	WEC	X	X	
Ronald P. Wessel	(via teleconference)	WEC	X	X	
Nicolas S. Nordmann	(via teleconference)	WEC	X	X	
Joseph F. Petagno	(via teleconference)	WEC	X	X	
Peter J. Varga	(via teleconference)	WEC		X	
Marie Blanc	(via teleconference)	WEC		X	
Paul A. Russ	(via teleconference)	WEC		X	
Lichao Du	(via teleconference)	WEC		X	
Chester Rodrigues III	(via teleconference)	SCANA	X	X	
Thomas Herring	(via teleconference)	SCANA	X	X	
Jennifer Harrelson	(via teleconference)	SNC	X	X	
Curtis Shiley	(via teleconference)	SNC	X	X	
Larry P. Cunningham	(via teleconference)	SNC		X	
Brent Clarke	Inspection Team Leader	NRC	X	X	N/A
Edward Roach	Inspector	NRC	X	X	N/A
Yamir Diaz-Castilo	Inspector	NRC	X	X	N/A
Qin Liwei	Inspector	NNSA (China)	X	X	N/A

2. INSPECTION PROCEDURES USED

IP 43002, "Routine Inspections of Nuclear Vendors," dated July 15, 2013.

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Item Number	Status	Type	Description	Applicable ITAAC
99901383/2014-201-01	Opened	NON	Criterion XVI	N/A

4. INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA

The U.S. Nuclear Regulatory Commission (NRC) inspection team identified the following inspections, tests, analyses, and acceptance criteria (ITAAC) related to the Reactor Coolant Pumps (RCPs) being designed and fabricated by EMD. At the time of the inspection, the RCP thrust bearings and the lower flywheel were being redesigned. That redesign directly affects several ITAAC. For the ITAAC listed below, the NRC inspection team reviewed EMD's quality assurance controls in the areas of design control, nonconforming materials parts and components, and corrective actions. The ITAAC design commitments referenced below are for future use by the NRC staff during the ITAAC closure process. The listing of these ITAAC design commitments does not indicate that they have been met and closed. The NRC inspection team did not identify any findings associated with the ITAAC identified below.

Appendix C from the Combined License for Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3	No. 13	ITAAC 2.1.02.02a
Appendix C from the Combined License for Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3	No. 15	ITAAC 2.1.02.03a
Appendix C from the Combined License for Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3	No. 17	ITAAC 2.1.02.04a
Appendix C from the Combined License for Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3	No. 20	ITAAC 2.1.02.05a.ii
Appendix C from the Combined License for Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3	No. 30	ITAAC 2.1.02.08b
Appendix C from the Combined License for Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3	No. 31	ITAAC 2.1.02.08c

5. DOCUMENTS REVIEWED

Policies and Procedures

- Curtiss-Wright Electro-Mechanical Corporation (EMD) Quality Assurance Program Manual for Construction of Class 1, 2, 3 Components, Parts, NS Supports, and Supply of Material in Accordance with ASME Section III, Division 1 Requirements, Revision 7
- EMD Quality Program Manual, Revision 13, dated February 4, 2014
- IDPQ01, "Control of Nonconforming Materials," Revision 20, dated January 13, 2014
- IDPQ02, "Identification and Reporting of Conditions Adverse to Quality in a Commercial Nuclear Power Plant per 10CFR21," Revision 11, dated June 4, 2014
- IDPQ07, "Preventive Action Programs," Revision 8, dated May 28, 2014
- INSIDP11, "Initiating a MRR," Revision 7, dated June 7, 2014
- IDPQ17, "Corrective Action Request Procedure," Revision 15, dated May 5, 2014
- INSIDP19, "Special Processes for Nonconformances," Revision 10, dated June 17, 2014
- INSIDP21, "Processing Dispositioned MRRs," Revision 5, dated June 17, 2014
- INSIDP25, "EMD Cause Analysis and Preventative Action (CAPA)," Revision 2, dated January 21, 2014
- INSIDP26, "Effectiveness Review Process," Revision 1, dated January 2, 2013
- CTTAP 12.0.1, "Design Control – AP1000 RCP – Technology Transfer," Revision 000, dated February 12, 2009
- IDPE21, "Design and Equipment Specifications," Revision 5, dated April 5, 2012
- IDPE22, "Design Verification and Reviews," Revision 11, dated April 30, 2014
- IDPE23, "Control of Design / Analysis Computer Programs," Revision 10, dated June 19, 2014
- IDPE24, "Material Ordering Documents (MODs)," revision 6, dated January 4, 2013
- IDPE37, "Existing Product Projects," Revision 4, dated June 28, 2013

Material Review Reports

- 4197Z, 9305Z, 9546Z, 9924Z, 0329AA, 0379AA, 0411AA, 1005AA, 1324AA, 1369AA

Corrective Action Reports

- 2009-00315, 2009-00316, 2009-00372, 2009-00376, 2012-00716, 2013-00042, 2013-00047, 2013-00063, 2013-00072, 2013-00085, 2013-00085, 2013-00093, 2013-00097, 2013-00098, 2013-00114, 2013-00116, 2013-00121, 2013-00130, 2013-00139, 2013-00142, 2013-157, 2013-159, 2013-163, 2013-00164, 2013-00166, 2013-00175, 2013-

00178, 2013-00181, 2014-00003, 2014-00010, 2014-00014, 2014-00029, 2014-00055,
2014-00062, 2014-00078, 2014-00063, 2014-00076, 2014-00117

Corrective Action Reports Generated during the NRC Inspection

- 2014-00124, 2014-00126, 2014-00127, 2014-00128, 2014-00129

Design Documents

- Purchase Order No. 4500265135, from Westinghouse Electric Company, for AP1000 Reactor Coolant Pumps for V. C. Summer, through Change Notice 22, dated April 30, 2008
- APP-MPO1-M2-001, "Design Specification for AP1000 Reactor Coolant Pumps," Revision 3, dated March 1, 2012