November 2, 2012

Mr. Stan Miller, General Manager
Enertech
2950 Birch Street
Brea, CA 92821

SUBJECT: U.S. NUCLEAR REGULATORY COMMISSION INSPECTION REPORT NO. 99901377/2012-201, NOTICE OF VIOLATION, AND NOTICE OF NONCONFORMANCE

Dear Mr. Miller:

From August 27–28, 2012, and from September 17-20, 2012, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection of Enertech at Logan, UT, and Brea, CA, respectively. This limited-scope routine inspection assessed Enertech's compliance with the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance," and selected portions of Appendix B, "Quality Assurance Program 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 evaluated the implementation of Enertech's quality assurance program, with a focus on Section III of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code and ASME Qualification of Active Mechanical Equipment Used in Nuclear Power Plants qualification testing associated with the nozzle check valves of the passive core cooling system for the Westinghouse Electric Corporation AP1000 design. These qualification tests are associated with inspections, tests, analyses, and acceptance criteria (ITAAC) from Revision 19 to the certified AP1000 Design Control Document, Tier 1. Currently, the combined licenses of Vogtle Electric Generating Plant, Units 3 and 4, and Virgil C. Summer Nuclear Station, Units 2 and 3, incorporate these ITAAC. In addition, the enclosed Notice of Nonconformance (NON) issues, if not corrected, may impact the ability of NRC licensees to meet applicable ITAAC from the AP1000 Design Control Document. The specific issues and applicable ITAAC are contained in Section 4 of the Attachment.

The enclosed report presents the results of this inspection. This NRC inspection report does not constitute the agency's endorsement of your overall quality assurance or 10 CFR Part 21 programs.

Based on the results of this inspection, the NRC has determined that one Severity Level IV violation of NRC requirements occurred. The NRC evaluated the violation in accordance with the agency's Enforcement Policy, which is available on the NRC's Web site at http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html.

The violation is cited in the enclosed notice of violation (Notice) and the circumstances surrounding it are described in detail in subject inspection report. The violation is being cited in the Notice because Enertech failed to inform all affected purchasers within five working days that it did not have the capability to perform an evaluation to determine if a defect exists.

You are required to respond to this letter and to follow the instructions specified in the enclosed Notice when preparing your response. If you have additional information that you believe the NRC should consider, you may provide it in your response to the Notice. The NRC's review of your response to the Notice also will determine if further enforcement action is necessary to ensure compliance with regulatory requirements.

In addition, during this inspection the NRC inspection team found that the implementation of your quality assurance program failed to meet certain regulatory requirements imposed on Enertech by your customers or NRC licensees. Specifically, the NRC inspection team determined that Enertech was not fully implementing its quality assurance program in the areas of commercial grade dedication, test control, control of measuring and test equipment, corrective action, and quality assurance records. The specific findings and references to the pertinent requirements are identified in the enclosures to this letter. Even though the NRC inspection team did not identify issues in all areas reviewed, Enertech should, in its response to the enclosed NON, document the results of the extent of the condition and should determine any effects on other components and testing activities.

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

In accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," the NRC will make available electronically for public inspection a copy of this letter, its enclosure, and your response through the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System, which is accessible at http://www.nrc.gov/reading-rm/adams.html. To the extent possible (and if applicable), your response 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, 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 be 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 would 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 Branch
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Docket No.: 99901377

You are required to respond to this letter and to follow the instructions specified in the enclosed Notice when preparing your response. If you have additional information that you believe the NRC should consider, you may provide it in your response to the Notice. The NRC's review of your response to the Notice also will determine if further enforcement action is necessary to ensure compliance with regulatory requirements.

In addition, during this inspection the NRC inspection team found that the implementation of your quality assurance program failed to meet certain regulatory requirements imposed on Enertech by your customers or NRC licensees. Specifically, the NRC inspection team determined that Enertech was not fully implementing its quality assurance program in the areas of commercial grade dedication, test control, control of measuring and test equipment, corrective action, and quality assurance records. The specific findings and references to the pertinent requirements are identified in the enclosures to this letter. Even though the NRC inspection team did not identify issues in all areas reviewed, Enertech should, in its response to the enclosed NON, document the results of the extent of the condition and should determine any effects on other components and testing activities.

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

In accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," the NRC will make available electronically for public inspection a copy of this letter, its enclosure, and your response through the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System, which is accessible at http://www.nrc.gov/reading-rm/adams.html. To the extent possible (and if applicable), your response 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, 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 be 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 would 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 Branch
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Docket No. 99901377

DISTRIBUTION:

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TSakadales rdekleine@curtisswright.com smiller@curtisswright.com AP1000 CONTACTS

ADAMS Accession No.: ML12306A385 *Concurrence via email NRC-001

OFFICE	NRO/DCIP/CMVB	NRO/DCIP/CMVB	*NRO/DE/CIB	*NRO/DE/CIB	*RII/DCI/CIB3
NAME	RMcIntyre	BClarke	JStrnisha	RDavis	JBartleman
DATE	10/31/2012	10/31/2012	11/ /2012	10/31/2012	10/31/2012
OFFICE	*RII/DCI/CIB3	NRO/DCIP/CAEB	*RII/DCI/CIB3	NRO/DCIPCITB	NRO/DCIP/CMVB
NAME	DJackson	TFrye	DJackson	MKowal	ERoach
DATE	10/31/2012	11/02/2012	10/31/2012	11/02/2012	11/02/2012

OFFICIAL RECORD COPY

NOTICE OF VIOLATION

Enertech
2950 East Birch Street
Brea, CA 92821

Docket No. 99901377
Report No. 2012-201

During a U.S. Nuclear Regulatory Commission (NRC) inspection conducted at Enertech in Brea, CA, on September 17-20, 2012, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

> Paragraph 21.21, "Notification of failure to comply or existence of a defect and its evaluation," of Title 10 of the *Code of Federal Regulations* (10 CFR) 21.21(b) requires, in part, that "if the deviation or failure to comply is discovered by a supplier of basic components, or services associated with basic components, and the supplier determines that it does not have the capability to perform the evaluation to determine if a defect exists, then the supplier must inform the purchasers or affected licensees within five working days of this determination so that purchasers or affected licensees may evaluate the deviation or failure to comply, pursuant to 10 CFR 21.21(a)."
>
> Contrary to the above, as of September 20, 2012, Enertech failed to inform all purchasers within five working days that it did not have the capability to perform an evaluation to determine the existence of a defect. Specifically, Enertech evaluated two issues concerning the arcing and short-circuiting of valve actuator circuit boards and concluded that the issues did not pose a significant safety hazard (SSH). However, there is no objective evidence that Enertech properly evaluated the shipped circuit boards in their various applications at numerous licensees to make a definitive SSH determination.

This issue has been identified as Violation 999013777/2012-201-01.

This is a Severity Level IV violation (Section 6.9.d of the NRC Enforcement Policy).

Pursuant to the the provisions of 10 CFR 2.201, "Notice of Violation," Enertech is hereby required to submit 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, Construction Mechanical Vendor Branch, Division of Construction Inspection and Operational Programs, Office of New Reactors, within 30 days of the date of the letter transmitting this Notice of Violation. This reply should be clearly marked as a "Reply to a Notice of Violation" and should include (1) the reason for the violation or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence if the correspondence adequately addresses the required response. Where good cause is shown, the NRC will consider extending the response time.

If you contest this enforcement action, provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room and from the NRC's Agencywide Documents Access and Management System, which is accessible from the NRC Web site at http://www.nrc.gov/ reading-rm/ adams.html, it should not include any personal privacy, proprietary, or Safeguards Information, to the extent possible, 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, 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 be withheld, 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."

In accordance with 10 CFR 19.11, "Posting of Notices to Workers," you may be required to post this notice within 2 working days of receipt.

Dated this 2nd of November 2012.

NOTICE OF NONCONFORMANCE

Enertech
2950 East Birch Street
Brea, CA 92821

Docket No. 99901377
Report No. 2012-201

Based on the results of a U.S. Nuclear Regulatory Commission (NRC) inspection conducted at Utah State University (USU) in Logan, UT, on August 27-28, 2012, and at the Enertech facility in Brea, CA, on September 17-20, 2012, it appears that certain activities were not conducted in accordance with NRC requirements that were contractually imposed on Enertech by its customers or NRC licensees:

A. Criterion III, "Design Control," 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, in part, that "measures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems, and components."

   Enertech Operating Procedure (EOP) 3140, "Procedure for the Dedication of Commercial-Grade Items/Services," Revision AB, dated July 26, 2012, provides the methods for the dedication of commercial grade items or services or both used in nuclear safety-related applications.

   Contrary to the above, as of September 20, 2012, Enertech failed to review for suitability of application materials that were essential to the safety-related functions of structures, systems, and components. Specifically, Enertech did not perform the following:

   - Adequately dedicate ERV-Z 8-inch nozzle check valve test activities conducted at USU. The commercial grade survey performed by Enertech at USU did not verify the calibration quality of the instruments used during the American Society of Mechanical Engineers (ASME) QME-1 functional flow tests to identify and record safety-related test data. These instruments included fluke meters, Rosemount pressure transmitters, a magnetic flow meter, a digital thermometer, and the Avery (water) weigh tank, which were commercially calibrated and accepted by USU and Enertech without verification of the calibration suppliers.

   - Employ suitable dedication methods to verify that safety-related non-pressure boundary ERV-Z 8-inch nozzle check valve parts purchased as commercial grade items (CGI) met the appropriate material specifications (chemical and mechanical properties) that the associated CGI Dedication Procedure document identified as critical characteristics. The diffuser, large retaining ring, and small retaining ring were purchased from commercial suppliers who had not received a commercial grade survey. Enertech accepted the material certification report for the chemical and mechanical properties through positive material identification (PMI) using an x-ray fluorescence alloy analyzer for only a limited sample of the chemical elements. The CGI Evaluation MA22004 (for the diffuser) and CGI Evaluation MA21723, (for the large and small retaining rings) did not include a documented technical justification necessary to address the acceptance of all identified material specification chemical and mechanical properties that were identified on the material certification report.

- Perform an appropriate CGI technical evaluation as part of CGD for the diffuser, the large retaining rings, and the small retaining rings. The CGI technical evaluation did not include a documented justification for the sampling plans that were being implemented for acceptance. Enertech received the sampled items from suppliers that had not been through a review or commercial grade survey to verify a traceability process for lot/batch heat number control. The CGI Evaluation MA22004 (for the diffuser) and CGI Evaluation MA21723 (for the large and small retaining rings) that were performed as part of the dedication did not include a documented basis for the sample testing population of the items received from commercial suppliers for which lot/batch homogeneity had not been verified.

These issues have been identified as Nonconformance 99901377/2012-201-02.

B. Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50 states, in part, that "a test program shall be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed."

Enertech Procedure MA22989, "Equipment Qualification Procedure for Enertech 8" Class 1707 ERV-Z Nozzle Check Valve," Revision B, dated February 16, 2012, states, in part, that "the purpose of this qualification procedure is to verify the appropriate inspection parameters and establish a testing procedure with acceptance criteria to successfully qualify the Enertech valve per ASME QME-1-2007 Section QV-7500."

Section QV-2000, "Purpose," of ASME QME-1-2007 states, in part, that "the purpose of Section QV is to provide requirements for the qualification of the design of valves to perform in service as required under all specified operating and design basis conditions."

Contrary to the above, as of September 20, 2012, Enertech failed to establish a test program to ensure that it had identified and performed all testing necessary to demonstrate that the ERV-Z 8-inch nozzle check valve will perform satisfactorily in service. Specifically, Enertech's test program did not identify and perform qualification testing of the valve to demonstrate operability under all QME-1-2007 specified operating and design basis conditions.

This issue has been identified as Nonconformance 99901377/2012-201-03.

C. Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50, states, in part, that "measures shall be established to assure that tools, gages, instruments, and other measuring and testing devices used in activities affecting quality are properly controlled, [and] calibrated…to maintain accuracy within necessary limits."

EOP 8120, "Calibration and Control of Measuring Test Equipment," Revision Q, dated October 15, 2008, states, in part, that "following a successful calibration, the calibration technician shall affix a calibration label to the instrument," that "calibration shall be performed prior to each test and after testing is completed for ASME Code items," and that "serial numbers shall be affixed by a permanent means."

Contrary to the above, as of September 20, 2012, Enertech failed to establish adequate controls to ensure that the gauges used in the qualification testing of a safety-related ASME Section III Class 1 "N-Stamp" valve were properly controlled to display accurate calibration labels. Specifically, Enertech failed to ensure that the gauges used in ASME Boiler and Pressure Vessel Code testing were calibrated before and after testing. Furthermore, Enertech failed to ensure that measuring and test equipment had permanent markings to identify the equipment.

This item is identified as Nonconformance 99901377/2012-201-04.

D. Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50, states, in part, 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."

EOP 8160, "Procedure for Corrective Action," Revision U, dated February 25, 2011, states, in part, that "a Corrective Action Request (CAR) may be initiated by any employee using a Corrective Action Request form (QAM Exhibit 16-1). Corrective Action Requests shall be prepared and forwarded to the responsible entity (Enertech Department Manager or Supplier) within 5 days of identifying a Corrective Action and [shall] clearly reference the supporting documents that explain the adverse condition."

Contrary to the above, as of September 20, 2012, Enertech failed to promptly identify and correct conditions adverse to quality and failed to adequately implement corrective actions. Specifically, Enertech failed to initiate a CAR related to the potential arcing and short-circuiting of actuator circuit boards, although two Enertech evaluations addressed this issue under 10 CFR Part 21, "Reporting of Defects and Noncompliance:"

- NRC 11-001, "Potential 10 CFR 21 Reportable Item, Actuator Circuit Boards," dated August 1, 2011
- NRC 11-002, "Potential 10 CFR 21 Reportable Item, Actuator Circuit Boards," dated September 20, 2011

Consequently, Enertech did not complete the corrective actions described in these evaluations, including sending letters to customers and making replacement parts kit and installation instructions available.

This issue has been identified as Nonconformance 99901377/2012-201-05.

E. Criterion XVII, "Quality Assurance Records," of Appendix B to 10 CFR Part 50 states, in part, that "records shall be identifiable and retrievable. Consistent with applicable regulatory requirements, the applicant shall establish requirements concerning record retention, such as duration, location, and assigned responsibility."

The Enertech Quality Assurance Manual, Fourth Edition, Revision 19, dated March 8, 2012, states, in part, that "access to records shall be limited to authorized personnel designated by the Director of Quality" and that "documents shall be stored to avoid damage or loss."

EOP 8170, “Quality Assurance Records,” Revision Q, dated September 22, 2011, states, in part, that “quality records will be placed in a controlled area with access to authorized personnel only.”

Contrary to the above, as of September 20, 2012, Enertech failed to establish adequate controls to ensure that it had stored quality records in a controlled area to prevent access by unauthorized personnel and to protect documents against loss. Specifically, Enertech stored calibration quality records in an unlocked filing cabinet that was located in a room that was not access controlled.

This item is identified as Nonconformance 99901377/2012-201-06.

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 Branch, Division of Construction Inspection 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 noncompliance, and (4) the date when the corrective action will be completed. Where good cause is shown, the NRC will consider 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 Agencywide Documents Access and Management System, which is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html, it should not include any personal privacy, proprietary, or safeguards information, to the extent possible, 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, 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 be withheld, 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 2nd of November 2012.

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

Docket No.:	99901377
Report No.:	99901377/2012-201
Vendor:	Enertech 2950 East Birch Street Brea, CA 92821
Vendor Contact:	Mr. Stan Miller, General Manager Telephone: 714-982-1874 E-mail: smiller@curtisswright.com
Nuclear Industry Activity:	Enertech, a business unit of Curtiss-Wright Flow Control Company, supplies safety-related American Society of Mechanical Engineers Boiler and Pressure Vessel Code valves, safety-related pumps, large bore and pipe support snubbers, pneumatic actuators, motors, safety-related instrumentation, diagnostic and test equipment, service and repair, and engineering services to the nuclear industry. Westinghouse Electric Corporation has contracted Enertech to design and manufacture nozzle check valves for the passive core cooling system of the AP1000 reactor design.
Inspection Dates:	August 27-28, 2012 Logan, UT September 17-20, 2012 Brea, CA
Inspectors:	Richard McIntyre, NRO/DCIP/CMVB, Team Leader Edward Roach, NRO/DCIP/CMVB Brent Clarke, NRO/DCIP/CMVB James Strnisha, NRO/DE/CIB Robert Davis, NRO/DE/CIB John Bartleman, R-II/DCI/CIB3 Donna Jackson, R-II/DCI/CIB3
Observers:	Gao Runsheng, National Nuclear Safety Administration (China) Zhao Dawei, National Nuclear Safety Administration (China)
Approved by:	Edward H. Roach, Chief Mechanical Vendor Branch Division of Construction Inspection and Operational Programs Office of New Reactors

EXECUTIVE SUMMARY

Enertech
99901377/2012-201

The U.S. Nuclear Regulatory Commission (NRC) conducted this inspection to verify that Enertech is adequately implementing a quality assurance (QA) program in accordance with 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," and 10 CFR Part 21, "Reporting of Defects and Noncompliance."

This technically focused inspection concentrated on implementation of Enertech's QA program activities associated with the design, fabrication, and testing of the ERV-Z 8-inch nozzle check valve for the passive core cooling system of the Westinghouse Electric Corporation AP1000 reactor design.

During the inspection, the NRC inspection team observed the American Society of Mechanical Engineers (ASME) Qualification of Active Mechanical Equipment in Nuclear Power Plants (QME-1) and American Society of Mechanical Engineers (ASME) Section III Code qualification and functional testing of the ERV-Z 8-inch nozzle check valve at Utah State University (August 27-28, 2012) and Brea, CA (September 17-20, 2012). These qualification tests are associated with inspections, tests, analyses, and acceptance criteria (ITAAC) from Revision 19 to the certified AP1000 Design Control Document, Tier 1. Currently, the combined licenses of Vogtle Electric Generating Plant, Units 3 and 4, and Virgil C. Summer Nuclear Station, Units 2 and 3, incorporate these ITAAC. In addition, the enclosed Notice of Nonconformance (NON) issues, if not corrected, may impact the ability of NRC licensees to meet applicable ITAAC from the AP1000 Design Control Document. The specific issues and applicable ITAAC are contained in Section 4 of the Attachment.

The NRC inspection team observed the following testing and activities associated with the ERV-Z 8-inch nozzle check valve:

- ASME QME-1 functional qualification testing for forward flow at various flow rates and closure under reverse flow
- ASME Section III hydrostatic testing at a pressure of 6,200 pounds-force per square inch gauge (psig)
- ASME Section III seat leakage testing at a pressure of 2,820 psig
- jet testing to ensure the proper closing of the valve and to verify that it remains free to move to the open and closed positions
- operability testing to verify the manual cycling of the valve and access for internal inspection
- assembly and disassembly for qualification testing
- component dimensional measurement verification

The following regulations served as the bases for the NRC inspection:

- Appendix B to 10 CFR Part 50
- 10 CFR Part 21

During the course of this inspection, the NRC inspection team implemented Inspection Procedure (IP) 43002, "Routine Inspections of Nuclear Vendors," dated April 25, 2011; IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated April 25, 2011; and IP 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance," dated February 13, 2012.

The last NRC inspection of Enertech occurred in September 2008.

With the exception of the violation and nonconformances described below, the NRC inspection team concluded that Enertech is implementing its QA and 10 CFR Part 21 programs in the design, manufacture, and testing of the ERV-Z 8-inch nozzle check valve. The results of the inspection are summarized below.

10 CFR Part 21 Program

The NRC inspection team issued Violation 99901377/2012-201-01 in association with Enertech's failure to implement the regulatory requirements in 10 CFR Part 21. Specifically, Enertech was cited for failing to inform all affected purchasers within 5 working days that it did not have the capability to perform an evaluation to determine if a defect exists. On August 1, 2011, and September 11, 2011, Enertech identified deviations with the arcing and short-circuiting of valve actuator circuit boards; however, it did not notify its customers. Additionally, Enertech did not ship any instructions or parts kits to customers under its commitment in 10 CFR Part 21 evaluation NRC 11-001, "Potential 10 CFR 21 Reportable Item, Actuator Circuit Boards," dated August 1, 2011.

Commercial Grade Dedication

The NRC inspection team issued Nonconformance 99901377/2012-201-02 in association with Enertech's failure to implement the regulatory requirements in Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. Specifically, Enertech was cited for not effectively implementing a commercial grade dedication (CGD) program to review the suitability of the application of commercially procured calibration services at Utah State University and the verification of ERV-Z 8-inch nozzle check valve non-pressure boundary items and materials that are essential to the safety-related functions of structures, systems, and components. In addition, the technical evaluations of commercial grade items performed as part of the dedication did not include a documented basis for the sample testing population for items from commercial suppliers where lot/batch homogeneity had not been verified.

Test Control

The NRC inspection team issued Nonconformance 99901377/2012-201-03 in association with Enertech's failure to implement the regulatory requirements in Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50. Specifically, the NRC inspection team determined that check valve testing was performed in accordance with written test procedures that incorporated the requirements and acceptance limits contained in applicable design documents. However,

Criterion XI specifically requires that testing demonstrate that components will perform satisfactorily in service. Enertech was cited for failing to have a test program for the ERV-Z 8-inch nozzle check valve that included adequate testing in accordance with ASME QME-1-2007 to demonstrate that the valve will perform satisfactorily in service.

Control of Measuring and Test Equipment

The NRC inspection team issued Nonconformance 99901377/2012-201-04 in association with Enertech's failure to implement the regulatory requirements in Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. Enertech was cited for failing to verify that the measuring and test equipment used in the qualification testing of the ERV-Z 8-inch nozzle check valve displayed accurate calibration labels. In addition, Enertech failed to ensure that the gauges used for ASME Section III testing were calibrated before and after each ASME code test and that its measuring and test equipment had permanent markings to identify the equipment.

Corrective Actions

The NRC inspection team issued Nonconformance 99901377/2012-201-05 in association with Enertech's failure to implement the regulatory requirements in Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. Enertech was cited for failing to complete corrective actions. Specifically, Enertech failed to initiate a corrective action related to the potential arcing and short-circuiting of actuator circuit boards and failed to provide instructions and replacement parts kit to customers as described in their 10 CFR Part 21 evaluations NRC11-001 and NRC 11-002.

QA Records

The NRC inspection team issued Nonconformance 99901377/2012-201-06 associated with Enertech's failure to implement the regulatory requirements in Criterion XVII, "Quality Assurance Records," of Appendix B to 10 CFR Part 50. Specifically, the NRC inspection team concluded that Enertech had not stored QA records in a controlled area to prevent access by unauthorized personnel and that these records were not protected against loss. Enertech was cited for failing to limit access to calibration records to authorized personnel only and for failing to protect such records against loss, damage, or destruction from disasters, such as fire.

The following inspection areas had no significant findings:

- control of special processes
- training and qualification
- procurement document control
- control of purchased material, equipment, and services
- nonconforming material, parts, or components
- audits

REPORT DETAILS

The U.S. Nuclear Regulatory Commission (NRC) inspection team evaluated the Enertech quality assurance (QA) program with an emphasis on observing activities associated with the design, manufacture, and testing of the ASME Section III, Class 1 safety-related Enertech model ERV-Z 8-inch nozzle check valve. Additionally, the inspection team conducted interviews with responsible Enertech personnel and reviewed documents to determine if Enertech performed activities in accordance with the applicable design, quality, and technical requirements imposed in the Westinghouse Electric Corporation (WEC) purchase order (PO). These ERV-Z 8-inch nozzle check valves will be used in the WEC AP1000 passive core cooling system (PXS). The tests that the NRC team inspected, including the functional and qualification tests, are associated with inspections, tests, analyses, and acceptance criteria (ITAAC) from Revision 19 to the certified AP1000 design. Currently, the combined licenses of Vogtle Electric Generating Plant, Units 3 and 4, and Virgil C. Summer Nuclear Station, Units 2 and 3, incorporate these ITAAC as the core makeup tank discharge check valves for the PXS.

Some of the activities observed by the NRC inspection team included the following:

- ASME QME-1 functional qualification testing for forward flow at various flow rates and closure under reverse flow
- ASME Section III hydrostatic testing at a pressure of 6,200 pounds-force per square inch gauge (psig)
- ASME Section III seat leakage testing at a pressure of 2,820 psig
- jet testing to ensure the proper closing of the valve and to verify that it remains free to move to the open and closed positions
- operability testing to verify the manual cycling of the valve and access for internal inspection
- assembly and disassembly for qualification testing
- component dimensional measurement verification

1. 10 CFR Part 21 Program

   a. Inspection Scope

      The NRC inspection team reviewed policies and implementing procedures that govern the Enertech program for the control of nonconforming material, parts, and components to verify compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance." Additionally, the NRC inspection team inspected and evaluated postings for compliance with 10 CFR 21.6, "Posting Requirements."

      The attachment to this inspection report lists the documents reviewed by the inspection team.

b. Observations and Findings

b.1 Postings

As required by 10 CFR Part 21.6, “Posting Requirements,” the NRC inspection team verified that Enertech had posted notices that included (1) a copy of Section 206 of the Energy Reorganization Act of 1974, (2) a copy of 10 CFR Part 21, and (3) a description of the Enertech procedure that implements the regulation.

b.2 10 CFR Part 21 Procedures and Implementation

Enertech Operating Procedure (EOP) 8200, “Employee Non-Discrimination Rights, and Reporting Requirements Concerning Defects and Noncompliance,” Revision Q, dated January 11, 2012, establishes the requirements for compliance with 10 CFR Part 21. This document defines the process for reporting defects; the posting requirements; and the responsibilities, timelines, and actions for identifying and evaluating deviations and failures to comply. The NRC inspection team verified that Enertech’s nonconforming items and corrective action programs, as described in EOP 8150, “Processing of Nonconformance Material Reports,” Revision AA, dated July 24, 2012, and EOP 8160, “Procedure for Corrective Action,” Revision U, dated February 22, 2012, provide a connection to the 10 CFR Part 21 program during the initial screening process.

The NRC inspection team observed errors and omissions in EOP 8200. Specifically, the NRC inspection team noted that some definitions identified in Section 4.0 and Attachment 8200-4 of EOP 8200 were inconsistent with the definitions in 10 CFR Part 21.3, “Definitions.” The NRC inspection team noted that Enertech made revisions to this operating procedure to address this inconsistency during the inspection.

Because Enertech did not make any 10 CFR Part 21.21 notifications nor conduct any evaluations associated with the ERV-Z 8-inch nozzle check valve and because Enertech did not make any 10 CFR Part 21 notifications at all since the last NRC inspection in 2008, the inspection team reviewed a representative sample of 10 CFR Part 21 evaluations and associated corrective action requests (CAR) and nonconforming material reports (NMR) to evaluate the effectiveness of the program.

The NRC inspection team noted that Enertech conducted two 10 CFR Part 21 evaluations on the arcing and short-circuiting of actuator circuit boards. Those two evaluations concluded that no 10 CFR Part 21 notification was required because the valves would fail “safe” in each application and would therefore not present a significant safety hazard. However, no objective evidence existed that Enertech had the ability to effectively analyze each application of these actuator circuit cards in various valve applications at numerous licensee sites. Consequently, Enertech failed to inform affected customers, within 5 working days, that it did not have the capability to perform an evaluation to determine the existence of a defect in accordance with 10 CFR Part 21.21(b). The NRC inspection team identified this issue as Violation 99901377/2012-201-01.

Furthermore, 10 CFR Part 21 evaluation NRC 11-001, "Potential 10 CFR 21 Reportable Item, Actuator Circuit Boards," dated August 1, 2011, committed to corrective actions, including sending instructions and a parts kit to each purchaser of these actuator circuit boards to correct the potential for arcing and short-circuiting. However, this issue was never captured in the corrective action program. As of September 21, 2012, no objective evidence existed that Enertech ever completed this corrective action. This issue is detailed in Section 10 of this report and is cited as Nonconformance 99901377/2012-201-05.

c. Conclusions

The NRC inspection team issued Violation 99901377/2012-201-01 in association with Enertech's failure to implement the regulatory requirements in 10 CFR Part 21. Specifically, Violation 99901377/2012-201-01 cites Enertech for failing to inform all affected purchasers within 5 working days that it did not have the capability to perform an evaluation to determine the existence of a defect. On August 1, 2011, and September 11, 2011, Enertech identified deviations with the arcing and short-circuiting of actuator circuit boards; however, it did not notify its customers. Additionally, Enertech did not ship any instructions or parts kits to customers as identified in their 10 CFR Part 21 evaluation NRC 11-001.

2. Training and Qualification of Personnel

a. Inspection Scope

The NRC inspection team reviewed various policies, implementing procedures, and records that govern Enertech's training and qualification to verify compliance with Criterion II, "Quality Assurance Program" of Appendix B, "Quality Assurance Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." The NRC inspection team reviewed the following items to verify the adequacy of Enertech's implementation and control of these processes:

- the formal Enertech procedures that govern training and qualification
- the online training records related to the Enertech QA indoctrination/orientation process, EOP 8020, Revision M, Attachment 8020-1 (Records 11-127 and 12-268)
- the hardcopy qualification and training records for a quality control (QC) inspector, a shop supervisor, a calibration technician, and a welder

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

b. Observations and Findings

The NRC inspection team verified that Enertech has programs in place to address the training and qualification of personnel performing activities that affect quality. The programs include procedures that incorporate appropriate training and qualification practices. The Enertech QAM, Fourth Edition, Revision 19, dated March 8, 2012, lists

the procedures that implement the training and qualification program. The inspectors reviewed four qualification folders for selected Enertech employees and discussed the QA indoctrination and refresher training for staff and the certification of technical skills and technical training. The inspectors reviewed the training and qualification of personnel involved in the Utah State University (USU) portion of the testing. The Enertech QA Director had electronic records available at the Brea, CA, facility; these records captured the resume of the lead test engineer at USU. Additionally, the QA Director provided a training record that documented that he had conducted test procedure training for USU staff.

The Enertech organization chart is the basis for determining whether personnel have responsibilities for activities that affect quality. The hiring manager identifies the job positions to the QA Director. Newly hired employees receive 4 hours of QA program indoctrination. Enertech administers this indoctrination to all employees through a video presentation or through the QA Director's presentation. EOP 8023, "Procedure for the Qualification of Personnel Performing Activities Affecting Quality," Revision O, dated September 30, 2011, documents certain positions that require qualification. Employees in these positions are recertified every 3 years. Additionally, an annual assessment is performed and documented.

Enertech conducts annual refresher training for all personnel for the QA program. When Enertech revises its QA program or EOPs, it notifies the affected staff and requires them to complete a training record that documents the review of the revised EOPs.

The inspectors did not identify any issues concerning the training and qualification program that required corrective action since the last NRC inspection of Enertech.

c. Conclusions

The NRC inspection team concluded that Enertech is implementing its training and qualification program in accordance with 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 Enertech is implementing its policies and procedures associated with its training and qualification programs. No findings of significance were identified.

3. Design Control

a. Inspection Scope

The NRC inspection team reviewed Enertech's ERV-Z 8-inch nozzle check valve design control activities to verify compliance with the requirements in Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. The NRC inspection team conducted interviews, reviewed policies and procedures related to design control, reviewed design specifications and their translation into drawings, and observed testing activities to the extent possible during the inspection. The NRC inspection team performed its review to verify that Enertech procedures adequately defined design activities to effectively control design inputs, outputs, analyses, records, and organizational interfaces. The team also performed its review to verify that Enertech accomplished its design activities and related changes in accordance with approved procedures.

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

b. Observations and Findings

The NRC inspection team evaluated Enertech's policies and procedures that provide controls for design inputs, outputs, design analyses, and organizational interfaces in the manufacturing of the ERV-Z 8-inch nozzle check valves. The inspection team also verified that Enertech accomplished its design activities and changes in accordance with approved procedures. Specific observations from the review of Enertech's design control process are described below.

b.1 Design Changes

The inspection team reviewed a design change to Enertech drawing MD22849, "Disc Assembly, 8-1500 ERV-Z," Revision C, dated September 13, 2012, for the ERV-Z 8-inch nozzle check valve as a result of inconsistent and high flow rates to close the valve during reverse flow testing performed at USU. Enertech's procedure directed testing to stop, disassembly, determination of the cause, and development of a resolution. Enertech identified the problem as the binding between the sliding surfaces of the disc and the diffuser. Engineering analysis and testing were done to redesign the valve parts and to verify acceptable operation. This resulted in a design change to the bearing surfaces between the disc and diffuser. Enertech added a satellite sleeve to the disc stem and redesigned the diffuser bearing surface. Enertech performed the testing of the new design in a test fixture to simulate valve operation with the new design. After successful testing, Enertech procedures directed the revision of valve drawing MD22849 to incorporate the design change. The attachment to this report lists the Enertech documents reviewed as part of the design change.

b.2 Valve Spring Qualification

The inspection team reviewed Enertech Procedure MA24192, "Spring Qualification for Enertech 8" ANSI Class 1707 Normally Open Nozzle Check Valve," Revision A, which provides qualification instructions for the ERV-Z 8-inch nozzle check valve spring to demonstrate operability during the design life of the valve. The qualified spring was cycled 8,000 times in a fixture that simulated installation in the valve. After testing, Enertech verified that the spring was within specification and that it met the acceptance criteria for operation during the valve design life. The tested spring was used in the qualification testing of the ERV-Z 8-inch nozzle check valve under ASME QME-1 and ASME Section III Code. The inspection team determined that the spring qualification was acceptable.

b.3 Seismic Analysis

The inspection team reviewed Enertech Report MA22867, "Design and Seismic Analysis Report for Enertech 8-Inch ANSI 1707 Type ERV-Z Nozzle Check Valve," Revision E, dated September 12, 2012, for the design and seismic analysis for the ERV-Z 8-inch nozzle check valve. The report documented the stress in accordance with WEC Specification APP-PV03-Z0-001 and with Paragraph 3500 in Subsection NB of Section III of the ASME Boiler and Pressure Vessel Code. Calculations were

performed using MathCad Prime 1.0 and verified and validated by Enertech Procedure MA23709, "Verification and Validation of MathCad Prime 1.0 Software," Revision 0, dated May 23, 2011. A simulation was performed by ANSYS Mechanical Version 13 Finite Element Analysis Software and was verified and validated by Enertech Procedure MA24148, "Verification and Validation of ANSYS Mechanical v.13 Software," Revision A, dated November 28, 2011. Enertech Report MA22867 calculations determined that all loading conditions (i.e., Level A, Level B, Level C, and Level D) and the maximum stress intensities were within the allowable ASME Code stress intensities. The inspection team verified the Enertech methodology used to perform the design and seismic analysis as follows:

- The report was in accordance with Subsection NB-3500 of Section III of the ASME Code.

- The verification and validation procedures specified the manufacturer and the version of the engineering software for verification in the commercial grade dedication.

- Enertech Procedure MA24148, "Verification and Validation of ANSYS Mechanical v.13 Software," Revision 0, dated November 28, 2011, was performed by comparing solutions of problems that are known to have analytical/empirical solutions to the solutions of the same problems obtained through the software. The inspection team reviewed and determined that these models simulated the check valve geometric shape.

- The mesh type and size was verified to converge and to be within the acceptance criteria.

- MathCad Prime 1.0 was verified and validated by Enertech Procedure MA23709, "Verification and Validation of MathCad Prime 1.0 Software," Revision 0, dated May 23, 2011. MathCad Prime 1.0 is a Windows-7-based mathematical program. Validation was performed by comparing results of hand calculations to the MathCad Prime 1.0 software calculation. The inspection team determined that the calculations performed by the MathCad Prime 1.0 software calculation were acceptable.

Based on the review of the seismic design report and on the verification and validation of the software used to perform the stress analysis calculations, the NRC inspection team determined that the ERV-Z 8-inch nozzle check valve design and seismic analysis was in accordance with Subsection NB-3500 of Section III of the ASME Code. The results of the seismic analysis may be used to support closure of ITAAC 2.2.03.05a.ii, which states that "a report exists and concludes that the seismic Category I equipment can withstand seismic loads without loss of safety function." These test activities apply to AP1000 component numbers PXS-PL-V016A, PXS-PL-V016B, PXS-PL-V017A, and PXS-PL-V017B, as identified in revision 19 of the AP1000 design control document, Table 2.3.3-1

c. Conclusions

The NRC inspection team concluded that Enertech is implementing the above portions of the design control program in accordance with Criterion III of Appendix B to 10 CFR Part 50. However, Nonconformance 99901377/2012-201-02 was identified in an inspection of the commercial-grade dedication program and cited against Criterion III of Appendix B to 10 CFR Part 50. Section 4 of this report addresses that issue.

4. Commercial-Grade Dedication

a. Inspection Scope

The NRC inspection team reviewed the QA policies and procedures that govern the implementation of Enertech's dedication of commercial grade items (CGI) used in safety-related applications to verify compliance with Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. Specifically, the NRC inspectors reviewed the following procedures established by Enertech:

- EOP 3140, "Procedure for the Dedication of Commercial Grade Items/Services," Revision AJ, dated July 26, 2012

- EOP 8185, "Procedure for Commercial Grade Survey," Revision H, dated September 26, 2011

The NRC inspection team reviewed the CGD procedures and several dedication packages. Emphasis was placed on critical characteristics, verification methods, commercial grade surveys, and source inspections for the ERV-Z 8-inch nozzle check valve.

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

b. Observations and Findings

The NRC inspection team observed dedication activities and reviewed dedication packages, commercial grade surveys (CGS), and source inspections to verify that Enertech had properly developed and implemented a plan for dedication of CGIs.

The NRC inspection team reviewed the dedication of ASME QME-1 functional qualification testing services provided by Utah State University (USU) for the ERV-Z 8-inch nozzle check valve. Additionally, the NRC inspection team reviewed dedication of commercially-procured items including the valve diffuser, large retaining rings, and small retaining rings for the ERV-Z 8-inch nozzle check valve. The NRC inspection team reviewed dedication plans, design drawings and inspection reports to verify; that critical characteristics and acceptance methods were specified, that the items' specific CGI dedication procedures referenced appropriate drawings, that they contained the associated acceptance criteria for each critical characteristic, and that the CGS Dedication Procedure documented the acceptance of the critical characteristics.

b.1 USU Testing Services

The NRC inspection team reviewed the CGD package and related documents for QME-1 functional qualification testing supplied by USU. Enertech Production Order 121006-1, dated August 30, 2012 was issued to USU to perform QME-1 testing of the ERV-Z 8-inch nozzle check valve per Enertech Procedure MA22989, "Equipment Qualification Procedure for Enertech 8" – Class 1707 ERV-Z Nozzle Check Valve," Revision B, dated April 30, 2012. Enertech performed a commercial survey and accepted the USU commercial Quality Assurance Program for use during the testing.

The Enertech dedication of the testing services included a commercial grade survey and source inspection of test activities against the identified acceptance criteria. The NRC inspection team reviewed the dedication documents including CGS Dedication Procedure CGSD7468N, Revision A, dated August 23, 2012. This document detailed the dedication plan for the forward and reverse flow tests at USU and described the critical characteristics, acceptance methods, and process controls. The document included a section on measuring and test equipment (M&TE) controls and identified an Enertech commercial grade survey and source inspection as the acceptance methods. The NRC inspection team identified seven instruments that were being used for data collection at USU including:

- Fluke multi-meter used for pressure drop measurements
- Fluke multi-meter used for flow rate measurements
- Rosemount pressure transmitter used for digital display and measurement of pressure drop (Low Range)
- Rosemount pressure transmitter used for digital display and measurement of pressure drop (High Range)
- magnetic flow meter
- digital thermometer
- Avery weigh tank

The NRC inspection team reviewed the Enertech commercial grade survey report performed at USU on April 24, 2012 for verification of the controls for M&TE. The survey used the Nuclear Instrument Assessment Committee CGI/Service Checklist. The NRC inspection team noted that the survey report for M&TE only verified that USU had procedural controls in place for calibration. This included acceptance of calibration certificates from non-surveyed commercial suppliers by USU without verification of their validity. Neither USU nor Enertech performed any oversight of the commercial calibration service suppliers for the instruments used for the ASME QME-1 functional qualification tests. Consequently, the NRC inspection team determined that the commercial survey performed by Enertech at USU did not ultimately verify the calibration quality of the measuring instruments.

This issue is an example of Nonconformance 99901377/2012-201-02 for Enertech's failure to effectively implement a CGD to review for suitability of commercially procured calibration services at USU.

b.2 Nozzle Check Valve Diffuser

The NRC inspection team reviewed the dedication package and related documents for the diffuser used in the ERV-Z 8-inch nozzle check valve per Enertech Production Order 635668. Enertech Production Order 119185, dated May 3, 2011, was issued to PCC Structurals to supply diffuser castings to American Society for Testing Materials (ASTM) A351 Grade CF8M material specification. This Production Order also required PCC Structurals to provide a Certified Material Test Report (CMTR) per Enertech Equipment Qualification Procedure, MA22989, Revision B, paragraph 8.0, dated April 30, 2012.

The NRC inspection team reviewed CGI Dedication Procedure CGID8740S, Revision 0, dated August 23, 2012, and associated drawings and inspection reports to verify that; critical characteristics and verification methods were specified in the dedication plan, that the plan referenced drawings and material specifications, that acceptance criteria were identified for each critical characteristic, and that the CGI Dedication Procedure documented the acceptance of the critical characteristics.

During the review of the CGI Dedication Procedure, the NRC inspection team noted that it included material type and material specification as critical characteristics. The material was to be verified to meet ASME Code material specification by performing a review of the CMTR, which required that the material needed to meet ASTM A351 material specification. The dedication plan also included material type as a critical characteristic and that the material was to be Type 316 stainless steel as verified by performing a positive material identification (PMI) using an x-ray fluorescence (XRF) alloy analyzer. The CMTR provided by the commercial supplier identified that the material met the specification for ASTM A351 Grade CF8M. Enertech had not performed a commercial grade survey of this commercial supplier.

To implement the PMI technique on the diffuser, Enertech used the XRF (in air) alloy analyzer to verify that the material was Type 316 stainless steel and met the ASME Code SA material specifications. XRF is a characterization technique used for qualitative and semi-quantitative elemental analysis. XRF has limitations due to instrument constraints that do not allow for the detection of light atomic elements such as carbon, sulfur, phosphorus, and silicon. Because of this limitation, XRF should not be used to check for elemental compliance with standards. ASME Code Section II SA351 CF8M material specification contains maximum limits on carbon, phosphorus, sulfur, and silicon which XRF (in air) cannot detect. Consequently, as a single test, XRF did not adequately verify the chemical properties of the diffuser. The CGI Dedication Procedure specified no additional methods for verifying the material characteristics (including the chemical and mechanical properties).

This issue is an example of Nonconformance 99901377/2012-201-02 for Enertech's failure to adequately verify that the diffuser for the ERV-Z 8-inch nozzle check valve met the material specifications identified as critical characteristics in the associated CGI dedication procedure.

The inspectors also reviewed CGI Evaluation MA22004, Revision B, dated May 24, 2007, to verify that Enertech had adequately identified the safety function, critical characteristics, and acceptance methods for the critical characteristics for the diffuser. This evaluation was generic for all non-pressure retaining valve parts.

The NRC inspection team noted that neither the CGI dedication procedure nor the CGI technical evaluation included a documented justification for the sampling plans for acceptance of the critical characteristics. Enertech purchased the diffusers from a commercial supplier that Enertech did not survey to verify a traceability process for lot/batch heat number control. The CGI technical evaluations did not include a documented basis for the sample plans for testing items received from commercial suppliers for which lot/batch homogeneity had not been verified. Accepting the validity of the material certification report from a commercial supplier is not acceptable without verification of the supplier's lot/batch control. In addition, neither the Enertech CGI dedication procedure nor the CGI technical evaluation addressed or documented the sampling plan basis beyond use of the standard (normal) Electric Power Research Institute (EPRI) 07218 sampling plan.

This issue is an example of Nonconformance 99901377/2012-201-02 for Enertech's failure to adequately verify critical characteristic material properties based on sample testing that included a documented justification for the sampling plans that were being implemented for acceptance of critical characteristics of the diffuser.

b.3 Nozzle Check Valve Retaining Rings

The NRC inspection team reviewed the dedication package and related documents for the retaining rings used in the ERV-Z 8-inch nozzle check valve for Enertech Production Order 635668. Enertech Production Order 119944-1, dated December 14, 2011, was issued to Bearings Engineers Inc. to supply 40 large (9.5") and 40 small (.932") retaining rings to the American Iron and Steel Institute (AISI) Type 302 stainless steel material specification. The Production Order also required Bearings Engineers Inc. to provide a material certification for the retaining rings.

During review of the CGI dedication procedure, the NRC inspection team noted that it included the material Type 300 stainless steel as the critical characteristic and required acceptance using the PMI technique in accordance with procedures. The Enertech material verification process using PMI states that, "the test methods outlined in this are intended to identify alloy materials and are not intended to establish the exact conformance of a material to a particular alloy specification." The CGI dedication procedure did not include or specify any other methods for verifying the material characteristics or the mechanical properties.

The NRC inspection team also reviewed CGI Evaluation MA21723, Revision B, dated October 24, 2006, which was provided as the CGI evaluation procedure for the retaining rings. However, this CGI evaluation was generic for spring clips of various configurations, which are used to retain a spring-loaded or press-fitted component within a housing or a piston shaft to a two piece assembly. There was no CGI evaluation specific to the ERV-Z 8-inch nozzle check valve retaining rings.

This issue is an example of Nonconformance 99901377/2012-201-02 for Enertech's failure to adequately verify that the retaining rings for the ERV-Z 8-inch nozzle check valve met the material specifications identified as critical characteristics in the associated CGI dedication procedure.

The NRC inspection team noted that neither the CGI dedication procedure nor the CGI technical evaluation included a justification for the sampling plan of 9 tested out of 40 items received, that were being implemented for acceptance of the critical characteristics. Enertech purchased the retaining rings from a commercial supplier that had not been surveyed to verify a traceability process for lot/batch heat number control. Similar to what was done for the diffuser, the CGI technical evaluations that were performed as part of the dedication did not include a documented basis for the sample plans for testing items received from commercial suppliers for which lot/batch homogeneity had not been verified. In addition, neither the Enertech CGI dedication procedure nor the CGI technical evaluation addressed or documented the sampling plan basis beyond use of the standard (normal) EPRI 07218 sampling plan.

This issue is an example of Nonconformance 99901377/2012-201-02 for Enertech's failure to adequately verify the critical characteristic for material properties based on sample population testing that did not include a documented justification for the sampling plans that were being implemented for acceptance.

c. Conclusions

The NRC inspection team issued Nonconformance 99901377/2012-201-02 in association with Enertech's failure to implement the regulatory requirements in Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. Specifically, Nonconformance 99901377/2012-201-02 cites Enertech for not effectively implementing a CGD program to review the suitability of the application of commercially procured calibration services at USU and the verification of ERV-Z 8-inch nozzle check valve items and materials that are essential to the safety-related functions of structures, systems, and components. In addition, the CGI technical evaluations performed as part of the dedication did not include a basis for sample testing items from commercial suppliers for which lot/batch homogeneity had not been verified.

5. Oversight of Contracted Activities

a. Inspection Scope

The NRC inspection team reviewed the policies and implementing procedures that govern the implementation of Enertech's oversight of contracted activities to verify compliance with the regulatory requirements in Criterion IV, "Procurement Document Control"; Criterion VII, "Control of Purchased Material, Equipment, and Services"; and Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed a sample of POs and external audit reports associated with the ERV-Z 8-inch nozzle check valve to evaluate compliance with Enertech's program and technical requirements. In addition, the NRC inspection team reviewed Enertech's approved suppliers list (ASL) to verify that it maintains the list as current.

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

b. Observations and Findings

b.1 Review of Vendor Audit Reports

The NRC inspection team reviewed a sample of external audits to verify that Enertech had prepared and approved plans identifying the scope, focus, and applicable checklist criteria before the initiation of the audit activity. The NRC inspection team also verified that Enertech adequately implemented its program and evaluated the vendor's compliance with the applicable requirements in Appendix B to 10 CFR Part 50 and that audit reports contained sufficient objective evidence to support the conclusions made by Enertech. Additionally, the NRC inspection team verified that acceptance of the supplier for addition to, or to be continued on, the ASL was documented using an assessment evaluation form. For audits that resulted in findings, the NRC inspection team verified that the supplier had established a plan for corrective action and that Enertech had tracked, reviewed, and approved the corrective action and had verified its satisfactory completion and proper documentation. The NRC inspection team reviewed a sample of lead auditor qualifications and confirmed that auditing personnel had proper qualification and certification in accordance with Enertech procedures.

b.2 Maintenance of the Approved Suppliers List (ASL)

The NRC inspection team reviewed the Enertech ASL to ensure that qualified and approved suppliers were listed. The NRC inspection team also confirmed that suppliers that perform work for Enertech related to the ERV-Z 8-inch nozzle check valves were appropriately listed on the ASL. Additionally, the NRC inspection team confirmed that the scope of supply was documented and consistent for the activities contracted. The NRC inspection team also verified that only authorized personnel maintained, distributed, and periodically updated the list and that any revisions were implemented in accordance with the applicable procedures.

b.3 Procurement Document Control

The NRC inspection team reviewed a sample of Enertech-issued POs related to the ERV-Z 8-inch nozzle check valve to determine that the requirements identified in the QAM and applicable procedures were imposed on applicable purchasing documents. The NRC inspection team verified that the POs adequately documented the procurement requirements as established by Enertech's governing policies and implementing procedures, which include (1) task definitions and responsibilities, (2) imposition of appropriate quality, technical, and regulatory requirements (e.g., a clause invoking the provisions of 10 CFR Part 21), and (3) identification of applicable codes and standards. The NRC inspection team also found that these POs adequately defined contract deliverables, the disposition of nonconformances, and the extension of contractual requirements to subcontractors.

c. Conclusion

The NRC inspection team concluded that Enertech is implementing its oversight of contracted activities consistent with the regulatory requirements in Criterion IV, Criterion VII, and Criterion XVIII of Appendix B to 10 CFR Part 50. No findings of significance were identified.

6. Test Control and Configuration Management

a. Inspection Scope

The NRC inspection team reviewed the policies and procedures that govern the implementation of Enertech's control and oversight of testing activities to verify compliance with the regulatory requirements in Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed a sample of procedures and plans associated with the testing and qualification conducted on an ASME Code, Section III, Class 1 ERV-Z 8-inch nozzle check valve to evaluate compliance with the QAM and program requirements.

The NRC inspection team witnessed the code qualification testing activities of ASME QME-1-2007, "Qualification of Active Mechanical Equipment Used in Nuclear Power Plants," to verify the design and operation of the ERV-Z 8-inch nozzle check valve. Additionally, the NRC inspection team witnessed the ASME Section III hydrostatic test, ASME Section III seat leakage test, jet test, and operability test. The inspection team witnessed testing activities at USU in Logan, UT, and at Enertech in Brea, CA.

The NRC inspection team observed the disassembly and assembly of the ERV-Z 8-inch nozzle check valve and reviewed manufacturing and fabrication documents to verify that Enertech had performed assembly activities in accordance with the applicable design, quality, and technical requirements imposed in the WEC PO.

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

b. Observations and Findings

The NRC inspection team witnessed the following testing activities performed on a fully assembled ERV-Z 8-inch nozzle check valve:

- ASME QME-1 flow qualification test (forward flow)
- ASME QME-1 flow qualification test (reverse flow)
- ASME Section III hydrostatic test
- ASME Section III seat leakage test
- Jet test
- Operability test

This testing will be used to qualify the ERV-Z 8-inch nozzle check valve for safety-related use in the WEC AP1000 nuclear power plant. The following sections summarize the testing conducted by Enertech and witnessed by the NRC.

ASME QME-1 Flow Qualification Test (Forward Flow)

The ASME QME-1 forward flow qualification test conducted at USU was performed at various flow rates with flow and pressure measurements recorded and used to determine the average flow coefficient (C_v). The flow qualification test determined that the C_v for the ERV-Z 8-inch nozzle check valve was acceptable. These test

activities apply to AP1000 component numbers PXS-PL-V016A, PXS-PL-V016B, PXS-PL-V017A, and PXS-PL-V017B.

ASME QME-1 Flow Qualification Test (Reverse Flow)

The flow qualification test was also performed in the reverse direction to verify that the nozzle check valve would close below its maximum designed reverse flow rate. The reverse flow test was completed satisfactorily. These test activities apply to AP1000 component numbers PXS-PL-V016A, PXS-PL-V016B, PXS-PL-V017A, and PXS-PL-V017B.

ASME Section III Hydrostatic Test

The hydrostatic test was performed at a pressure of 6,200 psig for 15 minutes to verify the valve's pressure boundary integrity met the requirements in Section III of the ASME Code. This test pressure met the requirement in Section III of the ASME Code to test the valve at 150 percent of its 100 degree Fahrenheit pressure rating for the pressure class of the valve, which, for Enertech's ERV-Z 8-inch nozzle check valve, was a custom code pressure rating of 1,707 psig. This test activity may be used to support closure of ITAAC 2.2.03.04a, which states that "a report exists and concludes that the results of the hydrostatic test of the components identified in Table 2.2.3-1 as ASME Code Section III conform with the requirements of the ASME Code Section III." These test activities apply to AP1000 component numbers PXS-PL-V016A, PXS-PL-V016B, PXS-PL-V017A, and PXS-PL-V017B.

ASME Section III Seat Leakage Test

The seat leakage test was performed at a pressure of 2,820 psig for a minimum of 10 minutes to verify the valve's seat leakage integrity in the closed position to demonstrate that the ASME Code section III, Manufacturers Standardization Society standard and WEC requirements were met. This test pressure met the requirement to test the valve at 110 percent of the valve's design pressure. This test data may be used to support closure of ITAAC 2.2.03.02a, which states that "the ASME Code Section III design reports exist for the as-built components identified in Table 2.2.3-1 as ASME Code Section III." These test activities apply to AP1000 component numbers PXS-PL-V016A, PXS-PL-V016B, PXS-PL-V017A, and PXS-PL-V017B.

Jet Test

The jet test was performed to ensure proper closing of the valve to verify its freedom of movement to change positions to perform its active safety-related function. When the test pressure was removed, the valve repositioned to the open position. The main purpose of the jet test was to demonstrate that Enertech can perform future testing in the plant to show that the nozzle check valve will close within its design parameters and then reopen after testing to demonstrate operability in its in-service state. These test activities apply to AP1000 component numbers PXS-PL-V016A, PXS-PL-V016B, PXS-PL-V017A, and PXS-PL-V017B.

Operability Test

The operability test was performed to demonstrate that the valve can be manually closed and provide for future visual inspection without disassembly to determine its internal condition.

b.1 Review of ASME QME-1 Requirements

Section QV-2000, "Purpose," of ASME QME-1-2007 states, in part, that "the purpose of Section QV is to provide requirements for the qualification of the design of valves to perform in service as required under all specified operating and design basis conditions." In addition, Section QV-7561.2 states, in part, that "if flow reversal can occur prior to valve closure, a test shall be performed to simulate the reverse flow and the valve open position to verify that sealing parts remain intact." Contrary to this requirement, the NRC inspection team observed that the functional qualification testing performed in accordance with Enertech Procedure MA22989, "Equipment Qualification Procedure for Enertech 8"—Class 1707 ERV-Z Nozzle Check Valve," Revision B, dated April 30, 2012, did not simulate the open-close-open function of the valve under all specified operating and design basis conditions and that the valve was not tested for sudden impact closure due to a line break or flow reversal as required by ASME QME-1-2007. This issue has been identified as Nonconformance 99901377/2012-201-03.

The NRC inspection team noted during this inspection that Enertech had not completed ERV-Z 8-inch nozzle check valve qualification testing. Consequently, the qualification report in accordance with Section QR-8000 of ASME QME-1-2007 was not available for inspection. The NRC will review the qualification report for compliance with ASME QME-1-2007 during the ITAAC closure process.

c. Conclusions

The NRC inspection team concluded that Enertech is implementing its test program for the ERV-Z 8-inch nozzle check valves in accordance with Criterion XI of Appendix B to 10 CFR Part 50. Based on the documents reviewed and the testing observed, the NRC inspection team determined that Enertech performed the nozzle check valve testing in accordance with written test procedures that incorporate the requirements and acceptance limits contained in applicable design documents. However, Criterion XI of Appendix B to 10 CFR Part 50 specifically states that the test program shall ensure that testing will demonstrate that components will perform satisfactorily in service. Nonconformance 99901377/2012-201-03 cites Enertech for failing to include adequate testing in accordance with ASME QME-1-2007, QV-2000, to demonstrate that the valve will perform satisfactorily in service.

7. Control of Special Processes

a. Inspection Scope

The NRC inspection team reviewed the implementing procedures and various records related to the control of welding and nondestructive examination (NDE) of the ERV-Z 8-inch nozzle check valve documented in Enertech Production Order 635668, "Item Number D7468N—Valve, Check; 8-1500," dated April 18, 2012, to verify compliance

with Section III of the ASME Code and the requirements in Criterion IX, "Control of Special Processes," of Appendix B to 10 CFR Part 50. To verify that Enertech's implementation and control of welding and NDE were adequate, the NRC inspection team reviewed the following items:

- Enertech procedures that govern welding and NDE
- WEC guidance documents and requirements
- Enertech Production Order 635668 and associated documents

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

b. Observations and Findings

The Enertech QAM, Fourth Edition, Section 9, describes the control of special processes for the fabrication of items under Section III of the ASME Code. It also describes the following items:

- the process for the preparation, issue, distribution, and implementation of production orders for manufacturing operations
- the general welding process requirements and limitations
- the controls in place for the performance of NDE and for the qualification and certification of NDE personnel

The NRC inspection team verified that Enertech's manufacturing process used Production Order 635668 as the method for controlling shop production activities during the fabrication of the ERV-Z 8-inch nozzle check valve. PO 635668 incorporates witness and hold points for the customer and the authorized nuclear inspector (ANI) and QC, as applicable, and identifies the drawings, material specifications, work instructions, and procedures applicable to the manufacturing activity under performance. The NRC inspection team concluded that the production order ensured that the fabrication activities were accomplished in accordance with specified requirements and were conducted in the correct operational sequence.

b.1 Welding

EOP 5005, "ASME Code and Safety-Related Welding Qualifications," Revision D, dated July 26, 2012, establishes the specific instructions for the qualification and certification of welding procedures and performance qualification of welding processes in accordance with the requirements in Section IX of the ASME Code, as supplemented by Section III of the ASME Code, and in accordance with the customer's contract. The NRC inspection team reviewed the welding procedure specification, the supporting welding procedure qualification record, the welder performance qualification record, and customer requirements associated with the welding performed on the ERV-Z 8-inch nozzle check valve.

The NRC inspection team verified that a qualified welder performed all welding on the ERV-Z 8-inch nozzle check valve in accordance with an approved welding

procedure. The welder was qualified in accordance with the requirements in the Enertech QAM, customer requirements, and Sections III and IX of the ASME Code. As a result of the review of the documentation related to welding activities performed on the ERV-Z 8-inch nozzle check valve, the NRC inspection team confirmed that the welding material certificate of material test report complied with PO and material specification requirements and verified completion of signoff of all required steps in the production order, including QC and ANI witness or hold points, associated with welding.

b.2 Control of Weld Material

EOP 5002, "Filler Metal Issue and Control," Revision F, dated July 26, 2012, establishes the method for storage, control, and accountability for weld filler materials used on ASME Code projects. This procedure applies to all weld filler material purchased for use on ASME Code and safety-related projects for which welding was performed by Enertech.

The NRC inspection team inspected documentation associated with the issuance and control of ASME filler material. The NRC inspection team also inspected the filler metal storage area. The filler metal storage area met the requirements in Section 9 of the Enertech QAM and in EOP 5002. Additionally, Enertech properly maintained the filler metal issuance log and the log sheet with the exception of some minor typographical errors on the log sheet. The NRC inspection team noted that Enertech corrected the typographical errors during the inspection.
The NRC inspection team verified Enertech's process for welding material control through interviews and through the review of welding material control records. Enertech used a welding material control log to control welding material. The weld filler metal issue and control was in accordance with EOP 5002. The filler metal is released by the Enertech warehouse staff and verified by a QC inspector.

The NRC inspection team verified the implementation of this process, by the review of records, for the withdrawal and release of stainless steel weld filler material used to weld the ERV-Z 8-inch nozzle check valve pressure boundary at the four inspection and test ports. The NRC inspection team verified that Enertech controlled welding material through use of the filler metal issuance log. The correct heat/lot number of the welding material was identified on the filler metal issuance log released by warehouse staff and was verified by a QC inspector.

b.3 NDE

The NRC inspection team reviewed NDE records for the pressure-retaining welds on the ERV-Z 8-inch nozzle check valve identified in Production Order 635668. Enertech procured liquid penetrant examination services from Element Materials Technology (formally Stork Material Testing and Inspection) through Enertech PO 120578. The NRC inspection team reviewed the certification records of the NDE inspector and NDE reports for the ERV-Z 8-inch nozzle check valve pressure-retaining welds and verified that the NDE inspector was properly qualified and that all welds were found acceptable and met the requirements in Section III of the ASME Code. The NRC inspection team also verified that Enertech performed an audit to verify that Element Materials Technology's quality manual was in compliance with Appendix B to 10 CFR Part 50, Section NB-5520 of the ASME

Code, and American Society for Nondestructive Testing SNT-TC-1A, "Personnel Qualification and Certification in Nondestructive Testing."

c. Conclusions

The NRC inspection team concluded that Enertech's program for the control of special processes was consistent with the regulatory requirements in Criterion IX of Appendix B to 10 CFR Part 50. Based on the records reviewed, the NRC inspection team concluded that qualified personnel effectively implemented the Enertech QAM and associated fabrication and special process procedures using qualified equipment and processes for the fabrication of the ERV-Z 8-inch nozzle check valve and that the welding and NDE met the requirements in Section III of the ASME Code. This inspection activity may be used to support closure of ITAAC 2.2.03.03a, which states that "pressure boundary welds in components identified in Table 2.2.3-1 as ASME Code Section III meet ASME Code Section III requirements." These weld activities apply to AP1000 component numbers PXS-PL-V016A, PXS-PL-V016B, PXS-PL-V017A, and PXS-PL-V017B.

8. Control of Measuring and Test Equipment

a. Inspection Scope

The NRC inspection team reviewed the policies and implementing procedures that govern Enertech's oversight and control of M&TE to verify compliance with the regulatory requirements in Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. The NRC inspection team observed activities associated with the testing of the ERV-Z 8-inch nozzle check valve and with the M&TE used during the testing. The NRC inspection team reviewed a sample of calibration records associated with the M&TE used during testing of the ERV-Z 8-inch nozzle check valve to evaluate compliance with Enertech's program and technical requirements.

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

b. Observations and Findings

The NRC inspection team observed that the M&TE used at Brea, CA during the testing of the ERV-Z 8-inch nozzle check valve did not have calibration stickers with the current calibration dates. The NRC inspection team reviewed the associated calibration records and determined that they were current and available for review. However, Enertech had not placed new calibration stickers on the M&TE that was used for testing. The NRC inspection team reviewed a sample of calibration records and verified that they included information on the "as-found" and "as-left" conditions, calibration results, reference standards, calibration date, and the due date for recalibration. The NRC inspection team also verified that the selected M&TE was calibrated using procedures traceable to known industry standards and certified equipment that has known valid relationships to nationally recognized standards.

The Enertech QAM states, in part, that "M&TE shall be calibrated prior to and after each code specified acceptance test." The QAM also states that "M&TE shall be permanently marked with a unique identifier." M&TE used during the seat leakage test on the ERV-Z 8-inch nozzle check valve was not post test calibrated, and other M&TE used for testing

did not have permanent markings. The NRC inspection team observed personnel using M&TE during assembly and inspection work performed on the ERV-Z 8-inch nozzle check valve and valve components. Additionally, the NRC inspection team witnessed direct measurement verification of the critical components of the valve after testing to determine whether any changes had occurred as a result of testing.

c. Conclusion

The NRC inspection team issued Nonconformance 99901377/2012-201-04 in association with Enertech's failure to implement the regulatory requirements in Criterion XII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and activities witnessed, the NRC inspection team concluded that Enertech is not implementing its policies and procedures associated with control of M&TE. Nonconformance 99901377/2012-201-04 cites Enertech for failing to verify that M&TE used in the qualification testing of the ERV-Z 8-inch nozzle check valve displayed accurate calibration labels, that M&TE used for code related tests were calibrated before and after each use, and that all M&TE had permanent markings to identify the equipment.

9. Nonconforming Material, Parts, or Components

a. Inspection Scope

The NRC inspection team reviewed policies, implementing procedures, and records that govern the control of nonconforming material, parts, and components to verify compliance with Criterion XV, "Nonconforming Materials, Parts, or Components," of Appendix B to 10 CFR Part 50. To verify that Enertech's implementation and control over these processes were adequate, the NRC inspection team reviewed the following items:

- Enertech procedures that govern corrective action and control and correction of nonconforming items
- the corrective action log, the NMR log, several NMRs, and several CARs

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

b. Observations and Findings

The NRC inspection team verified that Enertech has programs in place to address nonconforming material, parts, or components. The programs are effective because procedures describe them, they are applied practically, and they incorporate training.

Because no NMRs were associated with the ERV-Z 8-inch nozzle check valve, the inspectors reviewed a representative sample of NMRs from previous nozzle check valve models and NMRs that resulted in CARs.

The NRC inspection team observed that Enertech conducts a trend analysis on nonconforming material, parts, and components quarterly and generates an annual

report that is provided to the general manager. This report summarizes the program during the previous calendar year and informs the process for selecting suppliers.

The NRC inspection team observed that there was a clear connection between the nonconforming material, parts, and components program and the 10 CFR Part 21 program.

c. Conclusions

The NRC inspection team concluded that Enertech is implementing its nonconforming material, parts, and components program in accordance with 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 Enertech is implementing its policies and procedures associated with its nonconforming material, parts, and components. No findings of significance were identified.

10. Corrective Actions

a. Inspection Scope

The NRC inspection team reviewed various policies, implementing procedures, and records that govern the corrective actions to verify compliance with Criterion XVI, "Corrective Actions," of Appendix B to 10 CFR Part 50. To verify that Enertech's implementation and control over these processes were adequate, the NRC inspection team reviewed the following items:

- Enertech procedures that govern corrective action and control and correction of nonconforming items
- the corrective action log, the NMR log, several NMRs, several CARs, and several 10 CFR Part 21 evaluations

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

b. Observations and Findings

The NRC inspection team verified that Enertech has programs in place to address corrective actions. The procedures describe the programs, and the programs are applied practically and incorporate training.

Because no CARs were associated with the ERV-Z 8-inch nozzle check valve, the inspectors reviewed a representative sample of CARs to ensure a representation of internal and external CARs and open and closed CARs. Additionally, 10 CFR Part 21 evaluations were reviewed to verify their tracking through the CAR system, as appropriate.

The NRC inspection team observed that Enertech conducts a trend analysis on corrective actions quarterly and generates an annual report that is provided to the general manager. This report summarizes the program during the previous calendar year and informs the process for selecting suppliers.

The NRC inspection team verified that Enertech has a procedural connection to ensure the evaluation of corrective actions for 10 CFR Part 21 applicability. However, the inspection team noted a deficiency in the system of having issues that were initiated as 10 CFR Part 21 evaluations captured in the corrective action program. Specifically, the following 10 CFR Part 21 evaluations describe corrective actions that were never captured in the CAR program:

- NRC 10-002, "Potential 10CFR21 Reportable Item, Body Seat or Seat Ring Not Adequately Press Fit," dated April 6, 2010
- NRC 11-001, "Potential10CFR21 Reportable Item, Actuator Circuit Boards, dated August 1, 2011
- NRC 11-002, "Potential 10CFR21 Reportable Item, Actuator Circuit Boards," dated September 20, 2011

Furthermore, NRC 11-001 and NRC 11-002 describe conditions with the potential arcing and short-circuiting of actuator circuit boards. Those evaluations committed to specific corrective actions, including sending letters to customers and making a replacement parts kit and installation instructions available. As of September 21, 2012, there was no objective evidence that CARs were ever opened on these issues or evidence that specific corrective actions were completed.

c. Conclusions

The NRC inspection team issued Nonconformance 99901377/2012-201-05 in association with Enertech's failure to implement the regulatory requirements in Criterion XVI of Appendix B to 10 CFR Part 50. Nonconformance 99901377/2012-201-05 cites Enertech for failing to complete corrective actions. Specifically, Enertech failed to initiate a CAR related to the potential arcing and short-circuiting of actuator circuit boards and failed to provide instructions and replacement parts kit to customers as described in the 10 CFR Part 21 evaluations NRC11-001 and NRC 11-002.

11. Quality Assurance Records

a. Inspection Scope

The NRC inspection team reviewed the policies and implementing procedures that govern the implementation of Enertech's oversight and control of quality assurance records to verify compliance with the regulatory requirements in Criterion XVII, "Quality Assurance Records," of Appendix B to 10 CFR Part 50. The NRC inspection team observed the storage of Enertech's M&TE calibration records. The NRC inspection team reviewed a sample of calibration records associated with M&TE used for testing and the storage of these calibration records to evaluate compliance with Enertech's program requirements.

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

b. Observations and Findings

The NRC inspection team reviewed records associated M&TE used during testing, assembly, disassembly, and inspection work performed on an ERV-Z 8-inch nozzle check valve. The NRC inspection team observed that Enertech was not controlling M&TE calibration records per the Enertech QAM and EOP 8170, "Quality Assurance Records," Revision Q, dated September 22, 2011, to prevent unauthorized personnel from accessing such records and that these quality records were not protected against damage or loss.

c. Conclusions

The NRC inspection team issued Nonconformance 99901377/2012-201-06 in association with Enertech's failure to implement the regulatory requirements in Criterion XVII of Appendix B to 10 CFR Part 50. Specifically, the NRC inspection team concluded that Enertech had not stored quality records in a controlled area to prevent access by unauthorized personnel and that these records were not protected against loss. Nonconformance 999013771/2012-201-06 cites Enertech for failing to limit access to quality calibration records by authorized personnel only and to protect such records against loss, damage, or destruction from disasters, such as fire.

12. Entrance and Exit Meetings

On August 27, 2012, the NRC inspection team discussed the Phase 1 inspection scope during an entrance meeting with Mr. John DeKleine, Enertech's Director of Quality Assurance, and other Enertech personnel. On August 28, 2012, the NRC inspection team presented the inspection results from Phase 1 to Mr. DeKleine and other Enertech personnel. On September 17, 2012, the NRC inspection team reviewed the Phase 1 results and discussed the Phase 2 inspection scope during an entrance meeting with Mr. Stan Miller, Enertech's General Manager, and other Enertech personnel. On September 20, 2012, the NRC inspection team presented the inspection results during an exit meeting with Mr. Miller and other Enertech personnel. Enertech invited personnel from WEC to attend each entrance and exit meeting. At the NRC's request and through Enertech approval, two members from the Chinese regulator, the National Nuclear Safety Administration, observed all aspects of Phase 2 of the inspection, including the entrance and exit meetings.

ATTACHMENT

1. PERSONS CONTACTED

Name	Title	Affiliation	Phase 1 Entrance	Phase 1 Exit	Phase 2 Entrance	Phase 2 Exit	Interviewed
Stan Miller	General Manager	Enertech			X	X	
Michael Lapp	Plant Manager	Enertech			X	X	X
Haykaz Mkrtchyan	Principal Engineer	Enertech	X	X		X	X
John Dekleine	Director, Quality Assurance	Enertech	X	X	X	X	X
Paul Mawn	Vice President of Sales and Marketing	Enertech	X	X	X	X	
Edward Buzby	Contracts Manager	Enertech			X	X	
Ararat Torosyan	Director of Operations	Enertech			X	X	X
Tad Gray	Vice President of Operational Excellence	Enertech			X	X	
Avi Shelcoviz	Director Technology	Enertech			X	X	X
Loretta Anaya	Quality Assurance Engineer	Enertech			X	X	X
Kim Serrano	Purchasing Manager	Enertech			X		
Patrick Schaller	Project Engineer	Enertech					X
Dan Hewitt	Logistics Supervisor	Enertech					X
Ira Silverman	Senior Principal Engineer	Enertech					X
Gary Ames	Welder	Enertech					X
Louis Lares	QC Supervisor	Enertech					X
Sherree Chaffino	QA Admin Assistant	Enertech					X

Name	Title	Affiliation	Phase 1 Entrance	Phase 1 Exit	Phase 2 Entrance	Phase 2 Exit	Interviewed
Joe DiNichols	Machine Operator	Enertech					X
Derek Bounds	Quality Control Technician	Enertech					X
Ron Tomon	Principal Product Engineer	WEC	X	X	X		
Preston Vock	Manager, Valve Engineering	WEC	X	X			
Anthony Trupiano	Principal Engineer	WEC	X	X	X		
Ed Drake	Senior Equipment Qualification Engineer	WEC	X	X	X		
Ron Wessel	Principal Engineer	WEC			X	X	
Richard McIntyre	Team Lead	NRC	X	X	X	X	
Edward Roach	Branch Chief	NRC			X	X	
James Strnisha	Mechanical Engineer	NRC	X	X	X	X	
Brent Clarke	Vendor Inspector	NRC	X	X	X	X	
Robert Davis	Reactor Operations Engineer	NRC			X	X	
John Bartleman	Senior Construction Inspector	NRC	X	X	X	X	
Donna Jackson	Construction Inspector	NRC				X	
Gao Runsheng	Inspector	NNSA (China)			X	X	
Zhao Dawei	Inspector	NNSA (China)			X	X	

2. INSPECTION PROCEDURES USED

Inspection Procedure (IP) 36100, “Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance,” dated April 25, 2011

IP 43002, “Routine Inspections of Nuclear Vendors,” dated April 25, 2011

IP 43004, “Inspection of Commercial-Grade Dedication Programs,” dated April 25, 2011

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

The following items were found during this inspection:

Item Number	Status	Type	Description
99901377/2012-201-01	Open	NOV	10 CFR 21.21(b)
99901377/2012-201-02	Open	NON	Criterion III
99901377/2012-201-03	Open	NON	Criterion XI
99901377/2012-201-04	Open	NON	Criterion XII
99901377/2012-201-05	Open	NON	Criterion XVI
99901377/2012-201-06	Open	NON	Criterion XVII

4. INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA

The NRC inspection team identified the following inspections, tests, analyses, and acceptance criteria (ITAAC) related to the ERV-Z 8-inch nozzle check valves. This section references these ITAAC for future use by the NRC staff during the ITAAC closure process; it by no means constitutes that the ITAAC have been met and closed.

AP1000 Design Control Document, Tier 1, Revision 19	Table 2.2.3-4	ITAAC 2.2.03.02a
AP1000 Design Control Document, Tier 1, Revision 19	Table 2.2.3-4	ITAAC 2.2.03.03a
AP1000 Design Control Document, Tier 1, Revision 19	Table 2.2.3-4	ITAAC 2.2.03.04a
AP1000 Design Control Document, Tier 1, Revision 19	Table 2.2.3-4	ITAAC 2.2.03.05a.ii

5. DOCUMENTS REVIEWED

Enertech Manuals and Procedures

- Enertech Quality Assurance Manual, Fourth Edition, Revision 19, dated March 8, 2012
- Enertech Operating Procedure (EOP) 3140, “Procedure for the Dedication of Commercial-Grade Items/Services,” Revision AJ, dated July 26, 2012
- EOP 3175, “Procedure for Qualification of Professional Engineers,” Revision E, dated August 23, 2012
- EOP 4501, “Qualification and Certification of NDE Personnel,” Revision E, dated August 23, 2012
- EOP 5002, “Filler Metal Issue and Control,” Revision F, dated July 26, 2012

- EOP 5005, “ASME Code and Safety Related Welding Qualifications,” Revision D, dated July 26, 2012
- EOP 6003, “Procedure for the Preparation of the Purchase Requisition,” Revision J, dated July 26, 2012
- EOP 6004, “Purchase Order Processing,” Revision K, dated July 26, 2012
- EOP 8020, “Indoctrination and Training of Personnel Affecting Quality Activities,” Revision O, dated July 26, 2012
- EOP 8021, “Qualification and Certification of Auditors and Lead Auditors,” Revision O, dated December 21, 2011
- EOP 8023, “Procedure for the Qualification of Personnel Performing Activities Affecting Quality,” Revision O, dated September 30, 2011
- EOP 8120, “Calibration and Control of Measuring Test Equipment,” Revision Q, dated October 15, 2008
- EOP 8150, “Processing of Nonconforming Material Reports,” Revision AA, dated July 24, 2012
- EOP 8170, “Quality Assurance Records,” Revision Q, dated September 22, 2011
- EOP 8180, “Audit and Planning Procedure,” Revision R, dated September 30, 2011
- EOP 8160, “Procedure for Corrective Action,” Revision U, dated February 25, 2011
- EOP 8185, “Procedure for Commercial Grade Survey,” Revision H, dated September 30, 2011
- EOP 8200, “Employee Non-Discrimination Rights, and Reporting Requirements concerning Defects and Noncompliance,” Revision P, dated January 1, 2012
- Enertech Procedure MA22867, “Design and Seismic Analysis Report for Enertech 8-Inch—ANSI 1707 Type ERV-Z Nozzle Check Valve,” Revision E, dated September 12, 2012
- Enertech Procedure MA22874, “Equipment Qualification Plan for Enertech 8 Inch—Class 1707 Type ERV-Z Nozzle Check Valve,” Revision B, dated August 30, 2012
- Enertech Procedure MA22886, “Test Procedure for Normally Open Nozzle Check Valve,” Revision E, dated September 13, 2012
- Enertech Procedure MA22989, “Equipment Qualification Procedure for Enertech 8"—Class 1707 ERV-Z Nozzle Check Valve,” Revision B, dated April 30, 2012
- Enertech Procedure MA23709, “Verification and Validation of MathCad Prime 1.0 Software,” Revision 0, dated May 23, 2011
- Enertech Procedure MA24148, “Verification and Validation of ANSYS Mechanical v.13 Software,” Revision A, dated November 28, 2011
- Enertech Procedure MA24192, “Spring Qualification for Enertech 8" ANSI Class 1707 Normally Open Nozzle Check Valve,” Revision A
- Enertech Procedure MA24560, “CGS Evaluation for Performance Testing Services,” Revision 0, dated May 4, 2012
- Enertech Procedure MA24750, “Sensitivity Analysis Report for Enertech ANSI 1707, ERV-Z, N.O. [Normally Open] w/Position Indicator,” Revision 0, dated July 11, 2012
- Enertech Procedure PA92491, “Calibration Procedure for Pressure Gauges,” Revision H, dated August 9, 2012

- Enertech CGS Dedication Procedure CGSD7468N, Revision A, dated August 23, 2012
- Enertech CGI Dedication Procedure CGID8740S, Revision 0, dated August 23, 2012
- Enertech Welding Procedure PA98159, "ASME Welding Procedure Specification P-8 to P-8," Revision F, dated October 5, 2009

Drawings

- Enertech Drawing MC23002, "Disc Assembly, 8-1500 ERV-Z," Revision C, dated September 13, 2012
- Enertech Drawing MD22849, "Nozzle Check Valve, 8"—Class 1707, ERV-Z, N.O. w/ Position Indicator," Revision L, dated September 12, 2012

Corrective Action Requests

- Corrective Action Request (CAR) 2024, "Duke Energy QA Surveillance on August 16–17, 2012, and Resulted in Deficiency Report Number VS12204-01 with 4 Issues," dated August 21, 2012
- CAR 2023, "CCI Shin Kori Incorrectly Installed Orifice," dated August 10, 2012
- CAR 2022, "Baldor QA Manual Procedures," dated June 6, 2012
- CAR 2019, "Manifold Assembly Shipped without Coils," dated May 17, 2012
- CAR 2018, "Missed Commercial-Grade Dedication Test," dated April 20, 2012
- CAR 2007, "Stork Material Testing and Inspection, No Internal Audits," dated September 21, 2011
- CAR 1976, "Missed Stuffing Box Heat Treatment," dated August 25, 2010
- CAR 1973, "Material List Not Matching As-Built on Pump," dated July 20, 2010
- CAR 1971, "Pump Bearing Wiped and Missing O-Rings," dated July 22, 2010
- CAR 2027, "M&TE Missing Accurate Calibration Labels and Permanent Markings," dated September 20, 2012

10 CFR Part 21 Evaluations

- NRC 10-002, "Potential 10CFR21 Reportable Item, Body Seat or Seat Ring Not Adequately Press Fit," dated April 6, 2010
- NRC 10-003, "Potential 10CFR21 Reportable Item, Pump Bearing Wiped and Missing O-Rings," dated July 13, 2010
- NRC 10-004, "Potential 10CFR21 Reportable Item, Material List Not Matching As-Built on Pump," dated July 17, 2010
- NRC 10-005, "Potential 10CFR21 Reportable Item, Missed Stuffing Box Heat Treatment," dated December 7, 2010
- NRC 11-001, "Potential 10CFR21 Reportable Item, Actuator Circuit Boards," dated August 1, 2011

- NRC 11-002, “Potential 10CFR21 Reportable Item, Actuator Circuit Boards,” dated September 20, 2011

Audit Reports

- Audit Report of Energy and Process Corporation, dated January 26, 2008
- Audit Report of Center Tool and Machine Company, dated March 1, 2010
- Audit Report of JAH Machine Company, dated May 27, 2011
- Audit Report of Wilcox Machine Company, dated August 9, 2011
- Audit Report of Stork Materials Testing and Inspection—Rancho Facility, dated September 12, 2011
- Audit Report of San Diego Fluid Systems Technologies, dated September 15, 2011
- Survey Report of Able Wire EDM, Inc., dated March 22, 2012
- Survey Report of UWRL, dated April 24, 2012
- Audit Report of Jorgensen Forge Corporation, dated May 8, 2012

Nonconforming Material Reports

- Nonconforming Material Report (NMR) 8056, “Bar, RD 7.00, ASME SA638 GR 660 TP1,” dated September 14, 2010
- NMR 8065, “Retaining Ring,” dated September 17, 2010
- NMR 8169, “Valve Check 6-900 DRV-Z (Body),” dated February 10, 2011
- NMR 8215, “Valve, Check 8-150 DRV-Z,” dated March 15, 2011
- NMR 8698, “Valve Check 8-150 DRV-Z,” dated June 13, 2012
- NMR 8423, “Pump, Goulds Model 3736,” dated September 12, 2011
- NMR 8685, “Forging, 15.0" OD x 6.0" ID x 24.0" Long,” dated June 4, 2012

Miscellaneous

- Enertech Annual Quality System Evaluation for Calendar Year 2011, dated June 22, 2012
- Enertech Corrective Action Log
- Enertech Return Material Authorization 2019, Manifold Assembly, dated May 11, 2012
- Enertech Manual Production Order S/T 960029-QME1
- Enertech Engineering Change Order 5-21134
- Enertech CGI Technical Evaluation MA22004, Non Pressure Retaining Parts
- Enertech Production Order 635668, “Item Number D7468N—Valve, Check; 8-1500,” dated April 18, 2012
- Addendum to Enertech Welding Procedure Specification PA98159, dated January 16, 1012
- Enertech Welder Performance Qualification Record MA21647, Revision 0, for Welder Gary Ames

- Enertech Procedure Qualification Record PA98160, Revision A, dated August 14, 1996
- Enertech Purchase Order 120578-1 to Element Materials Technology for Nondestructive Examination Services, dated May 21, 2012
- Enertech Purchase Order 121006-1 to Utah Water Research Laboratory (UWRL), College of Engineering, dated August 30, 2012
- UWRL Test Report No. 2674, QME-1 functional qualification testing, dated August 2012
- Utah State University, "UWRL Certificate of Compliance that Enertech PO 121006-1 requirements have been fulfilled," dated September 4, 2012
- Westinghouse Design Specification APP-PV03-Z0-001, "3-inch and Larger Manually Operated Gate, Stop Check, and Check Valves, ASME Boiler and Pressure Vessel Code Section III Class 1, 2, and 3," Revision 8, dated January 30, 2012
- Westinghouse Design Specification APP-PV03-Z5-014, Appendix 4, "Enertech Compliance Matrix for Design Specification APP-PV03-Z0-001 in Support of AP1000 Projects," Revision 0, dated October 26, 2009
- Westinghouse Purchase Order 4500322510, dated October 28, 2009
- Westinghouse Document APP-PV03-Z0D-186, "PV03 Datasheet 186," Revision 3, dated November 3, 2011

6. LIST OF ACRONYMS

AISI	American Iron and Steel Institute
ANI	authorized nuclear inspector
ASL	approved suppliers list
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing Materials
CAR	corrective action request
CFR	Code of Federal Regulations
CG	commercial grade
CGI	commercial grade item
CGS	commercial grade service
CMVB	Construction Mechanical Vendor Branch
C_v	flow coefficient
DCIP	Division of Construction Inspection and Operational Programs
EOP	Enertech operating procedure
IP	inspection procedure
ITAAC	inspections, tests, analyses, and acceptance criteria
M&TE	measuring and test equipment
NDE	nondestructive examination
NMR	nonconforming material report
NNSA	National Nuclear Safety Administration (China)
N.O.	normally open
NON	notice of nonconformance
NRC	U.S. Nuclear Regulatory Commission
NRO	Office of New Reactors

PO	purchase order
psig	pounds-force per square inch gauge
PXS	passive core cooling system
QA	quality assurance
QAM	Quality Assurance Manual
QC	quality control
SSH	significant safety hazard
USU	Utah State University
WEC	Westinghouse Electric Corporation
XRF	x-ray fluorescence